

Gut Feelings: Calibrations of Care(-work) in Human-Microbe Relationships

Master's Thesis

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Abstract

In the context of rising concerns about microbial deficiencies in Western guts, and the reactive resurgence of a “controlled decontrolling” of microbes in modern kitchens (from the home- and industrial production of “functional beverages” like kombucha, to old hits like sauerkraut), this thesis investigates what the human-microbe relationship can tell us about both the intraspecies and interspecies care relationships, and their concurrent standing in Western socio-economic systems. It herein takes a cue from multispecies scholars studying “how a multitude of organisms’ livelihoods shape and are shaped by political, economic, and cultural forces”, and from their concurrent methodology in its efforts to map out the “world” of human-microbe relationships, via four interviews with categorically different microbial interactors (a home-fermenter, a chef, a retailer and a doctor), an analysis of online discourse, and participant observation in fermentation.

This thesis shows that once subjected to capital exchange, the human-microbe relationship is fraught with cost calculations on the former’s side. When microbes are predicted to fall on the side of “costly”, they are meticulously “sterilized”, a form removing life that does not only bear titular similitude to the programmes of reproductive steralization of “degenerate” (human) life in favour of capital. Further, subjecting the human-microbe relationship to capital exchanges via the “care-turned-commodity” that embedded in certain forms of “self-care” mirrors the outsourcing of care that happens on an interpersonal level (as theorized by Fraser), and reproduces a channeling of value-excesses from care. It also makes (and leads consumers to make) hopeful assumptions about the certain linear effects of consumption, especially visible in the case of fecal transplantations (insofar fecal transplantations can be called consumption, as Miranda points out). In the case of the latter, its refigured exploitation of indigenous bodies brings us right back to capital exchange, once again situating it in the long contentious history of assessing microbes (and people) by their productivity to capital and acting accordingly.

I. Introduction	3
II. Theoretical Framework	5

A. Microbes and “free” reproduction.....	5
B. A twenty-first century restructuring of care: outsourcing care to non-human life	6
C. Reciprocal notions of inter-species care: naming sourdough.....	7
D. Present Study	7
III. Method.....	8
IV. Analysis	9
A. Generous Microbes? A “multispecies gift economies” in the world of fermentation	9
B. Biological Determination and The Risks of Mystifying Labour	11
D. “I’m not someone who says that you can cure cancer with sauerkraut”: forms of acceptable killing and beliefs in “mainstream” care	17
E. The commodification of (intraspecies) care	18
F. Bio-hacking, fecal profiles and the (colonial) possibility of returning to microbial pasts	19
G. E. Capital-free fermentation? Home-fermentation as a possibility.....	21
V. Conclusion.....	23
V. Works Cited.....	24
VI. Appendix 1: Data and Privacy Checklist	27
VII. Appendix 2: Ethics forms (English and Dutch)	32

I. Introduction

Since the beginning of recorded time, humans have engaged in what Paxson says can only be described as “microbiopolitics”, or the purposeful cultivation of “good” microbes and eradication of “bad” microbes (2008, as cited in Lorimer, 2016, p. 58). The past decades, however, have ushered in a new era for (categorically “good”) microbes: a “controlled decontrolling” of microbial reproduction,

in efforts to “reorganize ecologies to secure systemic properties” is on the rise in certain pockets of society (Keulartz, 2012, as cited by Lorimer, 2016, p. 58; Lorimer, 2016, p. 58). Ecological hopes for the (re)introduction of microbes into different ecologies are informed by, for example, their ability to “transform” foods with little to no excess resources (such as energy, or gas) (Hey, 2022, p. 28). Physiological hopes are informed by positive outcomes of microbial interventions into the body, which span from a regular consumption of live fermented foods to more invasive procedures such as faecal transplantations.

In part, the roles that microbes ought to fulfil for human beings have been made visible particularly when they are *not* fulfilled. While pathogenic (“bad”) microbes make themselves known by activating our immune system (a sore throat may signal that *Streptococcus* bacteria have staked out their turf in the area), attending “good”¹ microbes tend “take care” of our physiological existence with a subtlety, and consequently, probiotic supplementation, practices of home-fermentation and other such therapeutic efforts have especially gained traction in the West parallel to (and because of) a rise in “epidemics of absence”, a name given to the various diseases argued to spring from an absence of “good” microbes (Lorimer, 2016, p. 58, “Sore throat”, n.d.). In this sense, the way that microbes “care” for us bears resemblance to forms of interpersonal care: as argued by María Puig de la Bellacasa in *Matters of Care* (2017), the ubiquity of care is evident even (or arguably, mainly) “through the effects of its absence” (p. 1). Many forms of intrapersonal care tend to be implicit, and only gain importance in their lack: daily forms of (child)care are often called upon only when a child shows signs of neglect.

It can be argued that there are different reasons for this visibility-by-absence dynamic: marxist-feminism would say intrahuman care is deliberately *held* invisible until it undeniably no longer serves its social and economic function, while microbes simply *are* invisible, and thus can often only be perceptible when their absence causes a corporeal discomfort (Federici, 1974). Even so, possible parallels between intraspecies and multispecies care should not be done away with, especially in light of the fact that human “political, economic, and cultural” systems and their objectives have historically shaped microbial geographies: for example, pasteurization (the heat removal of pathogenic microbes in food and drink) is argued to have gained consent in the context of France’s colonial ambitions (Kirksey & Helmreich, p. 545; Latour, 1988, as cited by Paxson, 2008, p. 17). This fact, taken in conjunction with the compounding structural pressure that present-day capitalism exerts on our ability to perform care, urgently invites us to look into a multispecies mirror in efforts to better understand the dynamic between capitalism and care (Fraser, 2016)². Thus, this paper will ask the question: how are notions of care-work calibrated in human-microbe relationships?

¹ A good versus bad perception of microbes has been pointed out by others. For an example, see Hey “Fermentation and Delicious/Disgusting Narratives” (2022)

² The introductory web-page “Micro-biopolitics and the deep relationality of (self)care” on The University of Sydney was also a catalyst for investigating the interspecies care that is implied in microbial interventions

It draws from those who conduct “multispecies ethnographies” in its attempts to answer this question by interviewing four categorically different (human) interactors: a home-fermenter, an industrial fermenter (the founder of a fermentation company), a restaurateur (the chef of Amsterdam-based restaurant Cornerstore) and a doctor (co-founder of the Nederlandse Donor Feces Bank) and analysing online discourse with regards to microbial interaction, all the while personally participating in fermentation.

II. Theoretical Framework

A. Microbes and “free” reproduction

“Take care of your gut and your gut will take care of you”, the packaging of GutCo’s *Gut Care* capsules (“a blend of live bacteria, live yeast and kiwi fruit extract”) promises. Its marketing plays into a surge of interest in what live microbes already do and could do for human health and well-being, lest we “treat them right” (“GutCo”, n.d.). Dubbed by Helmreich as a “microbiomania”, this surge of interest is a product of novel scientific revelations about just how many microbes coinhabit our bodies (only about one percent of the genes in the “human body” have been found to be distinctly human genes, as opposed to the genes of bacteria, archaea, microscopic animals etcetera.), and the pinning of a range of Western epidemics onto microbial deficiencies produced by hygienic urban living conditions (such as antibiotic overuse and the treatment of drinking water) (2015, as cited by Lorimer, 2016, p. 58; Lorimer, 2016). Beyond the newfound popularity of probiotic consumer products in response to these “epidemics of absence”, the microbiome is also more frequently tinkered with within clinical settings: from vaginal microbiota transplantation’s (VMT) to remedy vaginal pathologies, to probiotic hydrogel transplants for wound-healing, the list of therapeutic exploitation for microbes is extensive (Lorimer, 2016, p. 57; Lorimer, 2016; Zhang et al., 2022, p. 20538). These developments seem to mark a new age in the human-microbe relationship, at least in the Western world: their Western scientific “discovery” in the context of “disease (anthrax) and decay (meat and wine spoilage) by Louis Pasteur”, and the anti-microbial campaign (“Pasteurianism”) that followed this discovery, has previously tainted the human-microbe relationship (Hey, 2022, p. 9; Latour, 1988, as cited by Paxson, 2008, p. 17)). The triumph of Pasteurianism can partially be credited to the threat that microbes posed to France’s colonial expeditions at the time (Patel & Marya, 2022). Upon bringing together new assemblages of humans and animals, the immune systems of French colonists (and importantly, indigenous people) proved no match for unencountered microbial species, such as malaria and cholera (*Ibid.*). By killing colonizers, these species appeared to inhibit the European project of plunder and expansion, and thus, like other living barriers to the project, they would have to be meticulously eradicated (*Ibid.*).

