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Performing the Slaughterhouse: Making Meaning and Worlds in Daily Practice

A dissertation submitted in partial satisfaction
of the requirements for the degree
Doctor of Philosophy

in

Communication (Science Studies)

by

Kara Nager Wentworth

Committee in charge:

Professor Chandra Mukerji, Chair
Professor Patrick Anderson
Professor Joseph Hankins
Professor Martha Lampland
Professor Carol Padden

2016

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Chair

University of California, San Diego

2016

DEDICATION

For all of you who let me in – to the kill floor, to parts of your lives.

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At the risk of seeming hip, I will say here that I became depressed that winter, for the first time in my life. Being pressed up against animals and humans through so many deaths might have contributed to it, but looking back I wonder if it wasn't the lack of rootedness and human connections I had in that time even more than the sadness of killing. Deep connectedness within a local social fabric defined the meat market owners and some of the butchers I met. Others were floundering more than I was, while some lived alone, sending money home to their families and outshining us all in work ethic and outlook. I hope that the work I have done at least honors the work and challenges of the people I learned from.

A portion of Chapter 2 on lifedeath and Chapter 3 on managing lives appears in modified form in the September 2015 issue of *Mosaic: a journal for the*

interdisciplinary study of literature. Wentworth, Kara. *Mosaic* (48:3), 2015. The dissertation author was the primary investigator and author of this paper.

Chapter 6, in full, is currently being prepared for submission for publication of the material. Wentworth, Kara. The dissertation author was the primary investigator and author of this paper.

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ABSTRACT OF THE DISSERTATION

Performing the Slaughterhouse: Making Meaning and Worlds in Daily Practice

by

Kara Nager Wentworth

Doctor of Philosophy

University of California, San Diego, 2016

Professor Chandra Mukerji, Chair

This dissertation is an ethnography of the kill floor – the small concrete room where animals are killed and dismembered – in small U.S. slaughterhouses. From 2010-2014, I visited two dozen slaughterhouses and meat businesses, spending time with people and animals, asking questions, helping out, and trying to answer one overarching question: **How is meaning made in practice?**

To answer this question, I take three different analytic approaches: In the first section, I work as an anthropologist. I focus on the details of daily work in a slaughterhouse to understand how boundaries (between life and death, clean and dirty,

inside and outside, animal and human) are made. Here I build on work in anthropology that seeks to understand the core frameworks that organize our cultural worlds. I argue that these core frameworks, and difference more broadly, are not fixed entities but are made through daily practice.

In the second section I focus on how bodies make meaning and become meaningful. I articulate a theory of embodied knowledge located not only in human bodies, but in animals, microbes, body parts and tissues. I contribute to interdisciplinary conversations on how cognition is distributed, and to feminist theories of how bodies come to matter.

In the third section, my analysis is sociological. I focus on shared cultural meanings, exploring how human relationships, feelings and actions carve out social worlds. I gather stories on and off the kill floor to explore how lives, livelihoods, and worlds are made in practice. I argue that seemingly intractable differences across cultural communities are located in the same core urges. Our hopes and fears for the future congeal in the present as political commitments.

Over the course of the project, I offer a novel analysis of the nature of difference, the nature of knowledge, and the nature of socio-political worlds. I argue that difference, knowledge, and the worlds we live in are all made through daily practice, and through interactions between humans, non-humans and things. Meaning is made through bodies, movement, action, interaction, cuts, marks, repetition, and agreement.

[INTRODUCTION] – WHY ARE WE HERE?

This project is an attempt to make sense of the unequal and unjust contemporary worlds we live in by focusing on what happens day-to-day in a particular sort of site. The primary site of this research is the kill floor of a small slaughterhouse: the small concrete room where pigs, cows, perhaps elk, bison, goats and sheep, enter as animals and leave as edible meat. I focus on the intimate details of daily work on the kill floor in order to answer bigger questions about how knowledge, meaning, and difference are made in practice.

Slaughterhouses are spaces of horror. Repetition. And places of everyday, ordinary violence. The sort of violence where you know who's gonna walk out intact and who's gonna leave wrapped in plastic before the day begins. But slaughterhouses are also workplaces, small businesses, hopes for a world or a legacy or enough to live on. Something to pass down to one's children, or a place to earn enough to send a check home to pay for your daughters' schools. Butchers are killers but they are also care-takers, ushering animals bred for meat across the threshold to death, and working to feed themselves, their families, and a larger community.

Out of some deaths, other lives are made/possible. Our lives are made possible by deaths we don't see, by innumerable killings done in our name. While in some nations, violence and armed defense are visible as making daily life possible, the vast USA manages to elide much of the killing protecting its borders and ways of life. Entering the small slaughterhouses that dot this country is one way to make sense of the hidden work and killing that makes our lives possible.

Within the US, divides across class/race/gender sculpt all sorts of variously visible violence: mass incarceration, defunding of pathways out of poverty, the disproportionate killings of black and brown bodies at the hands of the police and transgender women of color at the hands of everyone else. In the context of the very real entanglements of modes of difference and disposability that determine who will live and who will die, this work focuses in on the practice of slaughter to understand how difference is carved out in the daily work of killing.

At the core of my approach is a commitment to understanding the world as *constructed*, and a drive to make sense of how the worlds we live in are *made*. My most fundamental argument is that the seemingly small interactions that make up the texture of our daily lives do not take place in the boxes allowed by pre-existing cultural forms or fixed social structures, but instead, that these everyday material happenings themselves constitute our worlds.

This is not to ignore the very real conditions of limited possibility that racism, policy, and ideological convictions allow. Certainly interactions across long histories have worn very deep groove-lines that push and guide our every days. But what happens if we concede that we are all engaged in producing and reproducing oppressions? What possibilities for change might there be if we focus in on the level of little tools and daily practices? What openings can we create for not only thinking otherwise but worlding otherwise if we look beyond our human selves to make sense of the scene?

This work engages at the level of detailed interactions between human hands, knives, hides, organs, microbes, paperwork, and storytelling to ask how meaning and difference are made in daily practice. Rather than study knowledge-making practices in laboratories as many of the scholars whose work I admire have done, I am focused on blue-collar labor and practices of killing as knowledge work. Through the daily practice of slaughter, I argue, butchers tools and animals make more than just meat. Difference is carved out between inside and outside, clean and dirty, chuck and brisket, as bodies come to be meaningful through repeating interactions. I argue that knowledge-making is inherently a process of carving out not only meaning but also difference in the world.

As knowledge and difference are made in practice, the contours of whole worlds emerge. The politics of food, of killing, of animals' and workers' rights, imagined futures, and hope for change and/or conservation are borne out of daily work and interaction. This research project builds an understanding of those macropolitical worlds by focusing on ground-level microinteractions.

I argue that the minutiae of intimate daily interactions between hands hides and knives are not metaphors or good to think with or even exemplars of how power or vision operates today. Instead, I insist that these daily practices are actively producing the worlds we live in. I argue that difference is made, that meaning is made, and that broader socio-political worlds are made through the daily work of slaughtering animals. Through and with animals and the many inanimate things around us, we learn to be human.

I entered the slaughterhouse asking the broadest questions I could: What is happening here? (Clarke, 2005) What is going on? (Stewart, 1994, p. 1016). I ended up answering, through several analytic approaches: How is meaning made in practice? How do we make meaning through interaction, out of bodies, out of killing?

Most broadly, this dissertation is about how meaning is made in practice. Through each section of this project, I focus on the relationship between the material world and the meaning we make through doing. I struggle, across chapters, to understand the nature of difference, the nature of knowledge, and the nature of the worlds we live in.

This is a book about semiosis and worlding: how meaning is made and how the worlds we live in are made. It is about horror, intimacy, and care.

This is a book about violence,

This is a book about bodies,

This is a book about food.

This is a book about politics today: the politics of food, politics of knowledge, politics of difference, the intimate politics of human interaction, dreams of the future, hope for one's family and oneself.

WHY STUDY SLAUGHTER: Entering the slaughterhouse

I began visiting small slaughterhouses in the winter of 2010 as research for a solo performance project. That hour-long show, “eat your heart out” was inspired by Carol Adams’ book *The Sexual Politics of Meat: A Feminist-Vegetarian Critical Theory* (1990). Adams argues that the woman’s body is the animal’s body in slaughter and the only possibility for feminists is vegetarianism. As an omnivorous (and ravenous) queer, I knew Adams’ sexual politics of meat didn’t capture the entanglements of sex-flesh-violence and possibilities for life that I experienced. I didn’t have a counter-argument or an articulated queer politics of meat, but I was curious and hungry.

The image printed on the cover of the 1998 Continuum edition of Adams’ book is of a naked woman seated on her heels facing diagonally away from the camera so her back and right thigh are in full view. Text and lines across her body separate flesh into legible ‘cuts’ of meat: chuck, rib, loin, rump, round, and disappearing down the front of her lower thigh and knee, “soup bone.” She wears a red cowboy hat and looks back over her shoulder at the viewer asking “what’s your cut?”

I encountered the image at a moment when my own unruly female body was at center stage, both literally and figuratively. In the annual valentine I always sent out to friends and fans of my drag queen performance art work, I posed that year as the pin-up woman from Adams’ book, drawn as cuts of meat. Flesh, the body, my body, questions of what can be done to a body and by whom, connections between sex,

power, performance, human-animal, the image, the word, were all there at the start, before I even entered a slaughterhouse for the first time.

At the time I was living in Seattle, Washington, the home of Oberto jerky, a locally industrially produced food I found myself surviving on. To explain how a girl from Brooklyn was first drawn to slaughterhouses, I usually tell the story of the jerky: this foodstuff I knew nothing about that had become part of my everyday cravings and needs. When I felt fussy I would ask: Am I thirsty? Do I need to get more sleep? Do I need to go exercise? Do I need jerky? Perhaps it was the quick jolt of protein, or the salts, or the MSG, but I was hooked. I enclosed a small piece of jerky with each valentine, which read “eat your heart out.”

Soon after sending out the valentines, sealed with a kiss, I got to work on writing a show: I described it as “a cooking show about sex”, a show about “sex, power, how to be a woman, and beef jerky.” To write and stage this queer ‘sexual politics of meat’, I knew I would have to learn more about meat, so I set up a trip to Texas to visit a small slaughterhouse and cattle ranch, a trip to Montana to learn to hunt, and a trip to Vermont to shadow my friend Juli, a chef who was grinding meat in a small slaughterhouse there. I didn’t end up hunting – it wasn’t open season that week – but I did find my way into two slaughterhouses, and into what would become my work for the next six plus years.

I have explained what first drew me to the kill floor. But why did I go back? Being present, standing by and participating is gruesome and challenging but some part of me is drawn deeply to that space and to killing. I don’t owe you an apology for

this – men don't apologize for loving first person shooter games or for wanting to go to war. But I have been asked to explain it, and I have found some ways of explaining it to myself.

Our lives are dependent on systematized killing. And most of the time, I do not watch it happen. The ground beef or steak on white Styrofoam, wrapped in clear cellophane, lit by red-enhancing fluorescents, elides the mess, violence, and killing that make it possible to shop in an American grocery store. We are differentially and unequally exposed to the violence – border patrols, wars on foreign soil, frequent shootings – that makes our everyday possible. For the most part, as a white urban woman whose deepest spate of poverty will likely be graduate school, I don't look down the barrels nor pull the triggers. I count meat among many luxuries built in killing. Even a vegan who doesn't touch honey lives in a world that depends on the bodies and deaths of other humans and non-humans. On a kill floor, the guns are not only visible and pointing away from you, the trigger is pulled. There is something beautifully honest about being there.

Slaughterhouses, I have come to believe, are at the center of many questions and tangles. Slaughterhouse kill floors are a node in networks of happenings that are making the broader social and political worlds around us. They are ideal sites to understand killing, governmental control, trust, the shifting nature of under-respected manual labor, the right to live, to die, to kill, how bodies are judged and pushed and marked, how some bodies and lives are dependent on the deaths of others. Small slaughterhouses are hidden spaces, and they are mundane workplaces, alongside the

baker, the post office, the hardware store in small towns all across the country. While the 1970s saw large slaughter facilities move out of city centers to peripheral rural areas with cheap rent, cheap labor, and fewer prying noses and eyes, these smaller slaughterhouses often stayed put: right on (or a block or two off of) Main Street. These small slaughterhouses are often at the center of networks of connection and consumption in small towns and rural communities: the place folks bring their animals, and the place they go to pick up a ham or a roast for the holidays, steaks in the summer, and sausages for every other occasion. Slaughterhouse kill floors are fascinating spaces, hidden from most of us, and I became truly and deeply obsessed.

HOW TO STUDY SLAUGHTER: analytic cuts and the contours of an obsession

Entering a slaughterhouse for the first time, I was met with queer bodies: ontological monsters that lived between animal and thing, lingering wearing their own skins as capes and sharing one head but split down the middle. And also with overwhelming senses of things: sensory overload and the sense that we were at the center of something.

In that first visit, I felt a curious mix of terror and fascination. I was bracing for the shock of each gunshot, the way it bent air and made my body tremble, but I couldn't turn away. There was too much I didn't understand.

I had no organizing frames to make sense of what was happening in a slaughterhouse: Death over and over again, death on purpose, making a living by making death happen, families who pass a business down over generations, where learning to kill is an essential part of (men) growing up. I became obsessed with the slaughterhouse kill floor. It was repulsive in some ways—the sort of door we often choose to shut and ignore—but I wanted to go back.

My obsession was never singular; the more time I spent on the kill floor, the more questions I had. On my first trip I was fascinated by the “being[s] of the middle” (Massumi, 2002, p. 70; McLean, 2013, p. 61): animals suspended between pig and pork, animal and meat, life and death.¹ These ontological monsters haunted me. They hovered in liminal spaces I didn't know existed and I had no language for. To make sense of these monsters, *I approached the site as an anthropologist, working to understand how categories and difference were being made in daily practice.*

But time spent in the slaughterhouse opened up new obsessions. Once I started to make sense of some aspect of what was going on, I would turn a corner to find whole new worlds of questions. I wanted to understand butchering itself – what kind of knowledge was it? Was it stored in minds, in hands, in knives, in animals' skins, someplace in between? Butchering is denigrated manual labor, but on the kill floor, butchers and inspectors alike were engaged in all sorts of diagnostics, applying complex rubrics to the specificity of each individual case, negotiating the diversity of living bodies into a standardized product. I started to see the kill floor as a site for understanding knowledge and meaning. So I used another analytic approach: *I focused in on the bodies themselves in interaction, working to understand how bodies become meaningful and knowable in the process of slaughter.*

Throughout this process I was spending time with people, learning more about their personal and working lives, about their hopes and dreams and families and favorite foods, what they did on the weekend, how they got into this work. But as I analyzed how boundaries are made and how bodies become meaningful, these human beings were strangely absent. In part, I was reluctant to write about people as people. It feels invasive and risky – I am scared I might get them wrong or they'll read it and think: that's not me. I really liked these people. I wanted to take them and their work seriously. In my first two analytic approaches, I had taken their work seriously, describing butchering as cultural-philosophical and knowledge work, but I had made analytic cuts that left out much about their lives. I found I had pages upon pages of field notes about the patterns I'd seen and themes I'd become taken with: the caring

practices in the process of slaughter, the ways butchers and owners and ranchers talked about family, about the future, about ‘sustainability.’ Though I’d leaned heavily into two other modes of analysis, asking how boundaries are made on the one hand and how bodies become meaningful on the other, I was still running social analytics in the background the entire time. Even while I tried to focus on analyzing boundaries and knowledge, *I was working to analyze how socio-cultural worlds were being made in the process.*

My analysis of human feelings and interactions became an exploration of how a broader “macro”political world gets made. A huge part of what first drew me into the slaughterhouse was the other-worldness of that place. And over many months of ‘deep hanging out,’² I started to understand that world. More importantly, I started to make sense of how that world is made, or ‘figured’ (Clammer, Poirier, & Schwimmer, 2004). I found that the same central commitments—visions of a better future, care for one’s people and for animals—that motivated these folks are the commitments that motivate their opposites and opponents. In other words, I found that the same pivot points were sending different socio-cultural worlds in opposite directions: toward conservative or progressive political stands.

All told, I’ve developed three approaches to making sense of the world while standing on the kill floor of a small slaughterhouse: I have focused in on how boundaries are made or attempted, on how bodies in interaction carve out meaning, and on how worlds are wrought through feelings and interaction. Each approach is a

different way of cutting the scene: of attempting to focus on one sort of question, to wear one sort of hat or lens, to make a certain sort of sense of what is happening.