Thus, newfound clinical application of microbes, as well as terms like “fermented”, “aged” and “sourdough” gracing many urban menus may signal a changing of the tide in favour of microbial life. However, Hey (2023) argues that, rather than signifying a growing awareness of our multi-species interdependency, the aforementioned programme of eradication has simply been reworked as

a programme of careful exploitation, now that it becomes evident that the former works to the detriment of human well-being. But while it goes against centuries of demonization of microbial life, this slow reworking is not entirely surprising. Aside from the need to channel funds into (food) safety research, the benefits that the return of “missing microbes” (Lorimer, 2016, p. 57) into human ecologies delivers arguably comes at little (monetary) cost to its human users, lest it doesn’t get out of control: it is “only natural” for the microbe to reproduce itself, and there is really no physical way to remunerate it for its reproduction. Microbial life may even alleviate some of the ailments of the very system that once attempted to eradicate it, one based on paradigms of boundless exploitation for the sake of accumulation: think, for example, of “plastic-eating bacteria”, put to work to digest (and thereby, delete) discarded, cheap plastic commodities (Briggs, 2024, §1).

Arguably, the framing of microbial reproduction and its products as “inherently free” is reminiscent of how consent is manufactured for the exploitation of human (often female) reproductive labour. Reproductive labour is a feminist Marxist term that reframes quotidian care activities such as cooking, raising children, but also less on-the-nose forms of “care work” (such as call center work and sex work) as forms of labour (Lorey, 2015). Despite their role in upholding the productive economy, such forms of labour often go taken for granted as “acts of love”, and their performance is often attributed to a “natural” desire in women to perform them, as if it were a product of female physiology (Federici, 1974). This presumed biological determination renders such labour as “invisible” in economic contexts (because, why include something that is “only natural” in systems of exchange?), even though their very performance upholds capitalist economies: the waged labourer could not produce goods and perform services without it (Federici, 1974, p. 78, Federici, 1974).

B. A twenty-first century restructuring of care: outsourcing care to non-human life

In spite of its serviceability to capital, Fraser (and other feminist writers of the like) have argued that a number of other capitalist forces have put human care work “in crisis”: the unravelling of the welfare system, the newfound “two-earner family” ideal, and a number of other compounding forces are tugging at the seams of our reproductive capacities (Fraser, 2016, p. 99, 104). While this “contradiction” (its indispensability and its simultaneous undermining) has manifested itself in a range of epochs of capitalist society, capitalism has restructured itself so as to preserve itself at the turning point of every era (Fraser, 2016). And thus, after discussing capital’s current epoch, Fraser asks: “Are the present contradictions of financialized capitalism severe enough to qualify as a general crisis, and should we anticipate another mutation of capitalist society?” (Fraser, 2016, p. 117). Arguably, this mutation is already underway: rather than receiving state care or rather than having a (paid) care-taker at home, those that want to sustain themselves under current systems are independently responsible for their health, where “good health” has become a signifier for proper personal “investments” (exercise, the “right” diet, the purchase of all sorts of products) into an individual’s own health (Hey, 2022, p. 12). These “self-care” practices have gained traction in recent years, and the (online) exchange of “best” practices of self-care has only exacerbated their use: from

herbal tinctures to mineral supplements, the list of ways in which people tinker with their physiology stretches far beyond regular exercise or a healthy diet. Caring for oneself by tinkering with one's microbiome (through probiotic supplements or the consumption of live fermented foods) arguably falls under the same set of practices and technologies of self-care, but adds a unique ingredient to capitalism's current reconstructive recipe: apart from responsabilizing individuals for their health (and enforcing "moral pressures to take ownership of our biological destinies" through self-care discourse, Puig de la Bellacasa, 2017, p. 139, as cited in Fournier, 2020, p. 102), care-work now also seems to be outsourced to non-human species.

C. Reciprocal notions of inter-species care: naming sourdough

Of course, the word "care" (in the human sense) need not be equated to undervalued reproductive labour, performed independently in every house-hold (rather than commoned), dissolving any solidarity between its performers (often women, or other vulnerable groups) and reifying an economic dependency on the wage-earning partner (often men) (Federici, 2018). Even under capitalist hegemony, reciprocal care and forms of care with affective intention persist: for example, community care in activist networks (cooking for one another, etcetera.) seems out of reach of capitalist tentacles. If on the one hand, conveniently "free" microbial (self-)care bears similarities to (and is a newfound extension of) "free" human reproductive labour, are such unencroached forms of care also visible in human-microbe relationships? Some seem to think so: despite the parallels between microbial work and (exploitative) reproductive labour, scholars have argued certain human-microbe care relationships to be the very antithesis to the aforementioned forms of care, where fermentation serves as a case in point: in *Fermenting Feminism as Methodology and Metaphor* (2017), Lauren Fournier argues that the practice of fermentation "embodies cross-species interdependence and nourishment" (p. 102). Further, while fermentation and the consumption of its products is motivated by an awareness of the presence of microbes and how they positively affect our physiology, fermenting is not a one way street in which the human consumer stands to gain: it requires a degree of care on the part of humans. A kombucha SCOBY requires being fed "fresh sweet tea every 7 days" by their human care-taker, and a sourdough requires being fed water and flour every twelve hours (Fenley, 2019, §10). While a discussion about whether microbes show affection toward humans can only be speculative, humans even tend to show affection toward their ferments at first glance: at a preliminary glance one reddit forum discusses what people have "named" their sourdough starters ("What's your starter's name", 2021).

D. Present Study

The above speculation on forms of care illustrates its complexity, also in its application to the human-microbe relationship. If care can be affection and work, both forms are expressed in the human-microbe relationship (affectivity on the side of humans plays a role in fermentation practices, while at the same time, one can argue that microbes invisibly "work" to reproduce our everyday existence). In *Matters of Care*, Puig de la Bellacasa echoes the idea that care is at once a "concrete

work of maintenance”, and a verb with “affective sides (love and affection, for instance)” (p. 5). At the same time, the role of microbiopolitics in modern forms of “self-care”, a form of care that has gained rapid attention in the neoliberal era, contradicts the very definition of the latter term (care is not an individual practice, because our health is maintained on the billions of microbes that co-inhabit us) (“Microbiopolitics and the deep relationality of (self)care”, 2023). As such, this paper seeks to disentangle how human care(work) expresses itself in human-microbe relationships, and, in turn, if we can gain new insights about intra-species care(work) from investigating human-microbe relationships. I draw here on Tsing, who argues that socio-political and economic structures, such as current configurations of care(-work), encroach upon “assemblages” (a given collection of human and/or non-human actors, such as human and microbe assemblage), and thus, they are sites for a reading of such structures (Tsing, 2015, p. 23). In short, the current paper seeks to answer the question: how is care(-work) recalibrated in human-microbe relationships?

III. Method

The present study then aims to create an ethnographic account of people (and their networks) that consciously interact with microbial life (predominantly in food contexts, but also in a clinical context) in order to seek out how (notions of) “care” are made visible in this multispecies relationship. Indeed, while classical ethnographic accounts seek to uncover “how people describe and structure their world” (Creswell & Creswell, 2022, p. 280), human embeddedness in a world equally (or, indeed, more so) inhabited by non-human life (as, for one, microbiome studies suggests) indicates that methods could and should be sensitive to how humans relate to such life, and vice versa. Such a sensitivity to cross-species relations is not a new way of doing ethnographic research, but has been the very occupation of multi-species scholars, who draw out the variety of ways in which human livelihoods are contingent on the livelihood of a host of other beings (without always centering the human) (Kirksey & Helmreich, 2010, p. 545).