Together, these three cuts answer the question *How is meaning made in practice?* three different ways: How is x separated from its opposite? How is x carved out as meaningful in and of itself? How are shared meanings and meaningful worlds made? These three questions are all semiotic questions. But each question draws from the tools of a particular academic field, entering into particular disciplinary conversations. In lieu of a literature review, I will briefly describe these disciplinary engagements with links to extensive endnotes discussing my debts and commitments within these fields.

My first ‘analytic cut’ is decidedly anthropological. My analysis of how boundaries are made in practice builds on a body of work in anthropology that attempts to understand the nature of essential boundaries. I define my work as anthropological not only because I use the most legible methods – fieldwork and ethnographic writing – of the discipline, but also because my work engages with some of the most pressing concerns of contemporary anthropology: a focus on ontology,³ and on more-than-human beings. Stuart McLean describes contemporary anthropology as a break from the old work of comparative cultural analysis toward a focus on the encounter as the focal point of theorizing (2013, p. 67). I focus in on encounters not only between the ethnographer and an *other* culture, but between humans, non-human beings, and objects in interaction. Tracing the contours of contemporary anthropology further, McLean points to Tim Ingold as offering a newer

way to make sense of the current work for anthropologists: not just to do ethnography but to conduct “an inquiry into the conditions and possibilities of human life in the world” (Ingold 2011: 242). Bringing Ingold into conversation with the many anthropologists engaged in multispecies ethnography,⁴ my work is an inquiry into the conditions and possibilities of more-than-human life in the world. Methodologically, my work offers a model for anthropology (contributing to the archive of work by Kohn, Tsing, Kirksey, Raffles and others) of how to do ethnography of non-human beings and things.

My second analytic cut draws from interdisciplinary studies of science and communication. In focusing on how bodies come to matter and how knowledge is made in practice, I build on work in science and technology studies, particularly laboratory studies and feminist explorations of the body and matter.⁵ Whereas the majority of research in laboratory studies explores how knowledge is made in practice by revered white-collar scientists, my work asks these questions among denigrated blue-collar workers. A long trajectory of feminist studies of science provide a foundation for my approach: studying everyday practices to understand politics and power, locating knowledge in (messy) practices and bodies, rejecting Cartesian divides between inside/outside, nature/culture, mind/body, and focusing on more-than-human happenings to understand the worlding of the world. Adding to these conversations, I extend an understanding of how knowledge and difference are made through everyday material practices in more-than-human worlds. I focus in on the bodies of human and non-human animals and other bodies, like knives, to understand

how bodies come to be meaningful through interaction. My analysis of how meaning and knowledge are made in practice also draws enormously from studies of communication and cognition that understand communication as complex, cognition as distributed, and power as diffuse, including the work of Vygotsky, Wood, Cole, Hutchins, Alač, Padden, and Mukerji.⁶

Finally, in the third section of the project I enact a third sort of analytic cut to understand how people make shared meanings and worlds. I analyze how meaningful socio-cultural worlds are made, building on work in sociology and anthropology that explores how worlds are made through everyday doing, feelings, and happenings. I contribute to conversations about how to understand worlding: the making or figuring of contemporary worlds through everyday practices. Here I am in conversation with a set of scholars who work on the “figuring” of worlds (Clammer et al., 2004; Holland, 1998; Urrieta, 2007), and with Katie Stewart, whose *Ordinary Affects* (2007) and “Cultural Poesis” (1994) articulate ways of thinking about ordinary everyday living, doing, and feeling, as constitutive of worlds.

This project, in short, is a contribution to interdisciplinary questions across the social sciences: what is the nature of knowledge? how is difference made? how do bodies become meaningful? how can we understand more-than-human material worlds? To address these questions, I have gone deeply into a particular site: small U.S. slaughterhouses, conducting an ethnographic exploration of what is happening there. I bring the methods and concerns of contemporary cultural anthropology (ethnography; ontology, the non-human, worlding) alongside a particular

understanding of Semiosis (meaning is made through everyday practices in and with the world, including non-humans) to make a contribution across disciplines but especially to feminist theories of how knowledge is made and how bodies become meaningful.

Empirical and theoretical CONTRIBUTIONS

This project contributes to a large body of work on the daily realities and politics of animal slaughter in the U.S. From Upton Sinclair's *The Jungle* to Timothy Pachirat's *Every Twelve Seconds*, I will highlight here some of the most significant work on slaughterhouses, emphasizing how my particular theoretical orientation and disciplinary toolkit set my work apart. Among the most significant differences that distinguish my project are my focus on small slaughterhouses rather than large industrial slaughterhouses, and my interdisciplinary emphasis on interactions and practices. Ultimately, my way of approaching the slaughterhouse offers a novel contribution to empirical work on slaughter and a theoretical contribution to feminist studies of how bodies become meaningful and how knowledge is made in practice.

Upton Sinclair's famous book *The Jungle* (1906) built on his experience visiting the Chicago stockyards, and came to be one of the most politically impactful novels ever written. Within a year of its publication, the president read it, then commissioned an investigation to determine whether Sinclair's horrific descriptions of working conditions and uncleanness were fact or fiction. While Sinclair intended his book as a socialist tome documenting the plight of the workers, the president and the public were outraged by something else: how dirty the meat must be. The Federal Meat Inspection Act (1906) was quickly passed into law, and serves as the origin point for legislation and surveillance of meat and slaughter today. I describe later on that this original focus on food safety over worker protections endures to the present. For

now, I will take Sinclair as a starting point for a lineage of folks who have entered US slaughterhouses and come out with something to say about them.

There are all sorts of folks who come to watch the slaughter and then leave: the farmer who brought in three cows, the USDA or state department of agriculture inspectors who must be on site any time slaughter is happening if the meat is going to be sold. I visited a USDA-inspected free-range chicken slaughter facility soon after a large group of retired women had come through on a tour. I have attended slaughters alongside lab researchers who are there waiting for blood or a lung or, as I will describe in detail later, a cervix or thigh. While taking a meat science night class, I walked through a kill floor with butchers and meat industry workers, seeing the equipment used at a local university's slaughter facility. As part of the annual small meat processors' convention, I sat in temporary bleachers erected in a cutting room and toured a small slaughterhouse in a group where I was likely the only person who did not own or work in a small slaughterhouse. I have seen butchers from another state come to watch how we are doing slaughter to take some of the strategies back to their own kill floor. These various groups are there for work or for pleasure, to learn more or to learn new strategies, to supervise the process or to give advice for improving it.

There are plenty of watchers who are there primarily to criticize, to put an end to or at least to encourage reform in slaughter. Some work within the system to make change and others work undercover, with the goal of exposing the wrongs and thereby bringing about change. I visited a small slaughterhouse in Vermont right after a

student of Temple Grandin's had been there to watch and consult with the butchers to make sure they weren't skinning any still-conscious animals. While that animal welfare consultant works within the system, others work against it.

Gail Eisnitz's book *Slaughterhouse* (1997) is heralded as the update to Sinclair's *Jungle* almost a hundred years later. Eisnitz is an investigative reporter focused on animal abuse, and her exploration of industrialized slaughter focuses on the horrible conditions for animals, workers, and consumers who are made sick by the contaminated meat coming out of large slaughterhouses driven by faster line speeds and increasing production goals.

SLAUGHTERHOUSE takes readers on a frightening but true journey from one slaughterhouse to another throughout the country. Along the way we encounter example after example of mistreated animals...intolerable working conditions...lax standards...the slow, painful deaths of children killed as a result of eating contaminated meat...the author's battle with the major television networks...and a dangerously corrupt federal agency that chooses to do nothing rather than risk the wrath of agribusiness...before the whole affair is blown wide open in this powerful exposé. (Eisnitz, 1997, p. book jacket)

In Eisnitz' book, she is the hero. Her work is to expose the horrors of industrialized slaughter in hopes that it will lead to reform. In my work, I am focused on butchers (and perhaps microbes) as heroes, and I have chosen to do research in small slaughterhouses where I respect the workers and business owners, and trust that I have something to learn from them about the nature of their work, about killing, and about doing slaughter as well as possible. My work is not to expose the wrongs of slaughter, but to understand how butchers, animals, inspectors, microbes and tools define and enact "good slaughter."

In Michael Pollan's *Omnivore's Dilemma* (2006) he describes a "glass abattoir", a slaughter facility that lets interested customers watch animals slaughtered on the kill floor through a large wall of glass. According to Pollan, if more slaughter happened in glass structures, our treatment of animals would improve. Visibility, in his reckoning, breeds ethical behavior. I imagined a structure like a greenhouse and was surprised when I arrived at the same slaughterhouse Pollan described, I encountered a large concrete building with a heavy metal door just like any other meatpacking facility I'd seen. The wall of glass, you see, is a wall of the boardroom, up a flight of stairs, beside the desks of the managers and overseers. One glass wall of the room looks down on the kill floor, while the glass wall opposite looks down on the production facility. Two flat screen TVs each display a quartered view of plant workers on live video feed.

Pollan's glass abattoir, in short, is a concrete warehouse with a surveillance system. There are many things this slaughter facility is doing well: processing meat; keeping a day on their calendar open for local farmers' cows even though they lose money doing it; partnering with niche meat purveyors in Asia. But slaughtering in a glass bubble is not one of them. While Pollan and I visited the same slaughterhouse, we walked away with very different analyses. For Pollan, this company is an exemplar for transparency in animal processing, a model that can bring about change in how we slaughter. My takeaway was that this is a smart and successful niche meat processing company with an effective surveillance system in place for monitoring

workers. And they allow visitors to come watch from the managerial surveillance room. This is a monitoring system for worker control, not industry-wide change.

As an academic text, my work on slaughter sits alongside a number of ethnographic projects located in slaughterhouses: Vanesa Ribas, a sociologist at UCSD, focuses on ethnic social groupings within a large industrial slaughterhouse (Ribas, 2016). Alex Blanchette, an anthropologist at University of Massachusetts Amherst, worked in sow barns and other segments of the fully vertically integrated largest pork producer in the nation (Blanchette, 2015). In a chapter of the volume *Taking Place*, Emma Roe focuses on how animal sentience is understood as materially located in flesh (Roe, 2010). Others visit kill floors or briefly theorize the work that happens there, including Donna Haraway's writing on premarin and horse slaughter (2012), and Nelly Oudshoorn's work on sex hormones (1994).

My work on slaughter has the most in common with political theorist Timothy Pachirat's book *Every Twelve Seconds: Industrialized Slaughter and the Politics of Sight* (2011). Pachirat and I both examine boundary, and we both write based on ethnographic work in a slaughterhouse. One piece of Pachirat's analysis is a refutation of Pollan, but with a different approach than my own. Pachirat takes on Pollan's analysis of the glass abattoir from a theoretical standpoint. Pachirat refutes the claim that glass abattoirs would lead to better slaughter practices, suggesting that transparency might lead to less revulsion and therefore more horrific practices. I instead have visited the glass abattoir, and come back with a different understanding of the material configuration and practices happening there: there is no glass abattoir,

there is a glass window in a board room and surveillance cameras. Had Pachirat visited the “glass abattoir” in person, he would have likely found great fortification for his thesis on surveillance and sequestration.

Beyond our refutations of Pollan, my work and Pachirat’s have a great deal in common. Both Pachirat’s work and my own are focused on the daily practices of slaughter in order to make sense of contemporary modes of power. But my articulation of how power operates differs radically from Pachirat’s. At first glance, one might imagine this is because our two projects are based in the same site (slaughterhouses!) but focused on different things. Indeed we have fundamentally different orientations to theory, practice, and their interaction. But we are also doing research in fundamentally different sites: the spaces and practices of a large industrial kill floor are very different from the spaces and practices in small slaughterhouses. At least in slaughterhouses, size really does matter.

In the large Nebraska slaughterhouse where Pachirat worked, some 2500 cattle (one every twelve seconds) were killed each day. The small kill floors I’ve worked on see more like three or ten or 25 animals in a day. Pachirat’s entire analysis is built around the separation and distance he felt from the killing even while being employed on the kill floor – in his months as a liver hanger, a cattle driver and a quality control manager. He emphasizes that everyone on the kill floor was separated – physically, mentally, morally from the work of killing. Workers on a large kill floor are also separated from the moment of death – so much so that Pachirat claims there is no moment of death, but rather fifty linear feet of “designated space for dying”, with

animals sometimes dying within or outside the imposed boundaries. On the kill floor he describes, there are multiple inspectors, several at specific inspection stations (inspecting live cattle, heads, innards, and looking for feces just before carcasses roll into the cooler), while a few other inspectors roam the kill floor looking for violations.

But on a small kill floor like the ones I've been in, these physical separations and divisions of labor simply aren't there. In these small slaughterhouses, one animal is killed at a time, and the pace of each animal's death guides the pace of the work. There is just one inspector who inspects live animals, heads, organs, paperwork, animal welfare, and cleanliness of carcasses, plus many other periodic tasks. And there are usually only one or two butchers who do all 100-plus jobs Pachirat describes. On a large industrial kill floor the animal is traveling alone, suspended from a hook on a moving rail that takes it around a corner hidden from view of the workers while it is losing blood. Next its tail is cut by a worker on an elevated platform who can't see the animal's head and doesn't know for sure if the animal is still sentient. Only an inspector who happened to be walking below at that moment might notice an animal is not yet dead.

On the smaller kill floors I describe, we are all standing in a room about the size of the average American living room. The rail is not automated, and the butchers, inspector, and I stand around waiting and watching as each animal loses enough blood to be dead enough to lay it on a metal cradle and start skinning it.

With human experience of space and vision as his primary analytics, Pachirat articulates modern power as a politics of sight: a combination of sequestration and

total visibility working together. With interactions between more-than-human bodies as my primary analytic, I articulate modern power as diffused practices of carving out difference: between categories like life and death and between variously valuable or disposable bodies and lives. In short, While Pachirat frames the slaughterhouse as articulating a politics of sight based in distancing and surveillance, I frame these small slaughterhouses as spaces of intimate interactions and multi-modal sensing where animals, technologies and workers make life and death happen each day.

Finally, Pachirat's analysis is built around the fact that he felt very removed from the act of killing, even while working yards away from the 'knocking box.' This removal and sequestration of sight becomes his primary analytic. My experience on small kill floors is quite the opposite. Killing was very literally present-at-hand with each death. I stood beside the butchers inspectors and animals sensing the lively beings in the pens, bracing for the moment of the shot, listening to cries if there were any, and waiting until the animal had lost enough blood to lose feeling. Distance and sequestration are not theories of power that make much sense standing on a small kill floor. Death takes up the air in the room, you can literally reach out and touch it.

My approach and my analysis, contrary to Pachirat's, are built around intimacy. Being present with an animal while it is dying, the sorts of touching and holding and waiting happening on these small kill floors are all deeply intimate practices. I focus on being with and touching, on the details of how and when bodies move in interaction from the holding pens to the cooler.

The works that I have outlined all offer accounts of slaughter and particular political analyses of what is being done or should be done differently. My work stands apart by approaching ‘macro’ political questions at the level of more-than-human ‘micro’ interactions. And while other work on slaughter has focused on the politics of labor, the politics of food (Pollan, 2006), the politics of sight (Pachirat, 2011), and the politics of race and class (Ribas, 2016), my work is focused on the politics of knowledge and bodies, with a primary theoretical contribution for feminist theory.

Thinking through feminist theory in the unusual site of a slaughterhouse kill floor is a contribution in itself to feminist scholarship. I am working as a feminist theorist of knowledge and meaning to understand knowledge practices outside of traditional ‘technoscientific’ spaces, among actors who are not typically understood as knowledge workers. I focus on messy bodies (of humans, non-humans and objects) in material detail and in motion and interaction, working to understand how bodies themselves are sites of knowledge and meaning. Through this work, I engage in a conversation about performance, matter and bodies with two key feminist thinkers: Judith Butler and Karen Barad.

Judith Butler, in *Gender Trouble* (1990) and *Bodies That Matter* (1993), articulates a theory of how bodies come to matter: repeated practices seem to cohere as stable (gender) identities. There is no biologically real sexed body prior to the body’s encounter with culture. Instead, our very material bodies come to be and be understood through the workings of discourse: social hegemonic normalizing powers

that work upon and generate matter. It is through ongoing contradictory partial performance, Butler argues, that gender, and more broadly, a meaningful body and self, seems to cohere. I extend Butler's articulation of how bodies come to matter through performance: By focusing on more-than-human bodies in repeated interaction, I articulate how bodies from cows to pigs to knives to thighs come to matter and be meaningful. While Butler reigns as the authority on how bodies come to matter, I contribute a detailed account of how more-than-human bodies come to matter through material interaction. While Butler's analysis is, I would argue, inherently material (not 'merely discursive' as some have charged) in its focus on repeating practices, clothing, and the details of bodily movement, my work focuses on the messy fleshy matter of bodies themselves: skin, hair, blood, organs, in interaction with non-human beings and things to understand how bodies come to matter. Butler has been criticized by numerous scholars for, in *Gender Trouble* leaving out the body in her theorization of gender performativity, and even in *Bodies that Matter*, for focusing too much on discourse and not enough on matter (Ahmed, 2008). Among the scholars who have tried to push Butler and the notion of performativity to a deeper engagement with materiality is feminist philosopher of science, Karen Barad.

My insistence on understanding Butler with a more material and more interaction-focused approach parallels Barad's work on performativity and knowing. While Barad positions her work as a new materialist update of Butler's notion of performativity, in my analysis Barad's work both denies the materiality of Butler and Foucault and still does not engage with fleshy material bodies. Though her focus is on

materiality, Barad still does not deal much with tangible, messy matter. While Barad develops her philosophy of how knowledge is material among elite physicists, I contribute an account of material knowledge-making practices in a space of denigrated blue-collar labor. This work takes everyday messy work as knowledge production, and works with hands, hides, and knives rather than particles and slits. In this materially different site, I develop a different understanding of the material nature of knowledge.

Barad, building on philosopher-physicist Niels Bohr, offers a framework of knowledge as material: a fact is inherently a positioning of entities – any position requires observers and observeds to be located in particular configurations. Complicating the notion of an observer and observed, Barad insists that all interactions are really “intra-actions,” between entities that only cohere as separate through their interactions. In other words, there is no separate object and subject prior to the encounter that positions someone or something as object and someone or something else as subject. Barad describes ‘apparatuses’: specific material configurations of entangled entities in intra-action that, through what she calls an ‘agential cut’, produce a clear observed phenomenon and an observer who can then communicate the results to others (2007, p. 174). While Barad’s notion of ‘intra-action’ has been formative to my orientation to the world, my reading of how knowledge is made through interaction differs from Barad’s. I offer an account of how knowledge is made in interactive performance⁷ that – unlike Barad’s – doesn’t focus on producing a new sort of objectivity as the endgame. Instead, as I will elaborate over the chapters to come, I

focus on knowledge and meaning-making as matters of partial and contextual agreement that are never fully resolved or closed, and always deeply subjective.

My work is also different from these feminist theorists' and from other writing on slaughter because of my particular methodological engagement. My methods are focused on the details of material practices as they unfold and repeat in daily work. More than the writers whose work I have outlined above, I am attuned to the minutiae of touch, mundane repetitions, the meeting of hand knife and hide. My analytic orientation to the world, radically constructivist and focused on how material interactions generate whole worlds, is made manifest/articulated in the methodological choices I make in research and analytic choices I make in writing. I don't believe there is a pure method prior to analysis, but rather that the peculiar orientation I bring to the site produces particular readings of what is happening there as much as the site forces me to make sense of my analytic orientation. Theory and method are dialogically entangled. Here I will articulate the details of my methodological approach: how I approached the slaughterhouse, what I did while I was there, what questions I asked, how I have made sense of worlds and world-making, and what sorts of possibilities these methods open up.

Methods

I began the project with my first trip to a slaughterhouse in central Texas in April 2010, and conducted scattered one-day visits to slaughter facilities in Vermont, Texas, and Washington State between 2010-2013. In June 2013 I moved to

Minnesota, where I spent over two years engaging with the small meat processors' community and doing research in small slaughterhouses and other sites. From my fieldwork, I have amassed some 400 recorded video clips, 85 audio recording clips, and 8 notebooks of field notes.

The cluster of disciplines I have pulled together to provide the context for this dissertation: Anthropology, Sociology, Science Studies, Communication, are also the constellation of modes of inquiry I draw from methodologically. In articulating both the theory and the methods: whom I am in conversation with and how I've done new work to enter that conversation, it seems like I'm sketching the outlines of a Frankenstein scholar. And perhaps (and proudly!) Frankenstein is exactly who I am: an interdisciplinarian digging through graveyards and offal bins to gather ideas and ways of finding new ones.

My research approach blends methods of anthropological fieldwork ("ethnography" or more specifically: being-there, participant observation, visual ethnography, end-of-day field notes, writing as method) with a particular brand of sociological inquiry modeled on grounded theory (begin with open questions, map out themes and actors as they emerge, include interviews, refine research questions as the project unfolds). While I blend formal anthropological and sociological methods, my approach is also built on the work of science studies scholars and communication analytic methods. In the tradition of laboratory studies scholars (Knorr-Cetina, 1983; Latour & Woolgar, 1979), I follow folks in white coats as they go about their daily work, only my white coat-wearers are mostly not scientists; they are blue-collar

butchers and inspectors. As STS scholars have included washing machines (Cowan), gardens (Mukerji), scallops (Callon), and other non-human entities as part of the analysis, I work to keep knives, animals, microbes, concrete floors and paperwork in my field of analysis as much as human beings. Scholars of communication have developed nuanced strategies for analyzing conversation and interaction, like transcription that includes pauses and interruptions (Sacks, Schegloff, & Jefferson, 1974), and that presents and analyzes gesture as well as words (Alaç, 2011; Goodwin, 1994). Though I don't build directly from still image and transcribed video analysis in the dissertation, doing this sort of research prior to and during the slaughterhouse project has made me attuned to the micro-level of gesture, touch, and interaction between hands hides knives and other participants in slaughter.

Inspired by Adele Clarke's articulation of grounded theory through the postmodern turn, I enter each research project and site trying to ask the broadest questions possible: "what is happening here?" (Clarke, 2005)

This open-ended question is a point of access, a way of suspending assumptions and remaining in a beginner's mind, willing to learn as much as possible from 'the field,' including why it is you are there in the first place. A suite of recommendations from an interdisciplinary set of social scientists became the bread and butter of my ways of working: *Just be there – show up each day. Ask questions. Get involved, see if you can help out, become a participant. Set up some interviews. Just be there, noticing. Give yourself homework assignments. Take notes!*

On one slaughter day, I helped shear sheep then ushered them out to the butchers. On a few occasions, a butcher would hand me a knife, and ask me to help out. In some slaughterhouses, I was handed a hose and asked to keep the place clean as we worked. In most of them I lingered, lending a hand when there was a chance to. But in two of my primary field sites – one a small slaughterhouse within a university, and the other about an hour away from the city, I just stood around. At the university slaughterhouse there were almost always plenty of extra hands (the hands of undergraduate student workers) to cut, push and spray. And in the small slaughterhouse further away, the owner didn't want to be liable if I were to be injured while working without formal work papers. In the more hands-on sites, I would often record my memories by talking out loud into a recorder as I drove the 40 minutes to 3 hours home from the site. I would describe anything that happened that day or anything I'd noticed, trying to recount this happened....and then this happened...and then this... but finding myself on tangents focused on what stood out the most - what patterns and similarities I was seeing or what was most surprising, interesting, different. My obsessions – boundaries, bodies, knowledge – led me to document particular parts of what had happened. In the places where I was just standing around, I took to carrying a small notebook and pen with me, and would give myself assignments each day: draw a thorough floor plan of the slaughterhouse; draw the body of the animal and label every cut that is made in the order it is made as the butchers work, like marking out the steps of a dance. Write exactly what is happening

as it is being done. Note every move that works to separate clean from dirty. Just write.

Sometimes I would wait until I got back to the women's locker room and would sit on the built-in bench and write there.

On several of the kill floors I asked for permission to record audio and video, and I spent many days doing so. I recorded extreme close-ups of the parts of slaughter I found beautiful, the curves in fat that a knife leaves behind; the way steam rises from a chipping green metal vat of boiling water. And I recorded long shots trying to create some sort of record of the moves of slaughter: first this, then this, then forty seconds later that. The films captured similarity and difference, and in editing some of them together I got to play with the strangeness of all of it: the way a pig rolls out of the holding device after it is stunned, but what if we use the film editing trick of "cutting on the action" so that the viewer doesn't notice we've moved to a different pig? This editing strategy is often used to move from a long shot to a close-up or from one angle to another – if you do it while the main character of focus on the screen is removing her hat, for example, the viewer's eye will follow the motion of the hand and the hat, and lock onto that again in the new shot you then cut to. I played with this to transition from a pink pig to a black spotted pig, rolling the same way out of the holding device. These editing tricks let me play with the repetition of slaughter, with the similarities and differences of taking unique living beings and putting them through a similar set of equipment and steps to produce legible commodity products. I have edited one short film "slaughterhouse summer" using footage from my visit to a

mobile slaughterhouse in Washington State (with screenings in US and France, 2014) and have begun to edit the many hours of video from my months of research in Minnesota. I screened a first cut of a short film of pig slaughter in a Minnesota slaughterhouse “boundary work” at a conference at NYU in February 2016.

In the process of analysis, my film footage has served as a ‘demonstration’ – I have used short clips in several of the conference talks that later became portions of the dissertation. The film footage has also been a reference for me to refer back to, checking whether butchers do indeed use handholds in flesh from both accidental and intentional knife-cuts, how long we all stand around in a small slaughterhouse waiting for an animal to lose enough blood to become completely unresponsive, and for thinking through the rhythms, surprises, beauty, and disturbance of being on the kill floor.

Sometimes I used my audio recorder as a simultaneous microphone recording alongside the video. Other times I just used the audio recorder, holding it at the mouth of the hose or the grate of a drain to see what sounds I might be able to separate from the familiar orchestra of slaughter. I intend to edit an audio-only piece documenting slaughter and to then experiment with setting it to different video clips. The simultaneous audio I recorded that corresponds second by second to video I’ve recorded will be attached to my edited short films as I prepare them for screening.

All in all, I have visited about a dozen small slaughterhouses in four states. A few of those have been just for a one-day visit (like my day shearing sheep and recording video of a mobile slaughterhouse on Washington’s San Juan Islands).

Others I visited for several weeks of slaughter days (every Wednesday, or Tuesday and Wednesday for example). And one slaughterhouse I was in every slaughter day for many months. I don't have a perfect record of my total number of days in slaughterhouses, but I estimate around 60 days of slaughter, plus another 40 or so days of butchering night class, food safety/"HACCP" training, one-day meat events, weekend-long meat processor conferences, and visits to restaurant kitchens, butcher shops, ranches, farms, meat inspection administrative offices, research laboratories, and other sites.

GETTING ACCESS and Research Ethics

Slaughterhouses are paranoid spaces, and rightly so. Visitors can be threats: to the safety and cleanliness of foods, to the separation of raw and cooked meat spaces, and to the business itself. Animal slaughter, like abortion, is contentious, and though I haven't read of PETA activists shooting butchers, those who are strongly anti-slaughter or pro-animal rights will often gain access to a slaughterhouse with the intention of shutting it down, imprisoning butchers, or at least bringing bad publicity to the business. It was an ongoing challenge to make it clear to small business owners that this mousy brown haired 20-30 something who just moved to town was not a PETA activist trying to gain access to the slaughterhouse under false pretense.

As I've told other academics what it is I've been working on "I do research in small slaughterhouses" I am often asked "do you have access?" People want to know, in other words, whether I am allowed to go into the slaughterhouses or I am writing about them from outside, but also whether I am there undercover or with the full consent of the owners and workers. The short answer is yes – I am in slaughterhouses and I am there without misrepresenting myself and with the consent of the people who work there. I am "deeply hanging out" as anthropologists like to say.⁸ My fieldwork has been centered on the kill floor itself – the place where animals enter alive and are stunned, then 'stuck' with a knife so that they bleed out, then skinned and eviscerated and finally cleaned off, stamped, and rolled into a cooler, legible as an edible carcass. And also yes, I have always visited slaughterhouses with the knowledge and consent

(and informed consent as defined by my university's institutional review board) of all of the people on the kill floor – owners and butchers alike.

While it is commonplace for academics, journalists and activists to enter slaughterhouses under false pretense, that was never an option for me – it simply does not feel right to me to misrepresent who I am or what I am doing for the benefit of some “higher good” that I believe in – whether in the name of research or the great book I'll write or animal rights or some other cause. I have enormous respect for the small business owners, the local infrastructures allowing people to raise their own food or source from small farms, and most of all for the workers who spend long hours in heat and cold using their physical bodies to help others put food on the table. For me, entering these spaces under false pretense would feel deeply disrespectful no matter how much faith I had in my project or cause.

Instead, I have entered as openly as I could, sharing as much as I knew about my research questions, where I come from, why I was there, what I hoped to get out of it, and how grateful I was to be there. I came in with written descriptions of my research focus and questions, and asked each person who worked in the spaces I visited whether it was alright for me to be there, giving them official documents describing my project and requesting their signature of consent to be observed for the purposes of the project if they did indeed consent to have me there. These were all forms I developed based on my university's human research protections requirements. The video I have recorded required another set of paperwork, where each person could select how I am permitted to use the footage they appear in. Some only wanted it to

be shown to other butchers and industry professionals, others were willing to have it shown in classrooms, to academic audiences, or even on film and television.

While I certainly do not feel that a university-based human research protections office and the permissions documents they approve are a perfect system for obtaining ethical consent, I think it is a good start. Conducting this research with an IRB committee's oversight has been challenging in some ways, but at minimum it has forced me to have some productive conversations with research participants, and has provided a system where they have some protections and maintain legal control over their likeness and workspaces. It is far from perfect and the informed consent process may magnify rather than mitigate the unequal power that a university-backed researcher enters a space with. But for me, entering as honestly as I knew how to and with protections for those I was learning from felt like a move toward respect and sharing of powers. I think it is possible for an informed consent process to shut down dialogue about researchers' intent and right to do research and about participants' needs powers and preferences, but it is also possible for the process to start those conversations and make them explicit. These documents at least made my right to be there officially contingent on their desires, and gave them a phone number to call if they ever felt uncomfortable or wanted me to erase video or stop coming to observe. Imperfect, frustrating at times, but at its best it could be an attempt to be honest and open a dialogue. In my next project, I plan to think through how I would develop a consent process without IRB documents, and then position those documents as part of a more open dialogue, still meeting IRB demands.

Getting “access” wasn’t always easy. In general, Texans were much warmer than Minnesotans. A phone call or email exchange about the project was usually enough to set up a first visit to a slaughterhouse, farm or ranch in Texas. In Minnesota things were harder. I was somehow more of an outsider than I’d even been in Texas, and I don’t think I could have set up many visits without help. The meat department at my local food coop and the University’s meat sciences program were two of the first field sites I visited and became two great references, helping me to connect with others. There my club memberships--as a meat eater who shops at and belongs to a local grocery cooperative and as a graduate student at another large public university--were markers of my identity that made me trustworthy within those communities. Rather than just cold calling slaughterhouses, I was able to be introduced by meat retailers and a well-liked and respected faculty member who runs the meat science extension programs. Once I had the support of a small handful of important players who work in and with small meat businesses in Minnesota, the cool mistrust behind the smiles (summarized as “Minnesota nice” – the phrase is meant to be ironic) shifted into something between tolerance and trust. I owe the deepest debt to the many people who welcomed me into their workplaces and lives over my years of research, and to those who have trusted me with their stories.

ANALYSIS

As I transitioned out of my year or so of full-time fieldwork and into my year or so of writing the dissertation, I ‘coded’ my field notebooks using my own set of categories that had emerged in the process of doing research: some I had planned to write about (like performance) and others I had not (like sustainability). Below is a window into this coding practice – which lies somewhere between the work of a sociologist or an anthropologist who knows what categories she is trying to understand, and an ethnographer or storyteller who wants to list and organize a set of stories based on emergent themes. The small post-its I attached to the pages of field notebooks earmark moments of surprise, interest, and patterns of thoughts, happenings, concepts and words I began to group together over time.