The fact that “multispecies ethnography” is said to be a method for studying “how a multitude of organisms’ livelihoods *shape* and *are shaped* by political, economic, and cultural forces”, arguably invites one to read the temporal character of such forces from animals and other non-human organisms (and our relationships to them), for example, in efforts to learn about position of care in the “web of life” under the current manifestation of capitalism (Kirksey & Helmreich, 2010, p. 545). Again, I am inspired here by the work of Tsing (2015), who argues that “assemblages cannot hide from capital and the state”, and that they are “sites for watching how political economy works”, where an assemblage is refers to a coming-together of actors whereby some harm each other and others help each other, and yet others do nothing but exist in the same space (pp. 22-23).

In its search for insights into care(work), this thesis is an effort toward establishing a multi-species ethnography through interviews with interactors, a discourse analysis and participatory observation. The interviews will be with four different “types” of people involved in microbial interaction, where three are fermenters: avid home-fermenter and university student Nelle, head-chef

of Amsterdam-based culinary “hotspot” Cornerstore Jorrit, and a founder of a live fermented food and fermentation workshop company (who chose to remain anonymous, from here on out referred to as “the founder”). These three may be interesting in the manner in which they all ferment on different scales, and therefore hold differential accountability to the clients they feed and the (state or industrial) actors that regulate them, if these are even involved in their practice at all. Further, because the “application” of microbes is multiplous, and in efforts to integrate an informant located at the intersection of microbial life and overt forms of human care(work) commonly held as such, the fourth “type” is Nederlandse Donor Feces Bank founder Dr. Josbert Keller, who integrates extrahuman care into intrahuman care in his conducting of “fecal microbial transplantations” (FMTs) in ill patients. These four types are not at all exhaustive of the ways in which people consciously interact with microbial life (let alone subconsciously), but their predefined differences (such as scalar differences, and their differential purposes with fermentation) ensure that its data outcomes have a degree of analytical potential. If possible, these semi-structured interviews will take place in the very settings where informants tend to engage with microbial life³. While some questions will be predetermined (for example, “what role does hygiene play in your practice?”), there will be room for follow-up or improvised questions. Also, questions will remain sensitive to outcomes of previous interviews (“I’ve talked to a home-fermenter who has said... (how) does this apply in your context?”).

Further, as fermentation practices in the West are not necessarily geographically concentrated, people also turn to digital networks to share experiences or exchange advice with one another. Therefore, a somewhat complete ethnographic account of human interactors necessitates studying the networks that take place in the digital world. This data collection will be non-interventional, and involve dissecting blog posts or simply observing natural exchanges between participants of these forums.

Finally, as the embodied experience of allowing microbial life to transgress species boundaries (into our guts, into our homes) is a rather unique experience and is sensitive to an informant's way of expressing oneself, this multispecies ethnography also incorporates participant observation. In its experiments in interacting with microbes (by making ferments like kimchi and sourdough), it integrates lived experiences with non-human species rather than told ones (through interviews).

IV. Analysis

A. Generous Microbes? A “multispecies gift economies” in the world of fermentation

From the recurring Amsterdam-based fermentation club “Blub Club”, to the “Verrot Lekker Community” Facebook group (“rotten good”, after the cookbook by Christian Weij) and the (more global) “r/sourdough” and “r/fermentation” Reddit pages, people in the Western hemisphere seem to

³ In the end, the interview with the founder and Dr. Josbert Keller were conducted over video and call, respectively

congregate around fermentation in all sorts of ways. The focus of these physical and online networks is variable: while some see their breeding of bacteria on all sorts of fruits and vegetables (and their subsequent consumption) as a health intervention, others see it as a culinary exploit, and yet others as a mixture of the two. All of these networks, however, share properties with what Lorimer (2016) refers to as the “hookworm underground” (p. 59), or networks of people that have begun to reinstate microscopic helminth species to their bodies outside of, and ahead of, official clinical trials for the same therapy. Members of the “hookworm underground” (Lorimer, 2016, p. 59), many of them with their own make-shift labs for cultivating more hookworms for (self-)reinstatement, share knowledges and even hookworms amongst one another in what the author refers to as a “multispecies gift economy” (Lorimer, 2016, p. 64). The do-it-yourself laboratories of the “hookworm underground” are not unlike those of home-fermenters, who invest in scales and thermostats and combine these technologies with their own constructions, such as incubators made of two flower pots atop each other (Figure 1).



Figure 1. A Facebook-user posts a picture of their fish-sauce fermentation process in the “Verrot Lekker Community”.

But what to make of Lorimer’s use of the term “multispecies gift economy” (p. 64)? If understanding a “multispecies gift economy” merely as a network in which other species (or knowledge about them) are passed between human ecologies without the involvement of a currency, fermenters have somewhat of a multispecies gift economy of their own (Lorimer, 2016, p. 64). The gifts in their economy are frequently instructive (read, tips and tricks, weigh-ins on whether a ferment is still edible), but also material: whereas hookworm communities gift each other hookworms, the

self-reproductive nature of ferments allows people to gift each other the outgrowths of their ferments (Lorimer, 2016). For example, “baby SCOBY’s” (a second, smaller “Symbiotic Culture of Bacteria and Yeast” which grows and can be separated from the “mother SCOBY” with which one produces kombucha) can be gifted to friends interested in brewing their own kombucha (“What is a SCOBY”, n.d., §4, 5). Yet, the question remains whether the term “multispecies gift economy” implies the inclusion of multiple species not just as the “gifted” objects, but also as “givers”, as participants in this economy (Lorimer, 2016, p. 64). For example, one could frame the “baby SCOBY” as further being a material gift from a “mother SCOBY”, a gut microbe’s daily digestive aid as a service gift to its healthy human host, or even frame the health outcomes of their mobilization against *Clostridium difficile* through fecal transplants (performed by authorities such as informant Dr. Josbert Keller) as a gift to an infected patient. Robin Wall Kimmerer, author of “Braiding Sweetgrass” argues for such a re-telling of the fruits of non-human reproduction as “gifts” in an essay on the Serviceberry: she writes of berries as a plant’s gift to the berry’s eater, as a “manifestation of [the plant’s] generosity, care and creativity” (2022, §7). Wall Kimmerer here does not speculate whether microbes or plants can actually “gift” with intention or care for their human hosts enough to do so (arguably, they do not possess the neurological features to do so), but rather, her focus is on how naming the fruits of non-human reproduction as “gifts” significantly changes our human relationship to it: one takes “much better care” of a gift than they do of a commodity⁴ (2022, §12). While the essay is for a larger part an argument for an interpersonal gift economy (an economy based on the expectation of future reciprocation, rather than on hoarding on the presumption of scarcity), Wall Kimmerer’s simultaneous retelling of our non-human counterparts as “gift-givers” might just inspire our better treatment of them.

B. Biological Determination and The Risks of Mystifying Labour

In a hopeful attempt at living otherwise, Wall Kimmerer identifies “gratitude and reciprocity” (toward both humans and non-human species alike), rather than capital, as “the currency of gifts” (2022, §3, 11). The author writes of the way she gives thanks to the plant and conjures up ways in which she might reciprocate, stretching from watering the plants to “donating to [her] local land trust”, as forms of participating in the alternate “gift economy” (Wall Kimmerer, 2022, §9). But while Wall Kimmerer (2022) does not deny that late-stage capitalism has led to a commoditization of natural resources (she names the bottling of the little unpolluted water left in certain regions as an example) and that therefore they *have already* been subjected to capital exchanges, she continues to walk a tight-rope in advocating for a reclaiming of natural resources as gift rather than commodity. As noted, naming certain goods and services as innately “free” of monetary value has historically also reproduced the exploitation of their performers, rather than served to emphasize their “generosity,