“sustainable”, HACCP (Hazard Analysis and Critical Control Points) = performative, family, “we as man have cut animal”, family/PURRS (Porcine Reproductive and Respiratory Syndrome – actually abbreviated PRRS), PURRS/community, rural community is dying, watching, BOK (Bodies of Knowledge), BOK inspector, feeling the scene, BOK teach in a retail space, BOK smell=old way of knowing, performance, BOK, performance – time, knives, clean up, performance @ University, BOK follow line..., performance D lists steps, **audio**, efficiency, robotic herds, reproduction – human animal microbe social lives, **SHOT LOG**, work ethic, feeling/singularity: shot fails, cleandirty, time, risk and vulnerability, Performance 1 2 3..., Fr tickles the medulla, cleandirty, Animal labs: “seed your own vagina”, Animal labs – first visit, Animal labs vagina, cleandirty, lifedeath – run fingers in front of pigs’ eyes “pigs give a lot with their eyes”, BOK FFA day!, feeling – pig shrieks “he knows”, BOK?, BOK bbq judging, clean dirty, BOK beef judge, jokes and human social practices, *Audio shot log 4/21, time, time, animal time, animal time, intimacy performance, “she’s wild”, guy watch a guy HACCP, lifedeath, performance, performance, performance inspector’s dance sharing pig as partner, cleandirty, HACCP, HACCP, feeling - Pachirat was removed; I’m right here, performance at U vs. [another site],

animal lab, animal lab, animal lab TIME, in vitro = more control, 5-year USDA grant, emulates inside the body, vag time – “within 3 hours of incision”, ex vivo vs. in vivo, standards and technique “he’s too little”, BOK, BOK “follow that line...” (as I open to this page I see I drew a cartoon of an ox tail that was twitching so much on the stainless steel inspection table that it flopped itself off and onto the floor), lifedeath, CARE/intimacy, how to get a PURE culture of muscle cells, cleandirty.

These ‘earmark’ notes were all written in the space of several days of reading through each notebook of field notes from cover to cover, highlighting material that I intended to write about in the dissertation. After chronicling the contents of field notes in this way, I set out to draft a master outline (at the urging of Chandra Mukerji), documenting which stories would be contained in each chapter. This detailed outline became a master guide for myself in writing, and I more or less stuck to the plan as I worked on one chapter at a time, changing the order, adding new stories, and elaborating some pieces more than others.

Throughout the project, I am attuned to the details of what is happening in everyday doing, concerned with what has happened, what is done and said more than the motives or explanations behind it. I am interested in what is actually being done, and with what surprising or unintended consequences. I show up, try to help out if I can, with pen and paper and sometimes audio and video recorders, and I ask the broadest research questions possible until several rounds of what seems to be interesting and then what seems even more interesting have emerged. This approach allows me to be surprised by what I learn as I go, and to adjust my questions and writing plans based on what I learn. The method means that my work itself is guided

by the peculiar connections that arose in my sense of what was happening, and that curiosity, overlap, ironies, and surprise drive the inquiry.

My hope is that this approach lets the content and the demands of the site guide the project, and that this open mode of inquiry produces scholarship that offers openings more than closure. While there certainly are challenges to the approach, and worthy critiques (You call that a method?! Is the first I think of), it has led me in deeply interesting directions, and allowed me to develop and work through emergent questions that I would never have thought to ask at the start:

Research Questions

Rather than a single list of research questions, I have gathered a list of types of research questions, with examples of each set. (1) First Questions: the question I began the project with (2) Entering/Boundary Questions: the questions I developed in my research documents that explained my work to myself, to funders, to the IRB, and to my participants (3) Interview/Kill Floor Questions: the questions I asked my participants in the process of doing research (4) Emergent Questions: the questions that emerged as the work unfolded (5) Overarching Questions: the ‘bigger questions’ I now understand the work to be addressing, with the perspective of having nearly finished the project.

(1) First Questions

As I’ve described, I began with the most general research questions inspired by Adele Clarke’s approach to grounded theory: What is happening here? (Clarke, 2005)

(2) Entering/Boundary Questions

Then I developed more detailed questions that I could ask in my field sites, and could use to honestly represent the work in my institutional review board/human research protections documents. In my first set of IRB documents, I described the project this way:

The purpose of this study is to understand how meat is produced and what the current and shifting patterns are in transporting animals and meat. During the observations, the researcher is primarily interested in documenting the everyday work practices within the local site. During individual interviews, you will be asked questions about your own work practice and experiences, about the trends you see, and about your own thoughts on animals and meat.

Workplace practices, how meat is produced, and questions about animals and meat continued to animate the project throughout the duration. But my initial questions about movement and transportation moved away from center stage as the project evolved. Several major questions emerged as I spent more time in slaughterhouses, and I was able to describe these questions to potential participants at each new slaughterhouse. My focus on the skill and knowledge of butchering and on how boundaries are made were all questions I could talk to butchers and owners about, and provided an accurate shorthand for the project while I was conducting research. These questions operated as what Star and Greisemer (1989) describe as boundary objects, allowing me to speak and work across worlds. I tried to articulate my respect for the butchers and my depth of interest in the details of what was happening. My major questions at this stage were:

How do skilled butchers perform animal slaughter?
 What kind of knowledge is butchering?
 How are boundaries between clean and dirty, etc made in the process of slaughter?

(3) Kill Floor/Interview Questions

On the kill floor, I found myself asking butchers and inspectors orienting questions:

what is that called? Why did you do that? How is that different from the one before?

What is that sticking out of that animal? How do you find what you're looking for?

In interviews, I always asked, How did you get into this work? Did you work with animals or meat or slaughter growing up? What is your favorite part of this work?

Your least favorite part?

(4) Emergent Questions

Over time, patterns emerged, certain words and phrases popped out and strange

surprises led me down unexpected 'rabbit holes' of research and analysis:

How does a pig cervix become a model of a human vagina?

If butchering is embodied knowledge, what does that mean? What bodies is it in?
How is it learned?

How do animals' bodies act as knowledge objects? Humans' bodies? The bodies of other objects like knives?

Is there a moment of death? How is a boundary between life and death drawn on the kill floor?

What do they do with that cow thigh they're wheeling out on the cart?!

How is "sustainability" being defined and used within the meat industry to justify practices that harm people, animals, and the planet?

(5) Overarching Questions (making sense of the project now)

And in hindsight, as I've describe the entirety of the project in job applications and

conversations, I have developed a new set of questions that capture these many large and small, obvious and bizarre questions in broader strokes:

What else is being made (besides meat) in the process of animal slaughter?

How are knowledge and difference carved out in the practice of slaughter?

How can we understand the politics of food/knowledge/difference by focusing on the intimate politics of slaughter?

How is meaning made in everyday interactions and practices in more-than-human material worlds?

In short, this project did not follow a straightforward trajectory of asking questions, gathering data, and answering those same questions. Instead, as Adele Clarke describes, new iterations of questions emerged to serve the process of research. These questions allowed me to interact with research participants, funders, and academic colleagues, and helped to guide my time and focus while in the field. The time in the field in turn shifted my focus and my questions, and the process of writing and revisiting field notes in the subsequent year plus has further developed and shifted both the focus and the questions. Even with the body of the dissertation written, the analytic focus and particular questions I find the work is answering continue to shift, aided in part by the demands of the academic job market, by feedback from audiences, and by current world events and concerns. I understand research questions to be, like boundaries, matters of partial agreement: good enough to hold the project together and communicate with self and others along the way, but ultimately shifting entities with lives that outlive the research process and the project.

Chapters summary

I: Making Difference

Boundary Work: Making Difference in Practice

The first section “Boundary Work: Making Difference in Practice”, is an exploration of how difference is carved out between opposites. Analytically, I work as an anthropologist, trying to understand how boundaries are made in practice. The first chapter, *Cleandirty/insideoutside* focuses on how a boundary between clean and dirty is drawn in daily practice, focusing first on the lines walked by animals and humans, then on daily practices, and finally on animal bodies themselves as they are turned inside out and eviscerated. I argue that threshold-crossing *produces* boundaries; that daily practices create locally specific boundaries; and that dichotomies like clean-dirty and inside-outside are entangled, dependent on and produced by one another. The next chapter *Lifedeath* continues the focus on how difference is made in practice by honing in on life and death. I describe attempts to separate life from death as instances of partial agreement and contextual, contingent, embodied judgments. I argue that life and death are not distinct categories but instead life and death exist in a fluid continuum; the difference between them is never fully closed. In *Managing Lives*, the final chapter on difference, I explore how daily management practices on the kill floor separate humans from animals and killers from killable. I argue that as clean/dirty and life/death are separated, power is articulated, determining who lives and who dies; who is protected and who is ‘managed’.

II: Making Meaning

How Bodies Come to Matter: Carving Meaning in Flesh

The second section of the dissertation continues the close attention to details of daily practice on the slaughterhouse kill floor, but focuses in more closely on human and animal bodies themselves. Rather than asking how difference is made between pairs of opposites, this section looks at a broader range of knowledge and meaning that is wrought from animal bodies in the process of slaughter. Analytically, I draw from feminist science studies and communication scholarship to make sense of how knowledge and meaning are made in practice. Throughout this section, I use ethnographic detail to argue that making meaning is a material and performative process. Chapter four, *Making Knowledge* looks at three groups of workers on the kill floor: butchers, meat inspectors, and laboratory researchers who come to the kill floor to collect organs and tissue. I argue that all three groups are knowledge workers, making sense and knowledge out of animal flesh. While most writing on tacit or embodied knowledge is concerned with human embodiements, I focus on butchering as skilled knowledge embodied by humans and non-human animals in interaction.

Chapter five, *Semiotics of Slaughter*, theorizes the act of cutting animal carcasses into cuts of meat as a material-semiotic process: carving meaning in flesh. I focus in on the practices of making cuts and judging meat as material practices that make meaning and difference. While the bulk of the dissertation is focused on human and non-human living (and dying) things, this chapter also analyzes the not-so-fleshy bodies of knives themselves, arguing that knives work with animals and butchers to make cuts, rearranging matter and preserving a record of the cuts that have been made. Wrapping up this set of chapters on knowledge, meaning and bodies, I focus in on

how bodies come to matter through performance, offering an intervention in feminist theory of performativity and meaning.

III: Making Worlds

The Intimate Politics of Slaughter: Making Worlds

The final section of the dissertation spirals out from the slaughterhouse, building on ethnographic and historical research to understand how slaughter produces pervasive cultural forms and ultimately cultural and political worlds. My analysis here is a model of how to explore more-than-human “worlding”, “world-making,” “cultural poesis,” or “figured worlds” in the making. Chapter six, *Ford’s Assembly Line* uses oral histories and images from the Henry Ford Archive to trace the story of how the disassembly of animal bodies inspired the first industrial assembly line. While this connection is frequently cited, I tell the story differently. Starting with the pig’s body itself, I ask how the material detail of an animal’s body inspired the disassembly lines that preceded Ford. In studying archival images and conflicting accounts of the first months of assembly lines at Ford, I make another contribution to the historiography of industrial capitalism: it was women, not men, who worked on the first assembly line. I argue that women’s practices of working seated, side-by-side with the supplies they needed in front of them (as opposed to men who enjoyed the freedom of an individual work station and walked around to pick up parts as they worked), made these female workers an ideal testing ground for the feminized de-skilling assembly line.

In chapter seven, *The Intimate Politics of Slaughter*, I build from ethnographic fieldwork at meat processing conventions, farms, agricultural colleges, and break rooms to understand the affects of slaughter: the emergent hopes, feelings, and futures

of animal slaughter. I explore questions about the politics of food and contemporary debates on meat eating, environmental sustainability, animals' and workers' rights at the level of daily conversation and intimate interactions. Combining stories from the field with analysis of current rhetorics in animal agriculture, I argue that sustainable agriculture is being articulated as constantly increasing production and (white, heterosexual) reproduction. I then focus on care and feeling on and around the kill floor, complicating notions of a good death, good work and good meat. Throughout the chapter, I emphasize that opposing political viewpoints and cultural worlds are built together, emerging out of daily feelings and investments in family and visions of a future.

In the conclusion, I take a wider look at what I've learned in the process of doing this research and what sorts of openings and questions my work opens up. I write explicitly about the politics of food and the politics of death and violence, engaging questions from "is there such a thing as GOOD meat?" to "which bodies matter?" I conclude with a plea to take ethical acts of eating as nodes in a web of practices and interactions, and to consider care across systems as a measure of "good."

Welcome to Minnesota, Land of 10,000 Lakes

After several years of brief visits to slaughter facilities in Texas, Vermont, and Washington State, I moved to Minnesota, the land of 10,000 lakes, where I did the bulk of my field research. As with many place-based mottos, it is hard to imagine exactly what it is *like* to live in a state with 10,000 lakes if you haven't lived there. It means that neighborhoods are organized around and named after lakes, that there are fancy houses along them, that they disrupt your attempts to drive straight from one place to another. Does it mean everyone parties on docks and pontoon boats in the summer time? Well yes, but they seem to do that mostly at their cabins, many of which are in Wisconsin. At a small barbecue one neighbor organized, the folks who live diagonally across the street from us learned that their family cabin is just up the road from the folks who live directly across the street from us and two doors over. They had been neighbors in weekday living and in cabin life for decades and never known it. The land of 10,000 lakes is small like that. Combined with the long cold winters, the presence of 10,000 lakes means a lot of socializing takes place on and around frozen lakes: ice fishing in small huts dragged out to the lake when its frozen solid enough to support trucks and many humans; ice skating and hockey games; funky arts and sculpture festivals on and around frozen water. Many of the lakes are part of the Boundary Waters Canoe Area Wilderness, a system of lakes linked to one another or with a brief strip of dry land between them in a preserved deep wilderness area along the border with Canada. We've only camped on the edge of the region, but friends tell us they canoed for days without seeing another soul.

The land of 10,000 lakes has its own rhythms - seasons, weather, holidays, high school basketball championships. The melting and freezing of water permeates and expands units of time. And the small meat markets dotting the state are buoyed by those same rhythms. There is a saying that in Minnesota there are only two seasons: winter and grilling.⁹ The first sunny day when all the snow melts will be a big day for meat sales - if it falls on a weekend even more so. We'll all be out in shorts and t-shirts grilling joyfully if temperatures hover above 50 and the clouds part. As Christmas and Easter approach, smokehouses do overtime to churn out enough ham; plants large or wealthy enough to have a spiral deboner will pull it out of storage and put the single-use machine to work making easy-to-serve boneless hams. Superbowls, Fourth of July, and Fathers' Days are all big sausage holidays.

In addition to all the lakes, Minnesota is home to several hundred small slaughterhouses. About 270 (as of 2014) are custom slaughter facilities, where meat can be slaughtered for local farmers but none of the meat can be sold. 57 or so are inspected by the Minnesota Department of Agriculture, allowing the meat to be sold within state lines. Another 35 to 40 plants of varying sizes are inspected by the United States Department of Agriculture, allowing the meat to be sold across state lines or for international export (CITE FSIS directory March 5, 2015 accessed April 9 online – see meat infrastructure spreadsheet). Altogether, over 300 plants are what the USDA would classify as “very small,” employing fewer than 10 employees and/or with annual sales of less than \$2.5 million.¹⁰ Compared to the large industrial slaughterhouses in the state, these small slaughterhouses vastly outnumber the large

slaughterhouses – there are more than ten times as many of these small businesses as there are large slaughterhouses.¹¹ But mirroring the face of meat production nationally, the quantity of meat produced in these small slaughterhouses is dwarfed by the market share of animals slaughtered in the large facilities annually. As a study of how meat is made, this ethnography documents a relatively small portion of the market. But as a study of meat businesses, this work fills in a gap in documentation: consumers hear relatively little about these tiny meat markets even though they far outnumber the more visible large slaughterhouses.

In Minnesota, these small meat markets are tied to the state's white settler history. As in Texas, waves of European immigration in the mid-to-late 1800s established a norm of small meat markets in each town, slaughtering live animals and making sausage and other cured meats. Before refrigeration, meat would have to be sold quickly to consumers or cured with salts, brines, and smoking processes to extend the shelf life. Salt pork, hams, cured sausages, jerky – meat could be preserved and kept without refrigeration in a range of forms. In Texas, the cuts that couldn't be easily preserved were often smoked over open, low fires¹² – there, some small slaughterhouses still operate as barbecue restaurants today. In Minnesota, the Scandinavian and German ethnic majorities focus their energy and pride around sausages. Wursts, braunschweiger, summer sausages – these classic preparations are proudly prepared and consumed, organizing white ethnic identities in much the same way pungent lye-cured lutefisk and lefse flatbreads do for Scandinavians of the region.

Between the advent of refrigeration and the popularity of home refrigerators in the 1950s, many small meat markets started to provide private refrigerated “lockers” that customers could rent. Not unlike drawers you might see in a wall at the morgue, these refrigerated receptacles could hold a family’s whole cow, and the customer could come pick up just the cuts he or she need to prepare whatever dishes they planned to cook that day. Many small Minnesota meat markets are still called “lockers” – Foley Locker, Dick’s Locker, Ellsworth Locker, and so on. Though the walls of lockers were usually removed when home refrigeration became common, at many meat markets, nearly 40 as of March 2016, the ‘locker’ name remains.¹³

Early one morning as a farmer pulls up with his cattle, he gets into a conversation with the meat market owner and I. Small businesses, the farmer declares, are "The heart blood of America." The owner responds by complementing his customers, "We have good customers, I never check IDs for checks. I just tell people I trust 'em. Most of my employees have been with me for twenty plus years...it makes life easy."