⁴ There are of course many exceptions, also within fermentation networks: informant Nelle left a sourdough starter she was gifted by her friend to waste away in her freezer for six years

care and creativity” (2022, §7). Federici (1975) has argued that framing the desire to do care-work as a biological (female) fact has served in the accumulation of capital at the expense of its performers. While in the case of microbes, it is true that they have a biological tendency to reproduce themselves under favorable conditions (whether it be in the gut, or a jar of vegetables), that they can not be remunerated and therefore their labour is somewhat “free” and that the products of their labour can therefore formally be afforded the term “gifts”, this does not absolve us of the need to take serious their embeddedness in capital exchanges, especially as it can determine their very existence (and the existence of Serviceberry plants, and other natural resources): especially in the case of microbes, it is regularly the input of human tending to that dictates their growth, and the willingness or ability to perform this care is swayed by decisions in which capital is an important stakeholder⁵. Interviews with occupational human-microbe interactors spoke to this fact: these fermenters are engaged in subtle weigh-offs between the willful “controlled decontrolling” (Keulartz, 2012, as cited by Lorimer, 2016, p. 58) of microbes, and the implicit accumulation or deaccumulation their presence could produce. So too, chef of Amsterdam-based head-chef at Cornerstore, an old shed in Amsterdam-Noord turned culinary “hotspot”. While its South-Asian infused menu is not based on fermented products, microbes add depth of flavour to number of its dishes, from “raw mullet with chili pepper and citrus kosho” (a fermented Japanese seasoning paste) to potatoes in a rice koji (rice inoculated with *Aspergillus oryzae*) and dried seaweed butter sauce. But while microbes then prove useful in adding complexity to certain dishes (“without having to turn to very heavy, often animal-based elements like butter or cream”, says Jorrit, 0:37, own translation) microbes’ right to populate a food is strategically managed by Jorrit, who oftentimes opts for fail-safe ferments because fermenting large batches of fresh produce or meat are simply not worth the risks. For starters, this is because he likes the produce fresh or a light fermented flavour, but also because the possible loss of control over a “controlled decontrolling” (Keulartz, 2012, as cited by Lorimer, 2016, p. 58) of microbial growth is only be affordable if serving at a smaller scale: a failed batch of asparagus doesn’t require that you turn down a substantial amount of diners. Further, Jorrit points out that “depending on the temperature, [fermentation is] a pretty capricious process...that you have to keep a close eye on” (own translation, 12:29) and therefore requires a larger staff (which in turn, needs to be paid), so that certain staff members can spend their time on fermentation research and design. In turn, the founder, owner of a fermented vegetables company whose produce is stocked in a variety of health-oriented supermarkets, has been in the same pickle as Jorrit: while at a smaller scale, the fermentation of their retail products was done in-house, the risk of another batch going “slimy” (signalling the colonization of *Leuconostoc*, a “slime forming bacteria” in the ferment, according to a StackExchange Seasoned Advice user) or possibly causing health complications, motivated the company to establish a partnership with a IFS, FSSC and BRC

⁵ Of course, this is not to claim that all natural reproduction is dictated by humans, but rather points to instances like fermentation or crop growth

certified facility, so as to continue production at a more environmentally-controlled site. It then appears that when capital is introduced into the human-microbe relationship, care (in the form of feeding and breeding), is only afforded to categorically “good” microbes under circumstances that guarantee no interference of categorically “bad” microbes (such as *Leuconostoc*), where certification serves as a symbolic guarantee for the lack of the latter. Or, in the case of Jorrit, it is not afforded to any microbes to err on the side of caution, unless a fail-safe, tried-and-tested recipe that requires little extra staff.



Figure 2. Chef Jorrit (left) and three vacuum-sealed fermented products: rice koji, fermented whole chili peppers, liquid by-product of fermented chili peppers (right). Own photos.

Thus, Jorrit and the founder (when it comes to his retail products) seem then subtly engaged in a “cost-benefit analysis” in their own ways (Jorrit weighs the costs of having to send diners home or hire extra staff against the benefits of depth of flavour, while the founder weighs a possible failed batch of ferments against the benefits of fermenting in-house). But possible capital losses do not weigh heavy on every fermenter’s decision to foster or curb (certain) microbial life, thus altering their practice: fail-prone experimentation is business-as-usual for home-fermenter and Dutch university student Nelle, who says of her practice that : “sometimes it’s just that I have left-overs and think, well let’s just see what happens... if I add salt⁶” (1:46). Even so, the way that she poors boiling water over a fermentation jar while she speaks to me, affirms that all fermenters are to some degree engaged in a “good/bad” binary casting, or, what Hey refers to as a “helpful” or “harmful” casting, and that they act

⁶ 2% salt is a precursor for any lacto-ferment

accordingly: in *Communicating with the Microbial Other* (2022), Hey argues that fermenters are continually involved in decisions “to enable, eradicate and let live”. The author argues that “a blue fuzz on the side of a container”, or other signifiers of “unwelcome” microbes, “compel the fermenter to decide and act upon microbial cues, and these iterative life-death decisions routinely make up the process of fermentation” (2022, p. 16). Engagement with fermenters showed that these “iterative life-death decisions” may be technologically mediated (such as with pH-measuring devices), but more frequently, all types of fermenters conduct small “sensory ethnographies” (Pink, 2015, as cited by Kinnunen, 2017) by using a mix of taste, vision and smell to identify the particular microbial geography of their ferments, and concurrently decide how to treat it: for example, chef Jorrit monitors the proliferation of pathogenic microbes over flavor-inducing microbes by looking at the “color of the water” (5:44), whereas home-fermenter Nelle notes, “I always taste everything. Even if I think, ‘that looks questionable’, I always taste it anyways” (4:36).

Despite different weights of capital in this life-death decision, a simple sensory assesment does not only belong to the realm of home-fermenters, and continues to play a part in determining the possible costs of ferments in restaurant and retail settings: “I ...wouldn’t get involved with the fermenting of meat and that sort of stuff. I’ve tried that, but then I looked at that jar after half a year and thought, I actually don’t know, and I can’t guarantee it[‘s edibility]” (5:44), says Jorrit, on trying out fermented meats which he does not serve at Cornerstore. But what then differentiates the human-microbe relationship implicated in home-fermentation from that in occupational fermentation, the latter of which becomes subject to capital exchanges? Arguably, “iterative life-or-death decisions” (Hey, 2022, p. 16) in which capital weighs takes place far before a ferment shows sense-able signs of maladaptation, and is based on a risk assessment rather than a real sensory experience: an assessment that has led Jorrit to continually opt against fermenting meats, and that has led the founder to opt for securing “sterile” fermentation environments.



Figure 3. Nelle (left) with her fermented chillies and garlic, and the salt in her ferment being weighed out (right).

While Nelle's assessment is likely based on which microbes seem sensibly "helpful" or "harmful" (Hey, 2022, p. 10) it can be argued that when introducing capital in the human-microbe relationship, the anticipatory decisions to kill or let live are arguably more so based on a categorization of the "costless" (or productive), or "costly" respectively. For example, in the case of the founder, microbial colonies normally present in the kitchen environment are not afforded the chance to prove their character as "helpful" or "harmful" by contaminating a batch and letting the fermenter see what grows from it, even though environmental microbes ordinarily form part of the ferment's microbiome, Redzepi & Zilber, 2018. Clinical applications speak to this preemptive killing of "costly", but not by default "harmful" microbes. Dr. Josbert Keller, founder of the Nederlandse Donor Feces Bank, conducts faecal transplantations in *Clostridium difficile* patients by isolating feces (with colonies of "helpful" microbes) from a healthy, thoroughly screened donor and transplanting them to an infected patient's gut (with colonies of "harmful" microbes) for them to reneest here. However, prior to the NDFB's streamlining of the donor-sourcing process, and because faecal transplantations were (and are) still quite experimental, costly and time-consuming, doctors recurringly tended towards prescribing antibiotic therapies, even if they were obviously ineffective after repeated therapies in a long process that often produced desperation in severely ill patients. While the microbes in the insides of healthy donors were not necessarily cast as "harmful", they remain unemployed, while the medical "tools of eradication" (in the form of antibiotics) became wielded against *all* microbes in infected patient's insides, including those "helpful" microbes that persisted alongside the *Clostridium difficile* bacterium: in fact, it is often the exploitation of antibiotics that causes a flare up of the *Clostridium difficile* bacterium, due to an inability for "helpful" bacteria

to counteract the “harmful” illness (Dall, 2023). It is in this multispecies procedure where the human-microbe connection to intrahuman care is manifested most explicitly: especially in the context of the rise of divestment from public care in the West (thus, when capital to bear more weight), does calculated “costly” care (such as a faecal transplant, prior to the intervention by the NDFB) become done away with as a “bad” option, even if it engenders life?

C. Steralization/steralization: identifying multispecies parallels of reducing life for capital

In sum, when the products of microbial reproduction (could possibly) enter the market, a microbes’ character is determined prior to its real-world (sensory) assessment. However, at whichever stage the “life-death decision” (the affordance of care or killing) is taken, meticulous tools of steralization (“a process of complete elimination or destruction of all forms of microbial life”, Mohapatra, 2017, §4) are employed against any and all microbes that fall into the categories of “bad”, “costly” or “harmful” (or a combination thereof): for example, whereas the latest production of the founder’s retailed ferments takes place at confidently sterile site as a precautionary measure, blogs that offer guidance for simple home ferments prescribe that “if a mold is on sourdough starter, a fermented beverage, or a condiment, then throw it out”, as “the hyphae will have contaminated the entire ferment” (Parrish, 2023, §17). The difference, however, is that sterility is structural for ferments that may become subject to capital exchange, it flows through every choice of what’s on the menu (in the case of Jorrit) to where production takes place (in the case of the founder), in order to avoid possible future costs. Meanwhile, for home-fermenter Nelle, sterility is a practice, performed at the moment of fermentation (for example, her heat-killing of microbes with boiling water prior to adding chillies, garlic and salt to her jar).

Structural steralization (as a product of prior cost assesment) is arguably not unique to the human-microbe relationship: the roll-out of programmes of “steralization” as one of the technologies of capital is multitemporal and multiscalar, well-illustrated by cases of “forced and coerced” steralization in 20th century United States, where steralization here refers is the inhibition of the human reproductive systems as a tool to limit life, rather than the sanitary procedures associated with microbial steralization. At the time (and still, in more implicit ways, today), “contraceptive-focused treatises and court decisions” served to bar those who were identified as “mentally or physically ‘degenerate’” from reproducing, where this identification was arguably not always a pathological decision, but tended fall along the lines of race and class (Goodrow, 2019, p. 137). These “degenerate” people tended to “supported by [society]”, and thus, their forced or coerced steralization provided a way to “[prevent] a great deal of suffering—as well as a great deal of social expense” that would result from bringing yet another “degenerate” person into the world (Fisher, 2007 as cited by Goodrow, 2019, p. 141; Goodrow, 2019, p. 37). It appears that in a somewhat interspecies fate, “degenerate” microbes, peoples, and other forms of life become carefully weeded out or at least be limited in their reproductive capacities, so that they cannot inhibit accumulation or bring about easily-

avoidable costs: once again, once capital comes to bear value, some lives prove more “costly” than others, and must be dealt with accordingly via tools of steralization.

D. “I’m not someone who says that you can cure cancer with sauerkraut”: forms of acceptable killing and beliefs in “mainstream” care

The identification of this parallel (between the steralization of microbes, and the problematic forced or coerced steralization of people) is not a suggestion that microbial life should not be intervened with *at all*, and this is also not what proponents of microbial interaction advocate for: in Dr. Keller’s mobilization of microbes against *Clostridiodes difficile* bacteria and in his colleagues’ decision to prescribe anti-biotics, the decision to kill some or all microbes can also greatly alleviate suffering that would otherwise be indefinite, or even kill. In turn, Lorimer’s “hookworm underground” (Lorimer, 2016, p. 59), too, there’s a continual awareness of the benefits of (some degree of) microbial eradication, and at a quick glance, online “wellness” communities tend toward the same rhetoric: the (not fermentation specific) “health and wellness” community “Seamoss Girlies” on social-media platform Geneva (after “sea moss gel” a substance thought to support healthy gut bacteria), users seem to see mainstream forms of health-care (for example, antibiotics) as indispensable, but are simply more desperate in their attempts to remedy the drawbacks of its severely microbe destructive properties via alternative routes⁷, then would be someone uninterested in their microbial ecology. That is, the “seamoss girlies” forum has several requests for guidance in “rebuilding” their gut microbiome after taking a round of antibiotics and one user reports “noticing a lot of gut issues from the antibiotics” and knowing her “microflora is just destroyed after I had it feeling great!!”.

This simultaneous acceptance of “mainstream” care, and the (still somewhat) “alternative” belief in the benefits of microbial restoration, to some degree contradicts some of the findings of Spackman (2017), who found fierce anti-establishment discourse in fermenters and live fermented food consumers, illustrating that a ban on the sale of non-pasturized kombucha in the United States in 2010 was met with state-sceptic discourse among kombucha-consuming Americans: “I think their real agenda is too many people are getting off of their lame a## prescription drugs because of foods like kombucha, so they’ve gotta step in and try to put an end to it”, said one of her informants (p. 58). In further contradiction, interviews with home-fermenter Nelle and the founder also showed that a belief in the “power” of live fermented foods and a trust in “modern medicine” can be held at once: Nelle, who believes in the power of keeping her internal “little ecosystem” healthy by eating fermented foods, recognizes this is not an end-all “miracle cure”: “I’m not someone who says that you can cure cancer with sauerkraut”, she very soberly says. In turn, the founder, who was motivated to start his own fermentation company because he felt that integrating live fermented foods in his diet, at least in

⁷ though one user reports her doctor prescribing pro-biotics; pro-biotic supplements appear not as extra-establishment as, for example, hookworms

part, had served as an important benefactor in his dealing with variety of mental and physical pathologies he suffered as a teenager and who was tipped to try dietary adjustments that included integrating fermented foods by “alternative” practitioners (among others), points out the presence of “doctors or nutritionists” (3:56) in the the community that has formed around his company. He seems to believe it is much more an issue of a lag in mainstream medical education rather than suggesting it is a ploy to steer people toward state-sanctioned care or toward lucrative, privately-held care.

E. The commodification of (intraspecies) care

When asked about her decision to ferment at home with the array of fermented products stacked on (bio-)supermarket shelves, Nelle immediately names their steep prices. Nelle points out that a basic lacto-fermentation only requires fresh produce and a packet of salt, and thus, a great deal of the excess value that a large-scale ferment producer captures from the sale of a tangy, probiotic-packed 5-euro jar is thanks to microbial presence and (re)production. Of course, the precursors of some microbial produce (such as kombucha or sourdough) require some degree of engagement in an incrementally more costly market that “deals in”, for example, SCOBY’s or sourdough starters (the latter of which can also be self-made). Indeed, I was oddly shipped a “mother SCOBY” in a plastic bag, commoditizing microbial life simply in form (Figure 4).

But Nelle points out that a basic lacto-fermentation only requires inexpensive product fresh produce and a packet of salt, and thus, a great deal of the excess value that a large-scale ferment producer captures from the sale of a tangy, probiotic-packed 5-euro jar is thanks to microbial presence and (re)production that has taken place in the jar. To return to a comparison with the work of Silvia Federici, whereas inherently “free” intrahuman care (in the form of housework) indirectly produces value (in that, by upholding life, it upholds production), it’s the supposed reproduction of “good” microbes that makes fermented products worth more than the sum of their parts, and in turn, this excess value is channeled by their producers.



Figure 4. A SCOBY from “koro-shop.nl”: it’s plastic seal makes the SCOBY resemble a commodity more than it does a live product. Own photo.

Of course, even Nelle's home fermentation does not take the microbial "reproductive labour" out of the ferment, but rather it demonetizes a form of labour that she finds is not meant to be monetized in the first place. However, as the founder points out, in urban settings (arguably, among the urban elite), many just about have the resources to buy a fermented product, but not the spare time and know-how to start their own fermentation projects, and this is where the retail portion of his company's customers are located. Indeed, it took a "stay-at-home" mandate under a global pandemic for Nelle, and many others (NPR continues to call the trends in sourdough-baking "pandemic-fueled sourdough frenzy"), to find the freedom to ferment herself ("Yes, it would probably be [during] Corona [when I started fermenting]... my graduation year...so I had a lot of time, because I didn't work at all and I lived at home and I also didn't have to do exams") ("The pandemic-fueled sourdough frenzy isn't over", 2024). One could argue that, the microbes in a batch of successful fermented foods (and other modular forms of microbial care, like capsules) made available on the market are constituents of a "care-turned-commodity" products that allow people to care for themselves (the afore-noted "self care") with a mere capital investment rather than a temporal investment. The commodification of interpersonal care, without compromising on time that can be spent on productive labour, is a previously theorized construct and brings us right back to feminist notions of reproductive labour: as Fraser points out in *Contradictions of Capital and Care*, care under "financialized capitalism" is "commodified for those who can pay for it, privatized for those who cannot" (p. 104), referring to the outsourcing of (child)care by middle to upper-class (often white) families to nannies, babysitters and others who could perform care labour wages, so that middle to upper-class (often white) women could now perform labour outside of the house. While the ability to purchase and perform self-care remains predicated on social features like class (the founder says he believes that fermentation is gaining traction in The Netherlands because people are quite "high on the pyramid of [basic] needs", and therefore are more concerned with issues such as "self-realization and actualization" (6:45), the large-scale commodification of interspecies care (such as in the form of live fermented products or probiotic pills) and other "self-care" products appears a catipulation of former commodified forms of care in its involvement of other (microscopic) species, and in its suggestion that good care is not fundamentally community-based ("self"-care).