SECTION I - BOUNDARY WORK: MAKING DIFFERENCE IN PRACTICE

Difference is made in daily practice.

How does difference happen? Are the boundaries between dichotomies we hold dear concrete forms, set in place before we (be we humans, animals, hot water or knives) arrive each morning? *Or each evening if we work third shift?* In this chapter, I collect stories from the slaughterhouse kill floor in an attempt to understand how boundaries are drawn between some of the most tenacious categories of difference. Through these stories, I explore durable dichotomies as they are made and made meaningful in daily practice.

I call these daily practices “boundary work,” to emphasize that categorical difference is emergent: it is always being made and remade. It takes work. It is work. “Boundary work” emerges at the hands of historian of science Tom Gieryn, who uses the phrase to emphasize the activities undertaken to demarcate science from non-science (Gieryn, 1983). Theorist of science and politics Sheila Jasanoff picks the term up in an essay several years later focused on how doing science is separated from policy-making (S. S. Jasanoff, 1987).¹⁴

This project offers a series of cuts through the question “how is meaning made in practice?” In this first section, I am focused on boundaries. I explore how boundaries are made, paying attention here to dichotomous pairs – the sorts of difference like inside/outside, clean/dirty, life/death that persist even after we’ve questioned and torn down the walls between Cartesian dualisms of mind/body and nature/nurture. I study how the walls between dichotomous pairs are erected, reified,

or at least attempted. Difference itself is the focus of my inquiry – not the whole buffer around an x that, by being not-x makes x—not the ocean around an object that isolates that object as an island and thus a *something*. That sort of meaning—how particular figure rises out of the ground of ‘everything’ to stand forth as itself, from not-x, or x from the world—I deal with in the next section. But here I am really focused on difference, on the wall in between, separating X from its alleged opposite, X’. This work of carving a boundary that separates X from its opposite X’ is what I call boundary work.

My articulation of boundary work in this section is focused on the making of boundaries between dichotomous pairs that have been examined more by philosophers and anthropologists than analysts of social inequality. But the exercise is not pure philosophy or anthropological analysis. I aim to understand how difference is made in order to be able to think through all sorts of differences differently. Fuss, in her introduction to *Inside/Outside* articulates that classic dichotomy as foundational for other sorts of difference, including sexuality. I hope that my focus on foundational, seemingly intractable dichotomies as made and re-made through daily movements and practices might open routes for analysis of the making of social difference including but not limited to race, class and gender.

This section is organized into three chapters, each focused on one or more essential dichotomies. I attempt to take on one dichotomous pair at a time but find them entangled and insistently intertwined. In the first chapter, I explore cleandirty and insideoutside as they produce one another: as bodies move through space tracing

lines of in/out clean/dirty, as local techniques and technologies work to separate clean from dirty, and as the animal's body itself inverts inside with outside taking clean and dirty with it. Next, I turn to lifedeath, exploring the details of butchers' attempts to identify whether an animal is dead enough to be skinned. By mapping these querying practices, I identify lifedeath as a dichotomous pair that is never fully resolved as two distinct states; instead, lifedeath is a matter of agreement between humans and animals, using a system of signs that point toward a transition from life to death but never prove a precise separation exists. In the final chapter, I focus on the boundary between human animals and non-human animals, exploring the process of determining what lives matter and which are disposable.

Throughout these chapters, I owe a great debt to other works on boundary that have greatly informed my own thinking. I rest on the shoulders of Mary Douglas, whose mid-twentieth century structuralist analysis of taboo offers an early model for careful analysis of the strange ritual practices we take for granted in our own cultures and daily lives. If Douglas' work sits alongside Levi-Strauss' as stalwarts of structuralist anthropology, my work is legibly poststructuralist, concerned less with identifying the overarching structures of cultural forms (clean and dirty; raw and cooked) and more with the practices of cooking and cleaning.¹⁵

Following Douglas, Timothy Pachirat's phenomenal ethnography of slaughter looks at matter out of place to understand the unquestioned arrangements of matter in place. As I will describe in more detail later, in Pachirat's analysis, the essential categories in a slaughterhouse were articulated by a builder or planner and are bullied

and transgressed in practice. Like Pachirat, the slaughterhouse is my ground for thinking through power and difference. But my experiences on small slaughterhouse kill floors lead me to understand boundary differently from Pachirat--not as pre-existing forms that are violated or followed, but as lines traced in the practices of living.¹⁶

Lastly, I am indebted to Karen Barad for the concept of intra-actions: an insistence that the distinctions between separate entities may never precede their interaction. Hence, any interaction should rightly be called an “intra-action” – a phenomenon involving non-distinct entities that are tangled together. For Barad, dichotomous pairs (subject-object, observer-observed...) enter the scene entangled. What we might come to understand as an observable object and a knowing subject are all part of entangled phenomena, posing a real challenge to traditional understandings of objectivity. But as Barad explains, in the unfolding of specific material setups, these problems are solved, at least for that material configuration and that space-time.¹⁷ What she calls an “agential cut” separates an observer from observed and allows for objectivity to still operate. In her account, there is a contingent solution to the trouble of entangled becomings. While I follow Barad in understanding seemingly discrete objects and concepts as entangled, her description of an agential cut that offers contingent, materially-specific separability does not seem to capture the happenings on a slaughterhouse kill floor.

On the kill floor, I encounter tangles that are never fully disentangled. There is no glowing moment when an observer and object cleanly emerge, allowing for some

sort of objectivity to remain. Clean and dirty are tangled up not only with one another but with other essential dichotomies too: inside-outside-clean-dirty are entangled and they never fully disentangle. Even when clean is separated from dirty, that clean is only clean because it is clean-inside or a relatively clean-outside. Dirty emerges as all-that-is-outside or as the inside within the inside. While clean and dirty can be locally, contingently separated from one another, they are never separated from the other modes of differing that produce them.

Life and death are even more troubling. They are never solved. Life and death emerge entangled and they remain entangled, a passing of matter and spirit through time that I describe, following Derrida in a series of 1974-1975 lectures, as *lifedeath*.¹⁸ The definitions and proddings of butcher-inquirers query animal bodies and get answers, but the answers (yes, tickling my brain stem will make me kick right now) respond to a question that attempts to define death in its articulation. Even if we accept each local definition of death and ‘dead enough’, the queries don’t capture a moment when life ends and death begins, but can only point to whether death has happened already, or happened enough for us, for now. Even with the most intimately attuned sensemakers, lifedeath is still an extended happening with no clear boundary in its middle. Indeterminacy reigns.

Weaving through the infrastructures of slaughter and daily performances on the kill floor animals and humans press closely against one another, dance together, in what Donna Haraway might call a non-innocent project of mutual becoming: a project that makes certain animals killable and others killers. Killing animals produces

profound senses of difference between human and non-human beings, even while individual animals and humans come more closely together and attune to one another in their final breaths.

[One] Cleandirty/Insideoutside

Cleandirty and insideoutside produce one another and nest within each other. Clean and dirty are cleaved and constituted through daily repeated activity.

Taken as more than something to think with, the slaughterhouse troubles divisions we hold dear: clean and dirty, messiness and order, inside and outside and shakes them, productively, to their core. In this section, I argue that cleandirty and insideoutside are not two separate pairs of dichotomies, but are instead senses of difference that produce one another, emerging entangled through daily practice. In *The Production of Space*, Lefebvre argues that the difference between inside and outside emerges during human embryo development as a single cell develops into a blastula--a mass of cells surrounding an internal cavity--and then a gastrula--with a distinct 'internal' wall of cells and 'external' wall--on the way to becoming a fetus (176).¹⁹ For Lefebvre, insideoutside is the first dichotomy, and all other sorts of difference follow, two by two. I refuse human embryo formation (or any sperm and egg stories or penis and vagina metaphors) as the primary parable of how we organize space. I enter the slaughterhouse curious and hungry, hoping that the happenings on the kill floor might inspire alternative geometries or perhaps non-geometries of difference and lives lived.

In *Inside/Outside*: Lesbian theories, gay theories, Diana Fuss explains that dichotomies tend to be built on top of one another. In her telling, in/out begets homo/heterosexual. Like Fuss, I understand insideoutside to be tangled up with other dichotomies. But unlike Fuss and Lefebvre, I do not take one dichotomy as preceding

others. In the daily practices on a slaughterhouse kill floor, the division between inside and outside does not precede all other difference but instead it emerges entangled alongside other sorts of difference. As the stories that follow articulate, cleandirty and insideoutside *produce one another* as categories of difference. Spatial categories and moral judgments: clean/dirty, pure/impure, good/bad, emerge together and actively make one another come to be and to be meaningful.

Most of the time, outsides are dirty and insides are clean, or at least they should be. But the practice of slaughter troubles these easy couplings: animal bodies have dirty outside hides housing clean muscle fat and bone, all of which encases a dirty inside: the gastrointestinal tract that travels from mouth to anus, taking in the world and turning it to shit. Internal organs are considered clean, except when they are condemned, and if you are in the US, when they are lungs. Or neurological material from a cow over two and a half years old.

While I reject Lefebvre's claim that inside/outside precedes all other boundaries (and his use of human embryogenesis as the primary script for social forms), I follow in his path somewhat in my approach. Lefebvre criticizes many of his contemporaries (Chomsky, Foucault, Kristeva, Greimas, Derrida) for focusing too much on the formal aspect of codes. Instead of trying to codify pre-formed spaces and understand their rules, Lefebvre tries to understand them in the process of being made. He claims that "(social) space is a (social) product" (26): spaces and boundaries do not exist outside of the context of their making. Though he does not use the term himself,

Lefebvre attempts what I would call a performative analysis, trying to understand spaces and boundaries as they emerge in (social/spatial) practice.

In this chapter, I move through three registers of insideoutside and cleandirty as they produce one another. First, I walk through a slaughterhouse, describing the movement of bodies as they make lines through slaughter and meat processing facilities. Then I describe specific techniques for separating the inside from outside and clean from dirty in the daily practices of slaughter. Last, I turn to the animal's body itself as it is turned inside out, making new outsides of its insides and insides of its outsides. I conclude the chapter by exploring alternative geometries of difference articulated by these stories in the context of feminist STS scholarship on difference.

Lines

Bodies moving through space in lines constitute insidesoutsides/cleandirty.

In the fall of 2013, I enrolled in a food safety training course for butchers, meat processors and inspectors. At the start of the course, our instructor presented a slide show of how meat *used* to be cut and how it still is in *other* countries. He situated our course quickly in the superior present-day United States, and gave us a counter object to fight against. In these photographs, meat was sold at outdoor street markets where it hung raw and unrefrigerated, subject to heat, flies, and the sneezes of passersby. Watermelon sat on a cutting board beside raw meat. A dog wandered into an open barn slaughter room and stood under a carcass hung from the rafters with rope. In the old-timey US photos, butchers with cigarettes dangling from their mouths cut on wood

boards standing on piles of sawdust that would be layered each day to soak up fat blood and odor, and cleaned out at the end of each week. The audience laughed and gasped together at the right moments, more or less; we were all well-trained in the modes of disgust that carve out spaces of civilization.²⁰

Indoor spaces can be protected zones, allowing for the exercise of sorts of control that are far more difficult to maintain in the great outdoors. Indoor slaughter, meat cutting and retail spaces allow owners to regulate temperature, airflow and, to some degree, vermin. Slaughter plants are a border zone between the dirty, shit-covered world of farming and the trustworthy steak on a white dinner plate. Manure on a farmer's boot does not violate codes of clean and dirty within daily farm work; if anything, a boot too clean would be suspect. But in the spaces that turn animals to food, dirt and poop are problems. The process of processing animals into food makes a break with the dirty lives, hides, stomachs and guts on the outside of the plant and on the outsides and insides of animals' bodies.

Most of the small slaughter plants I've visited have the same basic layout: a front entrance with offices and often a retail meat counter, ranging from a single cooler to a mid-sized convenience store. At the back are animal pens that lead to the kill floor entrance, typically on the opposite side of the building or buildings from the main human entrance. And in between is everything else: cutting rooms, coolers, smokehouses, packaging, restrooms, lockers, storage areas, supply rooms, scales for weighing meat and spices, sometimes a loading dock. The back of the facility is dirty:

animals are pooping, standing and lying in their own shit in the pens, and then being killed. The front is clean: humans are clocking in or buying summer sausage.

Timothy Pachirat, in his ethnography of slaughter in a large Midwestern packing plant, draws an overlay onto his map of the facility, marking one side dirty and the other side clean. Clean side workers have their own bathroom and lunch area and they take off their dirty clothes each day in separate locker rooms. Pachirat describes the boundaries between clean and dirty and life and death as having been put in place by a slaughterhouse planner. But in practice, he says, these borders are regularly transgressed. For example, there aren't enough women working on the dirty side to have their own bathroom, so they use the clean side women's room. For Pachirat these categories are fixed, imagined by a slaughterhouse planner once upon a time, but transgressed in the realities of daily living on a kill floor. In Pachirat's description of boundaries, first there is the plan, then there are constant repeating violations.

Unlike Pachirat, who sees boundaries as pre-existing in the designs of a planner and daily border-crossings as transgressions, I argue that these apparent transgressions are themselves inscribing the boundaries. While guidelines and definitions of clean and dirty are inscribed in the documents, protocols, and built structures of a slaughter plant, they are enacted --they actually come to be and be meaningful -- in daily practice. I argue that boundary work is ongoing: rather than stable categories and laws that are broken or transgressed, I chronicle ongoing daily

performances that make boundaries come to be and come to mean. Difference is performed.

Social anthropologist Tim Ingold offers a compelling formulation for understanding boundaries in his book *Lines: A Brief History*. Rather than approach objects or places as separated by a boundary from other places or things, Ingold proposes that continued practices of woven-together line-making precede the urge to separate and contain. Ingold takes entities as line-makers, not fixed points in space but bodies-in-motion that become what they are through the movement and tying-together of tracing lines. “Life is lived...along paths, not just in places...what is a thing, or indeed a person, if not a tying together of the lines – the paths of growth and movement – of all the many constituents gathered there?”²¹

In a 2008 article, Ingold begins with a hand-drawn sketch of a circle and challenges the reader to think of this not as a boundary that contains life, but as a line along which life is lived (2008, 1796). He describes life as an entanglement²² of interconnected trajectories of growth and movement, interacting in the “open.”²³ Rather than a network approach to things and a bounded-circle idea of boundaries, Ingold proposes a focus on the line as a “trail of movement or growth (1805).”

Inspired by Ingold, I trace the paths taken by bodies moving through a slaughter and meat processing facility. I argue that the trails of bodies moving through space produce cleandirty and insideoutside as they move. First, we’ll follow an animal’s body, then in reverse, the path a visitor would take on a tour. Next I describe the varied sorts of paths workers take, including the troubling paths inspectors and I

traveled, acting as vectors for disease and thought. Finally, I explore the counter-case of a mobile slaughterhouse built into an 18-wheeler truck, traveling through the world and open to the outdoors.

Animal Paths

If you were a pig, you'd have been here for hours. Brought in the night before or the morning before that, kept in a calm stall, darkly lit or maybe outdoors with sunlight coming through the wood slats. Familiar enough, and long enough to start to calm down after riding here in that horrible vehicle. That was a stressful day. But by now you're likely feeling better, you might have slept, you're drinking water and wondering when the next meal is going to come.

Here comes a human, maybe he'll feed us, nope? OK, time to move. We know how this goes, the big orange walls they put up to say "no! Don't go this way." We get the message. We listen if we feel like it. We'd rather stay together.

You'd walk along a hallway, well sort of a hallway made of metal gates on each side, you can see everything, you are supposed to go forward, someone might stand behind you, nudging your rear with his hips, you move forward. Bear with me here - at some point you will lose consciousness and would no longer be a reliable narrator as a sentient being. But we'll follow you as you go - watching from above, describing your path even when you are no longer living-thinking.

First you'd find your way onto a kill floor: a small or medium-sized concrete room, if there are windows they are high up and let some natural light in. It's brighter

here than in the pens, but not nearly as bright as outside. I won't go into detail here, but things you can't imagine will happen to your body and you will leave this room through a different door, this one large, metal, insulated, leading your body without organs into a cooler. You'll hang here a couple of days then travel from the cooler into the cutting room, where meaning will be made of your flesh, and your body parts will be monetized -- a value system so divorced from your own priorities in life (that layer of fat on your belly? Expensive! Your snout? Worthless), you won't recognize yourself.