F. Bio-hacking, fecal profiles and the (colonial) possibility of returning to microbial pasts

Albeit her interest being elsewhere, home-fermenter Nelle brings up that people have started to use nutrition to "hack" their bodies: "...that also doesn't seem fun to me. If you're so busy with eating to try to fully hack your body, or something", she says, when asked about the benefits of gut health on the brain (15:38). Indeed, the afore-noted self-care market is arguably saturated with "biohacking" narratives and their accompanying buyables, which, according to American business magazine *Forbes* is "a term used to describe various tips and tricks for enhancing the body's ability to function at peak performance—and maybe even extend one's lifespan" (Neumann, 2024, §1). Attempts at biohacking are also diagnostic of current manifestations of capitalism

(“technocapitalism”) in their somewhat futuristic, cyborg-like character, in their fantasy that people could tinker with their internal ecology as they could with a machine, giving them a (arguably false) sense of control, over every detail of their “biological destinies” (Hey, 2022, Puig de la Bellacasa, 2017, p. 139, as cited in Fournier, 2020, p. 102). This tinkering is typically enabled through certain products (commodification) but also by changing sleeping, exercise and eating patterns.

Narratives of biohacking specifically by tending to one’s microbial ecology has moved beyond the marketing of live fermented and gut-supporting foods and capsules (where it is ever-present, one company with gut-supporting capsules is frankly titled “Biohacking Bestie”, or in otherwords, a woman’s best friend in biohacking) and into the imaginaries of urban, techy design companies like London food studio Bompas & Parr, whom Heitger, Biedermann & Niewohner (2021) critique in their article *More-than-Human Eating*. In their future idealistic food predictions, the “experimental” studio encourages the future “use of gut bacteria from ‘carefully selected donors, who boast ... ‘peak mental and physical conditions’ to produce ‘healthy mind inducing products’ via fermentation processes”, and later on note that, “perhaps in the future, world leaders and inventors will eat certain foods to enhance their dreams in order to come up with inventions that could save the planet from a climate crisis.” (as cited in Heitger, Biedermann & Niewohner, 2021, pp. 39-40). First and foremost, such narratives obviously neglect the root causes of systemic physical and psychological pathologies that have sky-rocketed under capitalist hegemony (the very system that has brought about the crisis from from which the planet needs saving) by providing a quick-fix for a “healthy mind”, as well as neglecting how the effects of consuming certain food (products) cannot be as obviously linearized as its marketing might claim (as Bennett writes on the subject of beneficial fats in *Vibrant Matter*, “particular fats, acting in different ways in different bodies and with different intensities may produce patterns of effects but not in ways that are not entirely predictable—for a small change in the assemblage may issue in a significant disruption of the pattern”, 2007, p. 137) (Heitger, Biedermann & Niewohner, 2021). Further, as Heitger, Biedermann & Niewohner (2021) argue, the pairing of these ideas with the technological and technocratic discourse that the planet can be saved from a doomful fate with “inventions” by a certain segment of society (“world leaders and investors”) makes their predictions especially problematic (p. 40).

But Bompas & Parr’s “predictions” are already underway: the first result when searching for “fecal transplant nederland” (fecal transplant netherlands) is a sponsored website entitled “gezonde-darmflora.nl”. First and foremost, unlike the informants, the founder of gezonde-darmflora.nl seems skeptical of “mainstream” care frameworks: the founder designed the capsules himself because he believes such frameworks failed him, and continues to fail others, in their unwillingness to perform transplantations. His blog writings include accounts in which the system did not comply with the demand to do a transplation (““and a pooptransplantation?” Floris had asked... the hospital didn’t do that. I visited Floris in the hospital and am just as defeated as him”, he writes as he recounts an interaction between a potential client and the hospital that prescribed him a stoma instead) (Kleijn,

2020, §9). Aside from this, the website merges the experimental food design studio's call for microbial donor-vetting for human health, and their association of meta-physical benefits (such as certain imaginary capabilities) with certain lifestyles (such as eating particular foods): apart from a detailed description of the benefits of fecal transplantation, the website contains a "shop" tab, which reveals a range of coded profiles (DF3, DF5, etc.) with the options to purchase fecal capsules or injections. In turn, each profile has a unique set of identifying features ranging from "skier" to "anthroposophically raised", from "professional opera singer" to "has a small *and* a big heart" ("Shop", n.d., §1, 2, 3; own translation). When asked about the website, Dr. Keller notes that perhaps there is some truth in the idea that someone who is physically active would take better care of their internal health too, but that evidence for linking people's microbiomes and their such detailed, metaphysical features is circumstantial.

While perhaps not entirely truthful then, the hyperspecific profiles section seems fairly innocent until digging deeper into the narratives behind fecal transplantation by private individuals. In a blog post on gezonde-darmflora.nl entitled "De Ideale Donor" ("the ideal donor"), under the heading "Donor Jacht" ("donor hunt"), owner and former Crohn's disease sufferer Marco argues that "gut bacteria know no color, religion, sexuality etcetera." and thus that these features are factored out in the search for the perfect fecal donor (Kleijn, 2020, §11). However, in advocating for the supposed "colorblindness" of microbes themselves, Marco does not take into account the ideologies of the human selector of potential donors: just as the some people that choose cultivate or eradicate microbes are affected by the sceptre of capital, so too do (Western, where FMT practices are becoming more common) people hold their own (racialized) ideologies which, in turn also link back to (the origins of) capital. In her essay in *On Racial Constitutions and Digestive Therapeutics*, Stephanie Maroney provides a case in point: she discusses Western microbiotic research into Indigenous communities (specifically, Hadza communities in Tanzania) to find the "ancestral indigenous organisms" that lack in (white) Western bodies after centuries of industrialization and modernization wreaked havoc on their digestive systems (Hobert & Maroney, 2019, p. 584). In the "therapeutic promise" of this research, indigenous bodies then serve as "reservoirs", yet untouched by modern civilization (Hobert & Maroney, 2019, p. 577, 584). Aside from the obvious orientalism detectable in this narrative, the microbes of indigenous people were then once seen as an invisible weapon against European domination and therefore killed along with their hosts, indigenous microbial constitutions are now paradoxically held highly by Westerners for the possible ailments they could alleviate, their microbial constituents now being recast as "good" microbes. This once again speaks to the fact that when capital is involved in these relationships (capital from colonial expansion, or capital from providing healthful "solutions"), (human, microbial, and their intersectional) lives only become valuable insofar they can produce costs, and become killable when they become costly.

G. Capital-free fermentation? Home-fermentation as a possibility

Is capital the evil-doer when it comes to cultivating “good” interspecies (and maybe, thereby intraspecies) care? Thus far, this thesis has shown that subjecting microbial reproduction to capital exchanges ensures that microbial life is “sterilized” when it becomes “costly”, absolving it of care other than careful sanitation and limiting its own ability to perform its own “care” (in the form of reproduction). In other words, it is barred before it has the chance to prove itself as “good” due to a meticulous risk assessment that precedes its sensory (real) presence, much as is the case in eugenic sterilization projects. Further, subjecting it to capital exchanges via “care-turned-commodity” mirrors the outsourcing of care that happens on an interpersonal level (as theorized by Fraser), and reproduces a channeling of value-excesses from care. Further, the changed status of the microbes that traverse indigenous bodies brings us right back to capital exchange, once again placing it in the long contentious history of assessing microbes (and people) by their productivity to capital and acting accordingly.

But again: is home-fermentation then a solution, as it takes ferments and their microbes out of capital exchanges? Of course, one should be careful of not reproducing the “gift economy” narrative, and there still looms a potential for capitalism to encroach on our multispecies relationships even if the ferments have not been subjected to its economy: that is, one could argue that it is not the gift, but the ability to demarcate a natural resource as one’s own that really inspires a “caring” for in (Western) urban dwellers: think, for example, of the White Dwarf Operation’s fundraising campaign (and other for-profit websites, such as “star-naming.com”) which allows people to “adopt” a star. While not observed in interviews, this phenomenon could start to unfurl within the fermentation: In the oft-cited “fermentation bible” *The Noma Guide to Fermentation*, after the world-class Copenhagen restaurant, Rene Redzepi writes of a phenomenon called “hand taste”, or “distinct character of a ferment imparted by its maker and the time and place in which it was made” and which lacks in industrial batches of ferments (p. 439). This is because the environment and maker’s “own” microbes are integrated into the food, and therefore, the “brands” their ferment.

In a more uplifting take on the relationship between humans and their ferments, the phenomenon of hand-taste may inspire real, unexploited care because it allows fermenters to see them as partially “coming forth” from them, not so that they can take ownership of the ferment, but in the way that a parent may perceive their child. Of course, one has to be enough of a romantic to personify ferments (and the microbes that make them “alive”) as a child: whereas my partner (an arguable “co-parent” of my sourdough starter) notes that the starter found wheat flour “particularly delicious” when it had shot past the edge of its glass casing overnight, Nelle, for example, calls the naming over her sourdough starter “a bit... weird” (own translation, 17:34). Original quote: “Maar ik zou mijn zuurdesem starter denk ik niet een naam geven, dat voelt toch, dat voelt toch een beetje... gek” (0:34). Further, one could argue that the anthropomorphism inherent in these sort of statements is rooted in an implicit anthropocentrism: Hey names examples such as the “[equation] of a bubbly starter with it being happy” in sourdough starter handbooks as a situation “incomprehensible *are spoken for*” (own

italics) reducing the possibility to tune into what is being “said”. Nevertheless, Brian Massumi, author of *What Animals Teach Us About Politics*, contends that “the act of imagining oneself another, or another in oneself, is a ludic, inventive gesture, a form of *sympathy* (rather than sentimentality) that refuses to be contained or governed categorically” (Massumi, as cited in Besky and Blanchette, 2019, p. 221), an act of sympathy that transcends ontological boundaries. Perhaps it is this interspecies sympathy, not the rendering as “gift”, that inspires extracapital care.

V. Conclusion

In conclusion, there’s much to “read from” the multispecies care relationship that is implicated in our relationship to microbes. First and foremost, the present research takes serious warnings by marxist-feminist writers such as Silvia Federici about intraspecies care (“reproductive labour”) and applies them to the rendering of microbial or other forms of “natural” care as “gifts”. Further, introducing capital into the relationship ensures that microbial life is “sterilized”, absolving it of care other than careful sanitation and limiting its own ability to perform its own “care” (in the form of reproduction). It is here parallel to when capital is a consideration in care (related) decisions for human beings: both the guts of *Clostridioides difficile* (through antibiotics), and the wombs of “degenerate” people become entirely “sterilized” so that costly reproduction is deferred.

But while home-fermenters are not engaged in a constant reassessment of whether their microbial counterparts will serve profit objectives, not everyone can make the temporal investment to care for and be cared for by microbes via home-fermentation, once again to the great convenience of capital, in its production of “a gap in the market”. Much like care is commodified by rendering it a hireable service under capitalism, products such as gut-friendly ferments and GutCo’s capsules commodify intraspecies care under the marketing guise of it being a “self-care” investment. These products make (and leads consumers to make) hopeful assumptions about the linear effects of consumption, also in the case of fecal transplantations (insofar fecal transplantations can be called consumption, as Miranda points out). In the case of the latter, it’s changed exploitation of indigenous peoples brings us right back to capital exchange, once again placing it in the long contentious history of assessing microbes (and people) by their productivity to capital and acting accordingly. Of course, this thesis is limited to but one informant per “type”, offering a narrow view: one chef may apply microbes to a further extent than would Jorrit, one home-fermenter may believe far more strongly in their practice as a form of state or corporate resistance than would Nelle. It is also situated in a Western contexts, speaking of the “introduction” of ferments into systems as if fermentation has not been practiced for centuries in non-Western settings (ferments like miso, tempeh, etc. originate from East and South-East Asia). Still, it provides a way to think about the introduction of capital into (intra)human, (inter)human systems and to what, and to whom, it encourages us to afford care.

Further, one could question the extent to which the above research is a true “multispecies ethnography”: does it truly take into account the “perspectives” of microbes and the caring they do (rather than simply our own relating to them) herein reproduce the mistake critiqued in the term

“multispecies economy” (Kirksey & Helmreich, 2010?) Of course the current research did still look into how “...organisms’ livelihoods shape and are shaped by political, economic, and cultural forces” and perhaps this qualifies it as “multispecies” research, but future research could use the aid of articles like *Communicating with the Microbial Other* (2022) to better “tune into” what microbes are really “saying” (Kirksey & Helmreich, 545).

What future awaits the human-microbe (care) relationship? Despite being a gloomy note to end on, some precursors to a further submission of the human-microbe care relationship are underway: while Dr. Keller sees his transplant practice as one that is currently cutting-edge, but he is well aware that it too has an expiry date, as he points out the interest of pharmaceutical companies in isolating helpful fecal bacteria in order to synthesize pills with a standardized mix of these bacteria. Dr. Keller’s practice and their comparative success rates act as a research phase for such companies, and will become irrelevant once they succeed. These companies could arguably channel a lot of profit if this development, given the fact that donor-vetting is now still a tedious process. Yet, Dr. Keller sees a possibility that there will be no such success: there is a chance that bacteria function well, and function safely, because of the specific situatedness of microbes within the eco-system (as in, complete fecal matter) in which they exist. Isolating them might cause a total disintegration of their function, if not be a potential safety hazard. Is the possibility that microbial life can only function well in its context perhaps analogous to human care being a product of social embeddedness? Of course, it is very much like capitalism to attempt to figuratively tear things from their web of social relations: a transspecies action that works to the detriment of all life on earth.

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VI. Appendix 1: Data and Privacy Checklist

CHECKLIST ETHICAL AND PRIVACY ASPECTS OF RESEARCH

INSTRUCTION

This checklist should be completed for every research study that is conducted at the Department of Public Administration and Sociology (DPAS). This checklist should be completed *before* commencing with data collection or approaching participants. Students can complete this checklist with help of their supervisor.

This checklist is a mandatory part of the empirical master's thesis and has to be uploaded along with the research proposal.

The guideline for ethical aspects of research of the Dutch Sociological Association (NSV) can be found on their website (http://www.nsv-sociologie.nl/?page_id=17). If you have doubts about ethical or privacy aspects of your research study, discuss and resolve the matter with your EUR supervisor. If needed and if advised to do so by your supervisor, you can also consult Dr. Bonnie French, coordinator of the Sociology Master's Thesis program.

PART I: GENERAL INFORMATION

Project title: Gut Feelings: Recalibrations of Care(-work) in Human-Microbe Relationships

Name, email of student: Fé Versteeg (543133cv@eur.nl)

Name, email of supervisor: Willem Schinkel (schinkel@essb.eur.nl)

Start date and duration:

Is the research study conducted within DPAS

YES - NO

If 'NO': at or for what institute or organization will the study be conducted?
(e.g. internship organization)

PART II: HUMAN SUBJECTS

1. Does your research involve human participants.

YES - NO

If 'NO': skip to part V.

If 'YES': does the study involve medical or physical research?

YES - NO

Research that falls under the Medical Research Involving Human Subjects Act ([WMO](#)) must first be submitted to [an accredited medical research ethics committee](#) or the Central Committee on Research Involving Human Subjects ([CCMO](#)).

2. Does your research involve field observations without manipulations that will not involve identification of participants.

YES - NO

If 'YES': skip to part IV.

3. Research involving completely anonymous data files (secondary data that has been anonymized by someone else). **YES - NO**

If 'YES': skip to part IV.

PART III: PARTICIPANTS

1. Will information about the nature of the study and about what participants can expect during the study be withheld from them?

YES - NO

2. Will any of the participants not be asked for verbal or written 'informed consent,' whereby they agree to participate in the study?