Then parts of you might be cooked, you'd travel to the mixing bowl and the sausage linker, or straight into the smokehouse. Out you'd go and join your raw parts in the packing room, heading into white origami folds or a Styrofoam tray with saran wrap on top. A sticker would be printed--your name, the date, the part, perhaps how to cook it at home, the name of the place you are traveling through, a seal of inspection with the place's unique number inside--and that sticker would be stuck on your paper or plastic clothing before you are moved to the freezers and coolers in the retail space from which you will be sold.

In short, if an animal were to take a tour, walking through the plant as its body would soon move, it would go something like this: From the holding pens to the kill floor, a concrete room with so-so lighting, then into a door to a walk-in hanging cooler. Out another cooler door (though sometimes the same one) and into the cutting room, where whole carcasses are broken down into 'cuts' of meat. Steaks, roasts, and much of it just ground. From the cutting room into a further processing room where

the ground meat might get spiced and enzymed and stirred up then run through a sausage linker, hung on a metal rolling cart and rolled into a smokehouse. Or straight from the cutting room into the packing and wrapping space, which could be a table in that same room or another room altogether. There might be one wrapper working there with a mounted roll of white paper, one-side-waxy, or a whole room of women in hairnets and machines bigger than cows. Regardless, this imagined animal on a pre-tour of the plant, would pass through this space and find himself ultimately in the retail portion of the facility: a restaurant perhaps, or a meat counter selling all the packaged products to humans.

People Paths

A human visitor would take precisely the opposite path: If they took off from the retail counter at the same time a pig ambled in from the pens, they would likely meet someplace in the cutting room.

Human visitors walk a path from clean to dirty. From the retail space and offices into the ready-to-eat facility with cooked, cured and smoked meats, from there to the raw meats (dirtier than the cooked), then to the kill floor (dirtier than the raw meats), and lastly out to the pens where animals may have spent the night or several before slaughter (dirtier still, and visibly covered in shit). Human visitors are guided through a plant from the least to the most dirty space, tracing a path and defining a spectrum of cleandirty as they go. Cooked packaged meat is cleaner than raw packaged meat and both are cleaner than meat that has not been wrapped yet. The

cutting room is cleaner than the kill floor and the kill floor is cleaner than the pens. This clean-to-dirty trajectory eliminates the likelihood of cross-contamination: delivering poop from the pens, say, via the hem of one's coat, onto the lower rack of summer sausage that just emerged from the smokehouse.

On the first visit to a new place I would usually be led through in the order any guest or tour would follow – from cleanest, retail and ready-to-eat foods, back to dirtiest shit-covered pens. In the spring of 2013, I visited the oldest barbecue place in Texas, where the segregation-era wooden wall dividing the dining room burned down in a fire in 1983. It was once a slaughter facility, but now it houses retail and wholesale meat production along with a restaurant under one roof. To take a tour, I put on a disposable hairnet and a size 3X white lab coat to cover my body and camera bag. I am led by the owner and the Quality Assurance guy through the plant starting with the rotisserie pits with their partly cooked briskets, then through the packaging room, where 6 women – all Latina – pack and vacuum seal sausage, then to the sausage-making room with its two stages of grinding, then mixing, then jizzing into pork casings: four machines, four people, a trashcan filled with the clear plastic condoms the pork casings arrive in. Our last stop is the cutting room.

When I walk from one 'zone' to another, from an area with cooked meats – briskets that day – to raw – sausage in various states of undress, I step through a several-inch-thick pile of what I take to be soap suds left from last night's or this morning's cleaning. I learn hours later that I am wrong: this is antibacterial foam, sprayed across the floor on an automatic timer every three to five minutes to grab hold

of any foot or wheel traffic going from space to space. These foam-sprayers are placed at the key borders between areas where cross-contamination could occur.

Because humans, like other animals, are vectors for dirt, shit, and disease, visitors are guided in paths that reduce the likelihood of cross-contamination between spaces. But humans can also be vectors for bacteria-killing material. Traveling bodies can carry clean as much as dirty.

As I became more familiar and learned my way around each plant, I would sometimes realize after the fact that the rhythms of my research day would make me a negligent vector for microbes and shit. One day in a small plant in Minnesota, I finished on the kill floor, walked through the cutting room to get to the break room, took off my protective shirt, grabbed my knapsack and jacket, walked to the front office to look for the owner, then the retail space, then the cutting room. Didn't find him. Back to the front office, then out the employee entrance, along the edge of the parking lot, and around to the pens to find one of the butchers who had taken home information about my project and a consent form allowing me to observe him at work. I stood with him in the shit for a while, translating each line of the institutional review board-mandated consent form into Spanish as we read through it, then left to try one last time to find the owner near the front office before I went through the retail meat market at the front to buy some jerky for the drive home. Traveling strange paths within a slaughter plant made me a vector for cross-contamination within plants. And traveling from plant to plant, often with my own boots and clothes on, made me a strangely mobile and troubling vector between different slaughter plants. Inspectors,

particularly state inspectors who visit 5 or more kill floors and many retail meat processing facilities each week are vectors too. Humans, non-human animals and non-living objects traveling in paths through space are vectors. Customers, visitors, employees, inspectors, researchers, knives, carts, plastic tubs, all of us move in particular paths, picking up travelers along the way.

At one plant, after unloading the cows first thing in the morning, the owner went home at 8:30 to change his clothes and come back in new ones before joining his wife, kids, extended family members and several non-related employees in the cutting room to work with raw product. Another owner left to take her daughter to nursery school after touring me through the entire plant. I watched one inspector remove his holster from around his waist and place it, chains, knives, hook, sharpening steel and all, into the stainless steel inspection table where he takes apart heads and organs. He then walked into the pen to help herd the last two pigs in. Upon returning to the kill floor, he washed his boots and rubber overalls with spray from the hose, then sprayed down the knives and holster before putting them back on and resuming his work of inspecting. Some plants provide him with his own knife to use; but for most plants, he travels with his same two knives and inspecting hook, washing them well between uses.

But what if the slaughterhouse itself is in motion? In June 2012, I spent a day in Washington State's San Juan Islands where a mobile slaughterhouse built onto an 18-wheeler truck rides the passenger ferry each day to get to small farms where animals are ready for slaughter. Rather than taking the animals to slaughter, they

bring slaughter to the animals. The slaughterhouse itself is a vector, traveling across water and roads back and forth each day. But the mobility of the slaughter facility is only one of the ways this technology of slaughter messes with entanglements of cleandirty and insideoutside.

The kill floor of this mobile slaughterhouse extends from the center of the truck bed, where a wall divides the cooler from the work space, out the open back of the truck and into the world outside. Animals are slaughtered outside the truck, in the farmer's field or, on the farm I visited, on a concrete platform with a drain built for this purpose.

The mobile slaughterhouse troubles boundaries between insideoutside and cleandirty through fundamental practice. There is no clear inside line that a butcher stays within for the duration of the workday. The grass is continuous with the ramp which leads to the floor of the inside of the truck. The butcher who sticks and bleeds the animals outside of the trailer then drags those carcasses, bled now, up the hole-punched steel ramp and into the kill floor/trailer. This may not seem like a great transgression, but in the ordinary divisions and supervisions of stationary slaughter facilities, this move is troubling. There was no boot washing or apron-dousing as the butcher stunned each pair of sheep, slit their throats, then dragged their bodies up the ramp once they had stopped thrashing. In a stationary slaughterhouse, the pens are dirty and are divided from the main kill floor by some sort of gate or door. One side of the kill floor is typically considered dirtier than the other side, with the moment an animal's hide is removed as the divide between the clean and dirty sides. For the

mobile slaughterhouse, these boundaries appear less salient in practice. Rather than insides and outsides, there are contiguous zones that might be dirtier on one end than the other. For the mobile slaughterhouse, the natural world is not a separate dirty outside but an essential part of the square footage required for making good, clean meat.

The paths traced by humans and animals trouble any easy separations between insides and outsides, cleans and dirties. For mobile and stationary slaughterhouses, one space's outside is always the next space's inside. Frequent travel across these thresholds and actions--walking, stopping, turning back, leaving knives behind, washing one's hands again--mark separate zones and gradations of cleanliness. While Pachirat describes clean-dirty divisions imagined by a slaughterhouse planner and violated in daily practice, I understand these divisions as always in a process of being made and re-made. Border crossings draw attention to both difference and continuity in side-by-side spaces that are being articulated as separate. Border crossings constitute boundaries, they don't just blur them. Rather than understanding clean-dirty as the work of a puppeteer who designed the space, I argue that the paths traveled by humans, animals, tools and slaughterhouses are boundary-making practices that meaningfully produce space and difference in the process of daily performances. The lines traced through these daily movements and practices make cleandirty and insideoutside into legible but entangled categories.

Practices

Daily practices on the kill floor produce cleandirty/insideoutside locally.

Rather than overarching categories across all sites, I understand cleandirty and insideoutside as defined and made real for each local site and particular moment. Each site, each butcher, each time, has slightly different techniques and technologies for separating clean from dirty, and any clear boundary between clean and dirty is accomplished locally and contingently, not globally or permanently. Even within the relatively dirty space of the kill floor, some objects and areas are cleaner than others, and some animals are considered cleaner than others. The order of events and specific strategies produce different realities of what is clean and what is dirty. While the previous section focused on movement, here I focus in on daily repeating *practices* on the kill floor.

Cleanside/dirtyside

In his ethnography of slaughter, Pachirat describes a clear division between a clean and dirty side of a large industrial slaughter floor. On a small kill floor there isn't the same sort of spatial barricade between a "clean side" and "dirty side" of the plant - animals may travel only a few feet or no distance at all from the location where they lose their hides to the entrance to the cooler. While this might be on the other side of an Ikea-sized factory floor in a large plant, in smaller plants, it is often happening in a room that looks like a small concrete bedroom. In one small plant with a larger kill floor - about the size of an open-plan living room, dining room and kitchen, an inspector explained that there is a frontside and a backside to the plant, even when it is small: the area where the animals enter is the backside. And the area

where meat is cut is the front side. The kill floor is the essential transition zone between them, with dirty hide-wearing animals at the back side, and skinned, washed carcasses at the front side.

For the kill floor itself, a department of agriculture inspector who works in multiple plants described the important distinction between food contact and non-food contact surfaces. Once a pig's legs are skinned but it still has some hide attached to its back, it is usually lying on a metal cradle with its feet in the air as a butcher hooks each ankle into opposite ends of a metal gambrel: the longhorn-shaped metal piece that separates the legs and suspend the animal from the ceiling rail. Because it touches a part of the animal that is considered food, that metal double-hook is held to a higher standard of cleanliness. In contrast, the metal cradle that the pig is lying in doesn't need to be cleaned as often or as thoroughly because it is only touching the outside of the animal's (shit-covered) hide. The floor is dirty, and the doors to the cooler have to be washed but they are technically considered a non-food contact area. Everyone on a kill floor knows that a carcass may touch the door on its way in, after inspection and stamping and after being sprayed with the acid wash or water. While the cooler doors are technically not a food contact area, an inspector may make an extra effort to inspect or collect samples from the door when testing for the presence of microbes, knowing the door's significance in practice may differ from its official status as a non-food-contact surface.²⁴

While most surfaces and equipment on the kill floor can be ordered as part of the dirty side (pens, hides, non-food contact) or clean side (food contact) of the

process, knives straddle this divide. The inspector described that knives are a "transition piece" that come in contact with the dirty outsides of animals as well as the clean muscle and dirty gastrointestinal tract that lie within the animal's body.

Knives must be kept clean and sharp. On one kill floor, a small stainless steel container with a heating mechanism in it hung on the side of the sink filled with hot water to dip knives in. Inspectors and butchers are expected to wash their knives off when transitioning between different animals and between the skinning step (touching dirty hide) and the further cutting and dismemberment (touching clean food). If a knife nicks the gastrointestinal organs,²⁵ the knife should be washed, and if material gets onto any food surfaces of the animal, those surfaces would need to be washed and likely trimmed off with a knife.²⁶

Dirty and dirtier: clean and dirty nest within one another

Within the messy space of the slaughterhouse, hierarchies of cleanness separate dirty from dirtier. Pigs are dirtier than cows, and must be slaughtered after cows. Custom product²⁷ is dirtier than inspected; exotic animals and wild animals are dirtier than domesticated animals. Organics must be done before non-organic animals (or else the whole place must be cleaned thoroughly in between). One inspector described to me that she is just looking for a lack of visible fat or flesh from the animals slaughtered already before if a plant wants to shift from exotics (2 bison and one elk on that day) to domestics (several cows and pigs). They don't need to spray thoroughly or disinfect the space, just get rid of visible material in the slaughter area.

For this inspector at this particular site, the fat and tissue that stayed on top of the drain in the floor did not present a problem.

Older cows (30 months +, judged by which teeth have grown in) are treated as if they have BSE/mad cow disease. On a day I visited a plant with a fairly new inspector, the kill floor was shut down for the day after the brain stem and other potentially threatening material was thought to have been handled improperly, contaminating the space. The butchers would have had to clean and sanitize the whole room thoroughly, as they did between days of slaughter, if they wanted to slaughter the last few animals waiting in the pen. They decided instead to wait until the next day, and only had to clean the plant once.

Local practices for separating clean and dirty

Each plant has its own strategies of managing dirtiness, and these strategies often highlight areas that the particular site deems dirty though other plants might not. In one plant I watched butchers add an extra step to manage the dirtiness of the lines where a knife first drew a seam in the animal's body. In that moment of the first cuts, knives are cutting through hide, pushing aside shit, hair and skin, and carrying them along with the blade until it touches the muscle within. In a plant that thoroughly sprays its animals with water before skinning them, this might just be an invisible line of water-feces-hair-microbes that is treated no differently than the rest of the animal. But on this one kill floor they added a final step before fully raising the animal off the cradle. Once they had put the hind legs into the metal gambrel and hooked it to

ceiling rail, they lifted the animal partway, so its rump was elevated though its shoulders and most of its spine still laid on the cradle. Then the two butchers worked together as mirrors, each trimming off a ligament that runs at the back of the leg he was holding. The inspector and I were hovering as they did this the first time I saw it, and I asked him why. He explains that they do it for two reasons. First, there's a lymph node under there, and they remove that. Second, that was the spot where the first seam was: one of the first cuts was made into the hide along that ligament, and therefore it's a likely site of contamination.

Contamination and cross-contamination are constant threats, especially on a small kill floor. In these small spaces, there are often two animals or more in different stages of undress in the space at the same time. A butcher might have his back to one animal, laying in the cradle with its hide still on while he cuts into a skinned pig that is hanging upside down from the overhead rail. If a sleeve or the back of his jumpsuit or lab coat touches the first animal's hide, it might then touch the skinned animal, transferring contaminants from one animal's outside to the other's inner flesh.

On my first day visiting a small plant several hours from home, I was startled when I found my entire front side being sprayed from chest to ankle with water from the high pressure hose. "It's ordinary" the butcher said, perhaps in apology or explanation – "we do this to each other all the time." At that plant, it was automatic to spray oneself and other butchers down whenever there was a hose in hand.

In another plant, every surface was subjected to water blasts between animals and throughout the process of slaughter. There, a butcher sprayed each carcass

thoroughly after the hide was removed then sprayed the cradle and the floor between each animal, keeping the whole room cleaner than any other place I'd seen.

I've encountered another peculiar practice of separating clean and dirty while splitting carcasses. Splitting a large cow in half to get two sides of beef is not easy. In the largest of the small plants I've been in, there is a moving platform that a butcher rides down as he holds a splitting saw at hip level, using gravity to divide the animal in half while the animal hovers suspended with its head a foot or more above the ground. In plants that are too small for that equipment, a cow might be lowered head-first onto the floor in a sort of headless handstand position with its legs still high in the air. Even a short butcher is able to angle the splitting saw so it points toward the ceiling and away from him, lowering the angle and then the saw as he cuts downward toward the neck. As he gets close to the ground, the animal can be lifted higher with the winch (a quick push of the button is all this takes) so he can get a clean cut without hitting concrete. In some places this headless handstand is directly on the dirty floor. But in one plant I visited, the floor is sprayed down thoroughly with water and three large squares of white wax paper for wrapping meat are laid down to make a miniature sanitary mat for the animal to lay its neck and arms, a clean yoga mat for a headless handstand.

After pulling a carcass from the cooler, careful meat cutters may trim off lymph nodes and the thin layer of flesh containing the inspector's blue-black ink stamp before putting meat into the grinder or cutting it further. Butchers who take these extra steps explained that their goal is to build trust with the consumer. If

someone gets a tough or rubbery chunk of meat in their stew, or sees something that doesn't look as it should, that could lead them to take their business elsewhere. In the cutting room of a food cooperative in a major city, there are plenty of other places to buy meat, and the cutters explained trust as connected to the cooperative philosophy: we all own this place, and mutual trust is essential. In a small meat market with its own exit lane from a mid-sized rural highway, trust is part of maintaining loyal customers over many years. There, buying meat at the closest large grocery store is the alternative, and the owner prioritizes trust of his customers alongside consistent, trustworthy meat quality. This is the business that never asks customers for ID when they write a check. This is also the plant that, as I will describe in more detail later in this chapter, pumps its pigs' arms like a bellows to help them bleed out quickly and gently, a practice the owner developed when he couldn't find anyone to do the butchering, and worked the kill floor alone for several years. Staying with the pigs and helping them die in this way isn't just an altruistic move; it aligns with meat quality too. In that plant, the owner tells me, they've found that they get better meat and nicer looking hams when they drain the blood out this way, swiftly and thoroughly.

National borders can also divide strategies for separating clean and dirty. In the US, lungs are never approved for human consumption. Not only are they a filtering organ, but they are seen as a primary contact with the dirty outside world with all the ills of air. Though they are inside the body, they form a continuous cavity with

the world outside, and while they are considered a delicacy in some countries, they go to pet food or a rendering plant in America.

Federally inspected plants approved for exporting meat need to follow the US rules for slaughter but also add the preferences and restrictions of the countries they export to. One plant I visited exports pork to several Asian countries and bison to the European Union. In the US, federal mandates demand that there be a “control point” at the final step before entering the cooler: a zero-tolerance inspection for the presence of any fecal matter or other contamination.²⁸ During this step, a hair, a small piece of hide that wasn’t removed, or any other visible particulate matter will be trimmed off along with the flesh it was touching. But prior to that final inspection step, most plants add a spray step either as another critical point or just as a part of the standard sanitation operating procedures. In some plants, this is a peroxyacetic acid or other acid wash. In more natural-leaning plants, they will use a simple vinegar-water solution or only use water. For animals being sold in the US, this federally inspected plant uses a peroxyacetic²⁹ acid wash on all animals. But for export to the EU, they only use water. Within the same plant on the same kill floor on the same day, the standard of cleanness can vary from process to process and animal to animal.

Some sickness is dirty; some is clean enough to eat

I’ve described cleandirty and insideoutside as locally and temporally contingent. The European Union wants only a water spray before a carcass goes in the cooler; pigs are too dirty to slaughter before cows, but are fine to slaughter after elk.

Pre and post-mortem inspection of animals highlights another local and temporal aspect of carving out cleandirty in animal slaughter. Before an animal gets to the knocking box, it is considered healthy and clean so long as it can walk on its own and has no discernible signs of illness. The shit that clings to its thighs is not seen as dirty or diseased because it poses no threat to the cow's health and to the parts of the animal that will be used for food. But once an animal has passed through the knocking box, bled out, and starts to be skinned, the natural world that clings to its skin is considered dirty. While its own shit may not have been a harbinger of disease for the animal, it could be for the human if it is directly consumed.

Inspectors are primarily concerned with identifying any animals or parts that might not be fit for human consumption. Lymph nodes are located amid masses of flesh and bisected to find signs of major infection. Heart valves are fingered, kidneys and stomachs and intestines are massaged and visually inspected. An inspector can condemn a single organ or if they suspect widespread illness throughout the body, they can "tag" the animal and wait for a licensed veterinarian who works for the department of agriculture to come out and make a formal ruling on the animal. For some concerns, photos sent by text message between the inspector on site and the head veterinarian can provide enough information to assess a body. Other times, the vet must come out in person to determine whether or not the carcass is fit for consumption.

Some sorts of illness in the living animal are alright for humans to consume once the animal has died. And others are not. If a pig has huge worms throughout its

intestines, but the worms have not infected the heart, the intestines would be tossed in the offal bin but the rest of the animal would be deemed safe for human consumption. Apparent tumors or cysts that are isolated to a single organ may result in condemnation of just that organ. As a rule, any infection or sign of illness in the heart - a small abscess or evidence of infection, scarring, worms, is grounds to tag an animal. As an inspector explained, that contamination has circulated through the whole animal, and the animal is considered systemically infected (septic).

On one kill floor they started trading stories of abscesses: when your knife cuts into it the smell is unlike anything else, it can linger for hours. One guy describes cutting into the head of an animal not realizing he was puncturing a large abscess – the rancid stuff fell all over his head and his boss instinctively, without asking, started spraying him down from the top of his head and face on down with the full force of the hose. He was grateful, but the smell still stayed.

Clean and dirty are not global master categories; they are solved locally and contingently by putting down paper for a cow's headstand (or not), by spraying each others' aprons (or not), by trimming off that ligament or this lymph node, putting fingers in the aorta, using a peroxyacetic acid spray...or not. One plant's clean is another plant's dirty and each day and each animal may demand different agreements about what is clean enough for right here, right now. What is clean in the pen may be dirty in the cooler. And gambrels may be scrubbed cleaner than cradles. In the segment that follows, I focus on the animal's body itself at the moment its hide is

removed, when animal (wearing its hide, resting on the cradle) officially becomes edible food (stripped of its hide, hanging from the gambrel).

Bodies

The animal's body: cleandirty/insideoutside produce one another.

In the process of skinning and dismembering an animal, a dirty outside is flipped inside out to reveal clean insides, insides which are themselves filled with a dirty inner tract continuous with the outside world from mouth to anus. Cleandirty and insideoutside produce one another but their relationship is not as simple as a clean interior and dirty exterior. As with the paths walked through a plant and the daily techniques and technologies I've described, the animal's body itself produces clean and dirty spaces as its insides and outsides are remade in the performance of slaughter. I have already described the paths taken as animals and humans move through a slaughter plant, and the practices of butchers and inspectors working to separate clean from dirty. Here I walk once more through the movements and practices of slaughter, this time paying particular attention to the details of what happens to an animal's material body between the holding pens and the cooler. Through this tracing, I explore how cleandirty and insideoutside are irrevocably entangled even as boundaries are drawn between each pair.

I have articulated my analytic mode as performance-based: focusing on the moves and routines of daily practices, and I have described boundary itself as performative: produced through repeated daily practices. I also use performance as a

mode of engaging content and audience, both through the more traditional academic mode of conference presentations and through performance art and stage performances. In this next segment, I offer a performance for the reader: a scripted enactment of removing an animal's hide, that you can perform right now at home or wherever you are as long as you have a few simple props: a pen, a condom, a banana, and something you can hang it from.

An animal leaves the pens and walks, coaxed or pushed, down the chute to enter a holding cage. They are typically stunned with a captive bolt gun or a shotgun or rifle, or an electrical shock or in larger plants a CO2 chamber to render them "senseless." They are then stuck – sliced across the neck and hung upside down so that the blood that hasn't contracted in their arteries spills out to a drain or tub. Then the process of altering or removing the skin begins.

Pigs and chickens are often scalded and stripped of hair or feathers, but cattle, bison, sheep, goats, and sometimes (in some small slaughterhouses without a scalding tank or according to preference) pigs too – are all peeled.

The ease of peeling depends on variations like breed, feed, species, age--an older animal can be harder to peel. *I've seen pigs peeled it was brutal. A matter of force, of blade, But not sheep. Sheep peel. All they need is a bit of a push, a start, an opening. They say it's the lanolin. After a day of peeling sheep, your hands are smooth and buttery, babies' bottoms.*

Bison and deer are often peeled, but less willingly, either an end of the hide is attached to a hook in the floor and the body is raised, pulling the skinless animal up

and out, or the animal's body might be attached to the floor, through a hook into the mouth perhaps, while the hide is attached to the winch and raised, coming up and off of the skinless body.

Inside, outside, clean and dirty switch places and produce one another in the practice of slaughter. In the moment of peeling, inside/outside/clean and dirty play a sort of ontological game of musical chairs and really start to matter. **[hold up banana on meat hook with condom on it]** I am going to assume that everyone in the audience knows how to put a condom *on* a banana, so I'll skip that part. I want you to imagine that this condom is the animal's skin--the barrier separating inside from outside.

But as the skin peels **[peel condom off banana]**, the inside – raw muscle **[point to yellow peel]** is exposed: the inside becomes a new outside for the body while the inside of the skin itself forms a new outside to an enclosed ball of wool, dirt and shit: A pillow of sorts, a stuffed twin to the skeleton, muscles and organs that remain hanging. In this moment the internal tissue –which we understand as clean so long as it's protected within the body – becomes a potential site for contamination. Though shit on the animal's hide is perfectly fine, shit on this edible muscle is dangerous.

Here inside becomes outside and dirt is only produced as dirty once the inside/outside inversion takes place, offering a clean slate that dirty can contaminate.

The peeling is a critical step, and it marks the start of practices of watching for shit once shit becomes troubling. When the skin is peeled, the inside becomes outside.

Animal is imagined as edible, and the teeming microbes on our and their skins become threatening.³⁰

Once an animal is skinned, the next step in the process of disassembly is evisceration: a slit down the ventral (belly) side of the animal **[use pen to make a slit down the banana]** and a few cuts allow the body's insides to come out: stomachs, hearts, livers, gallbladders, kidneys, intestines, **[remove whole banana through the slit]** all this offal is removed – (some discarded, some inspected, and some slated for every manner of industrial, biomedical, and edible use).

Although the flesh inside a skinned hide is clean, there are insides within insides that are themselves, again, dirty. As it was explained in our food safety course, all animals, human and non-human alike, are covered from head to toe in shit. Not only are we covered in shit, we are also *full* of shit. So the problem of animal slaughter becomes a sanitation nightmare. The flesh of living animals is imagined as food while the organs that keep the animal alive are Trojan horses packed with microbial enemies. Inside the insides within the inside of each animal, shit teems with microbes – some of them threatening to human eaters. Once these innards are brought outside the body, this body without organs must be washed – the inner cavity may have touched fecal matter when the innards were removed. In this space of death, extraordinarily prolific liveliness threatens the lives of future human consumers.

Once skinned, eviscerated, and sprayed, the carcass is clean, sellable meat. But if it falls to the ground at any point- a dirty, contaminating surface, every bit of surface area that touched ground is taken to be dirty. Carcasses do fall, whether from

human error or a faulty hook or a glitch in the rail or something else. When it happens, a cleaned knife is used to whittle away these bits of skin, losing as little meat as possible to remove all the dirty and leave again a clean, bloody dead carcass. This is a numbers game, and more meat on the bone means more yield - more sellable meat from the animal. The thinnest possible layer of fat or muscled is sliced off so that the contaminated material is removed without reducing the carcass weight too much.

Inside and outside continue to matter and come to matter differently as the carcass goes from cooler to cutting room. The exterior surfaces of any cut of meat are places for bacteria to accumulate and grow. Grinding meat troubles these boundaries of insideoutside/cleandirty deeply. With ground product, as one meat expert explained to me, “you’ve taken the external environment and turned it inward. The entire product is considered an external item now.” More stringent protocols guide the handling and testing of raw ground product as opposed to whole cuts of meat. When a plant is developing HACCP plans, they need to have a separate plan for processing raw, raw ground, and cooked/ready-to-eat products. Ground meat with its nearly infinite outsideness poses more threats than whole muscle cuts, and it is subject to greater scrutiny and more frequent testing for the presence of *E. coli* and other microbes. These infinitely outside insides are troublingly dirty.

Final notes on cleandirty/insideoutside

I have argued that cleandirty and insideoutside are entangled and messy dichotomies that produce one another through daily performances: walking in paths

through a slaughter plant, dragging a carcass up the ramp of a truck, sniffing out abscesses as local or systemic infections, trimming off ligaments and lymph nodes, peeling animals inside out then bringing their insides out. In all of these paths traveled and daily techniques, cleandirty comes to be along with and alongside insideoutside. Not only are the partner-pairs within each dichotomy deeply entangled, what we typically understand as two distinct dichotomies are part of the same meshwork.³¹

Lefebvre claims that embryogenesis can explain the primary dichotomy -- inside/outside-- and all dichotomies that follow it. Rejecting this Noah's ark of differences, perhaps animal slaughter can add to the attempts to rethink difference with different geometries, or to move beyond geometrics or boundary entirely. The very process of forming a gastrula takes us through a fishy time, where matter has neither inside nor outside, a sort of proto-body not unlike a skinned and eviscerated animal with a slit down its middle. If we were to take Lefebvre's embryogenesis as a worthwhile thinking space, but to pause here, in the space of potential before the gastrula has closed, other ways of thinking difference might open up. The animal carcass, a body without organs, is a rough reversal of Lefebvre's gastrula in the disassembly of a post-natal body: a line traced along the exposed flesh of a carcass would find itself outside then inside then outside again, much like a line traced on the multicellular mass of a developing embryo.

This movement mirrors Elizabeth Grosz's geometrics of the Mobius strip, drawn from Lacan's description of the subject, where inside begets outside and inside again rather than a dichotomous break between dualisms. In her 1994 book *Volatile*

Bodies: Towards a Corporeal Feminism, (1994) Grosz uses the Mobius strip to explain the relationship between the (interior) psyche and (exterior) material body. She moves away from more common metaphors of dualism and from monistic accounts where the mind and body are one inseparable mass. Instead, she prefers a geometry that emphasizes dualisms that flow into and become one another (Grosz, 1994, p. xii). Anne Fausto-Sterling picks up this strand in her *Sexing the Body* (Fausto-Sterling, 2000), as a compelling challenge to the notion that things or spaces have distinct insides and outsides. Instead, Fausto-Sterling argues, the *materialization of bodies* ("sex/nature") and the *production of knowledge* of gendered bodies ("culture/gender, science, nurture") are mutually implicated rather than an inside/outside dichotomous pair. Fausto-Sterling later adds another material metaphor: what if history and culture, human relationships, the psyche, the organism, and the cell are like nesting dolls, where the beauty and intricacies of the system can only be understood in aggregate? (Fausto-Sterling, 2000, pp. 253-255).

But the geometrics of solid surfaces, no matter how they nest or twist and conjoin is a limited stand-in for the material complexities of bodies. Though animal hides are treated as sterile blankets with a dirty outside and a clean inside, we know that skin is a selectively porous barrier, allowing hormone-mimicking toxins and carcinogens in our face creams to enter the bloodstream. The porosity of body boundaries, Mobius strips, bodies without organs, lines as traces of paths traveled rather than walls between points: I offer these to our multidisciplinary toolbox of conceptual tools and figures for thinking difference differently.

[Two] Lifedeath

Lifedeath is never fully cleaved. Separating life from death is a matter of local and partial agreement and good-enough-for-the-job-at-hand embodied judgments.

Dichotomous pairs misbehave on the kill floor: clean and dirty nest within one another and may never be wrenched from insides and outsides, but the boundary between life and death is more troubling still. Lifedeath doesn't ever seem to be resolved into two clear segments with a line between, even for a particular instance and location. Life and death are not clear and separate categories in the slaughterhouse: they zig zag, nest, and lay on top of one another. Animals are stunned unconscious, but they may wake to consciousness again before losing enough blood to lose consciousness for good. Cells continue respiration long after death, breaking down muscle into meat, or living for days or years in the laboratories that come to collect tissue samples. And from the holding pens to the cooler, the insides and outsides of animal bodies teem with microbial life.

Lifedeath on the kill floor is a messy happening, a phenomenon with no clear moment where life ends and death begins except as it is defined through acts of querying bodies: are you dead yet? As I will describe in detail, life and death are not separated by a fixed locatable boundary but through locally agreed-upon signs of animal-human agreement that are good enough for now. Lifedeath on the kill floor is messy not only in the blood and fat that fall to the floor or the spirawhirl painting an elk left on three walls – not only materially messy but ontologically messy too. Butchers, inspectors, and lab workers collecting specimens on the kill floor all define

death differently, and they are each invested in their techniques for separating life from death.

To butchers and inspectors, sentience is what matters: can the animal sense? Animal sentience is understood as the capacity to feel and to suffer. Emma Roe (2010) explains that animal sentience is important in the slaughter industry for two reasons: if an animal is skinned while it is still sentient, it would both violate animal welfare regulations in many countries *and* produce poor quality meat. While Roe examines the materiality of sentience in antemortem and postmortem analysis of animals, I focus on *perimortem* sentience: kill floor workers' embodied practices of watching, listening, and touching the animal *around the time of death* to determine how dead an animal is.

In his ethnography of slaughter on a large Midwestern kill floor, Timothy Pachirat argues that there it is never possible to categorically state that there was a moment when animals were dead (238).³² I agree with Pachirat that there is no precise moment of death, but on the small kill floors I've been to, butchers spend a great deal of time and energy working to categorically claim that death has happened, or happened enough. Across multiple sites, the goal is to determine when and whether an animal has become permanently unconscious and is dead enough to be skinned. But the strategies for determining whether this has happened vary enormously, and are among the most intimate animal-human practices I have witnessed anywhere.