YES - NO

3. Will information about the possibility to discontinue the participation at any time be withheld from participants?

YES

- NO

4. Will the study involve actively deceiving the participants?

YES - NO

Note: almost all research studies involve some kind of deception of participants. Try to

think about what types of deception are ethical or non-ethical (e.g. purpose of the study is not told, coercion is exerted on participants, giving participants the feeling that they harm other people by making certain decisions, etc.).

5. Does the study involve the risk of causing psychological stress or negative emotions beyond those normally encountered by participants? YES
- **NO**
6. Will information be collected about special categories of data, as defined by the GDPR (e.g. racial or ethnic origin, political opinions, religious or philosophical beliefs, trade union membership, genetic data, biometric data for the purpose of uniquely identifying a person, data concerning mental or physical health, data concerning a person's sex life or sexual orientation)?
YES - NO
7. Will the study involve the participation of minors (<18 years old) or other groups that cannot give consent?
YES - **NO**
8. Is the health and/or safety of participants at risk during the study?
YES - **NO**
9. Can participants be identified by the study results or can the confidentiality of the participants' identity not be ensured?
YES - NO
10. Are there any other possible ethical issues with regard to this study?
YES - **NO**

If you have answered 'YES' to any of the previous questions, please indicate below why this issue is unavoidable in this study.

As noted in the thesis proposal, it is important that participants (the home-fermenter, the industrial fermenter, the restaurateur and the clinician) and online participants stay true to their actual perception of their relationships to microbes. If participants know the research comes from a critical (care) studies approach, it might affect their narrative. Hence, the answer of "YES" to question 1: the exact subject of the study will be somewhat vague (see consent form below). Further, though this will be ensured if requested by participants, it might be difficult to fully ensure the full confidentiality of all participant identities (9): their identity may be deduced from their workplace (e.g. the Butcha brewery) and their respective position within this workplace (e.g. spokesperson). Finally, one can argue that detailing one's ideas about their relation to microbes involves "philosophical beliefs", to a degree, hence the answer "YES" to question 6.

What safeguards are taken to relieve possible adverse consequences of these issues (e.g., informing participants about the study afterwards, extra safety regulations, etc.).

Participants are given the opportunity to review the thesis afterwards, and request to withdraw or confederalize their data as far as possible.

Are there any unintended circumstances in the study that can cause harm or have negative (emotional) consequences to the participants? Indicate what possible circumstances this could be.

Not to my knowledge.

Please attach your informed consent form in Appendix I, if applicable.

Continue to part IV.

PART IV: SAMPLE

Where will you collect or obtain your data?

Note: indicate for separate data sources.

The home fermenter will be obtained via an open call on social media and/or public fliers in relevant locations (e.g. Alon's Pickles market stand), the industrial fermenter will be a representative from the Cultcha brewery, the restaurateur will be from De Nieuwe Winkel, and the clinician from the Nederlandse Feces Donor Bank. Other data will come from online forums (such as Reddit forums on fermentation), and from my own kitchen (the sensory ethnography section).

What is the (anticipated) size of your sample?

Note: indicate for separate data sources.

Four to five from the first section (interviews), numerous (10-20) for the second section (digital forums) and no one other than myself and the microbes for the third section (sensory ethnography).

What is the size of the population from which you will sample?

Note: indicate for separate data sources.

This is difficult to specify a number due to the vast amount of people who ferment/interact with microbes in other ways.

Continue to part V.

Part V: Data storage and backup

Where and when will you store your data in the short term, after acquisition?

Note: indicate for separate data sources, for instance for paper-and pencil test data, and for digital data files.

Recordings and notes (physical and digital) will be stored on my laptop, and on the Google Drive cloud.

Who is responsible for the immediate day-to-day management, storage and backup of the data arising from your research?

I, the researcher.

How (frequently) will you back-up your research data for short-term data security?

Data will be uploaded to Google Drive as soon as I transfer it to my computer.

In case of collecting personal data how will you anonymize the data?

Note: It is advisable to keep directly identifying personal details separated from the rest of the data. Personal details are then replaced by a key/ code. Only the code is part of the database with data and the list of respondents/research subjects is kept separate.

Data will not be anonymized during collection and analysis. It will be held confidentially if so requested by a participant after reviewing the thesis, and before the final submission.

PART VI: SIGNATURE

Please note that it is your responsibility to follow the ethical guidelines in the conduct of your study. This includes providing information to participants about the study and ensuring confidentiality in storage and use of personal data. Treat participants respectfully, be on time at appointments, call participants when they have signed up for your study and fulfil promises made to participants.

Furthermore, it is your responsibility that data are authentic, of high quality and properly stored. The principle is always that the supervisor (or strictly speaking the Erasmus University Rotterdam) remains owner of the data, and that the student should therefore hand over all data to the supervisor.

Hereby I declare that the study will be conducted in accordance with the ethical guidelines of the Department of Public Administration and Sociology at Erasmus University Rotterdam. I have answered the questions truthfully.

Name student: Fé Versteeg

Name (EUR) supervisor: Willem Schinkel

Date: 24/3/2024

Date:

VII. Appendix 2: Ethics forms (English and Dutch)⁸

Onderzoek(st)er: Ms. Fé Versteeg (543133cv@eur.nl)

Onderzoeksbegeleider: Dr. Willem Schinkel (schinkel@essb.eur.nl)

Universiteit en faculteit: Erasmus School of Social and Behavioural Sciences

Gegevensbescherming functionaris: privacy@eur.nl

Beste lezer,

U bent uitgenodigd om mee te doen aan een etnografische studie over de sociale relatie tussen mensen en microbiotisch leven (zoals in een thuis-, industriële, restaurant en klinische setting). De precieze invalshoek zal u pas later in het onderzoek verteld worden, om participatiebias te voorkomen. Door dit formulier te ondertekenen, geeft u toestemming om gegevens te verwerken die mogelijk betrekking hebben op uw filosofische ideeën over de mens-microben interactie.

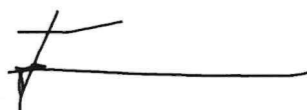
Vanaf de dataverzameling (via audio-opnamen, aantekeningen, foto's) tot aan het inleveren van de scriptie, wordt uw (te identificeren) data alleen bekeken door de onderzoekster, haar onderzoeksbegeleider, en haar scriptie werkgroep. Verder worden audio-opnamen geüpload op een online transcriptie tool, en wordt alle data (en de verwerking hiervan) opgeslagen op de persoonlijke laptop van de onderzoekster, en op Google Drive.

U krijgt toestemming om uw data en hoe deze is verwerkt in het onderzoek terug te zien voordat de scriptie wordt ingeleverd. Op dit punt mag u eventuele aanpassingen en/of geheimhouding van uw identiteit aanvragen. U heeft het recht om uzelf op ieder punt terug te trekken uit het onderzoek.

Voor eventuele klachten kan u contact opnemen met de scriptiebegeleider.

Teken hier als u akkoord gaat met deze voorwaarden:

Naam participant:



Name onderzoekster: Fé Versteeg

⁸ Ethics form was made more detailed after proposal submission. Further, a slight change had to be made in this agreement, only segments (not the full thesis) were sent for approval. All informants agreed.

Researcher: Ms. Fé Versteeg (543133cv@eur.nl)

Research supervisor: Dr. Willem Schinkel (schinkel@essb.eur.nl)

University and faculty: Erasmus School of Social and Behavioural Sciences

Data Protection Officer: privacy@eur.nl

Dear reader,

You have been invited to participate in an ethnographic study on the social relationship between humans and microbial life (including in a home, industrial, restaurant, and clinical setting). Exact details about the subject of analysis are withheld to protect against participant bias. By signing this form, you consent to the processing of possible data related to your philosophical beliefs about human-microbe interaction.

From the point of data collection (via audio recording and note-taking) to submission, your identifiable data will only be viewed by the researcher, their supervisor, and their thesis module peers. Apart from these parties, your data will be uploaded as a private document to an online transcription and coding tool, and be held in Google Drive.

Before the final submission, you will be allowed to retrospectively review your data and how it has been integrated into the research, and request any adjustments. Further, you will be allowed to request confidentiality of your data before the submission, and you will be allowed to withdraw your participation at any point. Finally, you will be allowed to contact the research supervisor with any complaints.

Please sign below if you agree to the above conditions:

Name informant:



Name researcher: Fé Versteeg