In a large industrial slaughter facility, the pace is set by a steady line speed: once an animal is hung up on the rail, that animal starts moving to the sticker who slits

its throat, then to the tail ripper or whomever is first to start the process of skinning and dismemberment. While line workers and inspectors may watch for and report an anomalous live animal on the line and shoot the animal or stop the rail until it is dead (at great expense to the facility), they do not have to carefully query each animal to determine whether the line will move: powered by electricity, the line moves on unless stopped.³³

In the smaller slaughterhouses I spend time in, butchers are face-to-face with the dying animals and work intimately with each animal to sense whether they are dead enough to take apart. On these small kill floors, the same butcher (or two or three) will stun the animal, slit its neck and hoist it onto a cradle for cutting. Rather than watching for something gone wrong in the normal course and pace of events, they query each animal to determine when and whether death has gone right. The pace is controlled by each animal's particular death rate not a predetermined standard line speed. While each animal loses blood, humans wait around or occupy themselves with other tasks, driven by the rate of each animal's death. The butchers, not a set line speed, must decide when an animal is dead enough to be placed on the cradle and skinned, and these butchers have developed intimate ways of sensing whether an animal still has the ability to sense.

This study of workers' ways of sensing builds on a body of literature on professional or skilled vision (Crary, 1990; Goodwin, 1994; Grasseni, 2009b). Focusing on archaeologists, police officers, cattle breeders, illustrators and other professions, these projects describe how skilled practitioners develop specific ways of

watching and seeing. In tracing the details of these ways of seeing, each author articulates ways of knowing as historically situated and lodged within particular communities of practice. I move away from a focus on vision and the dominant metaphor of seeing as knowing (D. Haraway, 1988) and into descriptions of the embodied, multi-sensory, interactive auditing practices that humans, animals and things accomplish together. In the stories that follow, I articulate the details of modes of watching and sensing for the right kicks, responses, and vocalizations that indicate when non-human animals are dead enough to be skinned. These are intimately engaged practices of staying with and auditing animals while they are dying in order to determine whether the animals are conscious or unconscious, dead or alive.

I argue that these skilled practices of embodied auditing not only discern whether and when death happens, but they define Death in the process. Not only does this work make each individual animal's death happen, it makes Death as a category distinguishable and distinct from Life. In other words, this is not only a problem of knowing: how do we know death? how do we determine when it has happened? It is a problem of being: what *is* death? when does it happen? Here I follow the lead of Annemarie Mol, Helen Verran, Eduardo Kohn, and others, taking these problems seriously as questions of what is and what can be, not only what can be known. Among anthropologists, this is described as an "ontological turn": rather than chalking up others' ways of knowing to their particular culture while staying comfortably anchored in one's own (usually Western) ontologies, we can instead take all knowledges *including our own* as equally world-producing systems. It is not simply

that African schoolchildren are understanding numbers differently; there are different numbers (Verran, 2001). The Amazon don't merely believe that dogs can predict the future in their dreams; dogs can sometimes do so (Kohn, 2007). In Mol's work, patients, lab technicians, and doctors don't merely have different perspectives or understandings of atherosclerosis; they *enact* multiple atheroscleroses in their daily practices (Mol, 2002). In each of these cases, what could be taken as a matter of knowing something is instead understood as constituting the thing itself. The details of how butchers sense animal sentience is not only a question of *knowing* life and death and *understanding* them as distinct; the butchers, animals, lab scientists, and microbes I describe are actively making life and death and producing them as distinct states of being.

Sensing sentience is a way of making meaning out of flesh: a mode of fleshy meaning-making (D. J. Haraway, 2003, p. 35).³⁴ In this case, human and non-human animals are making sense together of their own lifedeaths through intimate and engaged fleshy sensing. In the stories that follow, animal flesh is sprayed, cut, and tickled, human fingers are drawn into brain stems, made to squeeze hoses, stunners, bolt guns, again, again, once more, making death happen and distinguishing life from death in the process. In these interactions, butchers work intimately with the animals to determine when death has happened.

Kicks

In 2010 I visited a friend in a small Vermont slaughterhouse where she worked as a meat cutter. She spent her day in a small room just off the kill floor cutting and grinding the bodies that were processed just a few feet away. Earlier that spring, she and her boss told me, an animal welfare expert had come in to train the staff on how to tell whether an animal was dead enough to be skinned.

She was hired by the state because there was an incident a couple years ago because someone saw them abusing animals—starting to skin calves before they were completely dead. Press like that can be really bad for an industry.

There are signs--there's a certain way that they're kicking post-death that's different...

[If] the leg that's dangling has random kicks, that means its dead--there are certain signs you're looking for in the way the animal hangs, it's kind of subtle. But the reason the one slaughterhouse was busted was the animals were still kicking in a way that meant they were not quite dead. (Guillemette, Personal Interview)

This description of how to determine whether an animal is dead—ignore the involuntary kicking, but watch for the sort of kicking that could mean it's alive—privileges skilled watching. Watching and listening for eyelid responsiveness, tongues hanging out, and vocalizations are the primary modes state and federal inspectors use in conducting animal welfare audits and daily observations on a kill floor. But the butchers I've worked with have much more varied and more intimate techniques for working with each animal to determine when it has died.

Francisco tickles the medulla

Francisco cuts each cow's head off entirely. He shoots to stun them, then opens the metal gate, attaches a chain with a hook on the end around the animal's hind ankle, then hoists the animal up into the air. When the cow's head is at about waist height, he cuts deep into the jugular vein – blood is pumped and drained: gravity and the cow's beating heart work together, moving toward death. And while some kill floors I've visited let the cow bleed out through a slit in the throat, here Francisco cuts off the whole head, either grabbing it by an ear and catching it as it severs, or letting it fall to the ground and picking it up by an ear to drag it to the offal bin.

He lets the cow bleed out, hanging headless over a bin, and then he moves in to check on lifedeath. Here death is a happening, a process, it takes time, and like cooking a steak, the doer checks in to see how it is coming along. Francisco waits, then reaches in, putting his hand up into the cavities of the severed neck. He does something, and the cow kicks. He waits, does this again, and again it triggers kicking. *Ahora, está muerto?* I ask. *No.*

I ask him what part he is touching – *qué parte?* *Como sabes cuando el animal está muerto?* How do you know when the animal is dead? He shows me that he is wiggling a finger right at the medulla: the place where the spinal cord and brain once connected. I think we are both grateful for these Latin anatomical words that allow us to exceed our abilities of translation. By wiggling a finger just so, he triggers the animal to kick. This is a strange puppetry, and I watch it for each animal: headless

beings that are still alive. Being asked: are you dead yet? With fingers, wiggling where a head once was.

Kicks in the water spray

On the kill floor of a large agricultural university, they stun pigs with an electrical stunner that hangs on the wall looking all of its 40 years of age but working more consistently than newer models I've seen elsewhere. A pig is led down the chute made of metal bars from the pens at the back of the food sciences building onto the kill floor. With a sharp left turn (some pigs cause trouble here, start to back up, are coaxed by two human thighs and hips planted squarely behind them pressing into their buttocks, pushing them forward), then a several-foot short incline, they are in a metal cradle: two slanted smooth walls on their right and left side, and a metal floor that promptly drops out when kicked by a human.

The pig hangs, suspended under its belly, legs dangling.

The butcher lifts the Y-shaped stunner from the long-handled human end of the y, flips a switch to turn on power, and touches the two prongs at the top of the y to the skin behind the pig's ears. With a jerk, the pig raises slightly like it is shrugging its shoulders or being slightly levitated, traveling upward with and towards the stunner.

Austin explained to me that he waits until the pig's tail is up in the air - that is the signal that she is electrocuted enough to be temporarily unconscious.

With the tail erect, the butcher lifts the stunner off the pig and returns it to its hook on the wall; the cradle is rotated so the pig slides out on its right side and falls to the floor. Student workers rush in with a chain to get her hung up by a hind leg, then lift her into the air with an electrical winch that whirrs. Once she is raised high enough – her head hanging upside down between human hip and knee height – the head butcher steps in to slit the pig's throat.

The student workers, often a woman if there is one there, spray the pig down from feet to neck to clean it. They use the pressure of the hose to guide the blood and dirt down to the drain in the center of the concrete lowered segment of the kill floor.

Then the people stand around for a bit while the pig hangs upside down, dripping water and bleeding out through the slit in its neck. Or two people will go usher another pig in or get back to disassembling the pig that came before this one.

To test whether the animal has bled out enough, if it is dead enough to now be skinned, the student workers will spray water at the pig's feet hanging up in the air. If the pig kicks in response, they wait, watching more blood drain from the neck to the ground.

Pumping the animal's heart like a bellows

On Francisco's kill floor, he and one other man do all of the killing. When they are finished for the day, they are the sanitation crew, taking apart the electric saw and scrubbing each component with soap and water; emptying and spraying down the animal pens; scrubbing and washing every wall of the kill floor. While the layout of

their space and divisions of labor are familiar across many small slaughterhouses, the way they bleed pigs is unlike anything I've seen.

On small kill floors, depending on space, equipment, and local practice, pigs might be stunned with electricity, as they are at the University, or else stunned with a shot to the head (from a bolt gun, rifle or even handgun). Then the pigs are either strung by a hind leg and stuck in the throat while dangling, or stuck while lying on the ground, slumped from the stun or shot, and left to bleed out on the floor. Francisco and his co-workers slit the pig's throat on the floor but they don't leave. They crouch beside the pig, holding his front arm in one hand and a small plastic tub to collect blood with the other. They place the lip of the tub against the pig's skin and pump the front arm up and down like a bellows. As they pump, seemingly in time with the slowing or stopped heart, blood flows out: trickle, gush, trickle, gush, trickle, gush. They stay like that with the animal until it has lost most of its blood and is ready to be lifted onto the cradle.

In each of these stories, human and non-human animals are working together to determine when death has happened. The messy space between living and dying gets organized into a before and after: now it is still sentient; now it is dead enough to be skinned. But it isn't as simple as locating a point of death on a unidirectional line. If an animal wakes from the stun before it has bled out enough, the animal might be unconscious, then conscious, then unconscious again, toggling back and forth between liveliness and brain death. Even once the organism is dead, living animal tissue is sometimes taken from the kill floor by lab scientists and maintained as living tissue or

living cells for days or even years. The line between life and death is not neat and it is not pre-determined. By staying close to one another, adjusting to the particular pace and details of each death, butchers and animals define what death is.

Butchers learn to watch for the right sorts of bodies and kicks on the kill floor, but they also engage in embodied sensing and auditing, not just passive looking. Strange though it may seem, headless creatures may still be sentient, and even if the brain stem is severed, bodies can respond to physical stimuli. Butchers don't only develop skilled vision but skilled doing-sensing. They become skilled not just in watching for kicks, but in ways of touching, crouching, and spraying, working closely with the animals to determine whether they are still sentient. Sensing sentience is not only a visual practice accomplished by the humans on the kill floor; it intimately engages the full bodies of butchers and animals.

Defining death and separating death from life requires animals and humans to come to agreement. Butchers query the animals, asking: are you dead enough to continue? The animals answer, saying "no, not yet" until they do not answer – this embodied non-response is the "yes, ok, let's continue" that butchers are waiting for. On a small kill floor where butchers work intimately with animals to meet or surpass national animal welfare standards for slaughter, slaughter cannot continue and death cannot exist without the animal's assent. This is one of many moments of animal agreement in the slaughterhouse. In raising, transporting, and bringing animals onto the kill floor, humans and animals are in constant communication and negotiation. Pigs, cows, elk, bison and other animals are too large to be forced by a human's hands

or to simply be carried in. Good butchers are working to ‘get to yes’ with the animals each step of the way.

Each slaughterhouse I have visited has a slightly different strategy and consensus for what signs are good enough indicators that an animal is dead enough to be skinned. With animals as with humans, there is no single indicator that can point to a precise moment of death. Pulse, electrical pulses from the heart, or brain wave signals are the most commonly used signs of human death or brain death. But with each of these there must be a consensus about how death is defined (dead enough for what?),³⁵ and what mediating technologies will be accepted indicators. Cutting off an animal’s head and tickling the medulla cuts out the lulls and errors of many mediating technologies, but still there is no definite moment where life ends and death begins, only good enough signs that enough of the process of dying has happened. There is no moment where a firm line is drawn across life and death, but instead a sort of coming to agreement around something – or a coming to agreement that produces a sense of something--deadness separate from liveness--that is good enough for now.

Still, practitioners care about a moment of death and will sometimes declare a moment. The declared moment of death and what deaths and lives matter (organism, tissue, cell, animal, microbe, etc) are specific to each site and community of practice, and are made through site and community-specific practices. On the same kill floor, butchers may be watching for kicks, but lab researchers who visit the kill floor to collect animal tissue have their own ways of defining death and determining when and whether it has happened.

Researchers from different labs come to the university kill floor periodically for a heart or lung or fresh cow's blood to feed flies. One lab, housed several stories above the kill floor in the same building comes several mornings in a row once or twice each year to pick up cow thigh muscles that they will use in experiments for the many months ahead. Around nine o'clock, a postdoctoral researcher named Kara and a colleague come down pushing a metal cart and carrying a clipboard. While the kill floor workers and inspectors all describe death to me as something that happens once the animal's neck has been slit but before it is skinned, Kara records the moment the first bolt gun shot fills the space. From then, she and her colleagues have 30 minutes to collect and process the muscle in order to stay within the protocol that they claim to use in their scientific publications. I will describe in detail later all that these researchers need to accomplish in those 30 minutes. But here I want to focus on how they measure the moment of death. As the cow is ushered into the knocking box and the butcher climbs up to stand above the animal with the bolt gun in hand, Kara keeps an eye on her iPhone, jotting down the animal's ID number, its weight, and the 'time of death' on her clipboard. This lab measures the moment of death as the instant when the stunning shot rings out: a time when the animal is still very much alive for the researchers and inspectors.

The university kill floor slaughters two pigs every Tuesday for a lab that uses the cervix and vaginal tissue to make models of human vaginas to understand and find treatments for toxic shock syndrome. One Tuesday morning, I wait in my car as the researcher who retrieves the tissue gets hers from a parking lot near the kill floor

building - then I follow her to the lab, about 10 minutes away, a route I haven't ever taken from where we are to the east bank of the Minneapolis campus. I find parking there and she waits for me so she can take me up on the elevator with her magnetic key card. I ask if it matters how much time passes between the time the animal dies and when she finishes processing the tissue: punching out little hole-punch-sized circles and placing them into small petri dishes with semi-permeable fabric bottoms. No, she says. They don't measure the time.

These models of human vaginas are lively in a different sense than the muscle cells that are frozen and defrosted across campus. While the muscle cell lab is focused on living cells, this lab maintains a model of living *tissue*: those small hole punches of vagina still carry on enough of the processes of living tissue to be considered "ex vivo": still living though external to the body. But here, the moment of the animal's death is not part of their calculations, instead they are focused on taking living tissue and maintaining its liveliness after the organism's death.

This is a different sort of lifedeath: not a unidirectional spectrum, not a line, but a peculiar sort of biological nesting of life within death. In the muscle cell lab, *cells* live on after organism death; in the vaginal model lab, *tissues* live on after organism death. A dead body can have live tissue nested within it, and even after the tissue is ground to a pulp and ceases the life processes that define it as living tissue, living cells abound. In the vaginal tissue lab, there is yet another nested life form that continues after the animal's death: microbes. Depending on the experiment they are running, sometimes the 'native' colonies of microbes are allowed to bloom on the

vaginal models; other times they are killed with antibiotics and replaced with the specific strain of bacteria the researchers want to study, oftentimes a strain of staphylococcus or “staph.” Staphylococcus is not a bacterium discussed much on the kill floor, but for these scientists studying toxic shock syndrome, it is one of the most important. In this lab, tissues are kept alive in order to understand how to best kill microbes that live on the tissue. Life begets life with the goal of learning to end other lives better.

On the kill floor and in these labs, daily practices around lifedeath produce boundaries between life and death, but they produce other cogent boundaries as well. The comings together of animals and humans position non-human animals as killable in contrast to human animals who are killers, eaters, and knowers. With each repetition, these practices of killing animals and discerning their deaths make animals more killable. The repetition of practices, whether they are well-worn or anomalous, make subsequent repetitions easier to imagine and to accomplish. In the process of killing, humans emerge as killers and pigs, cows, goats, sheep, elk, bison and other creatures as killable. In the next and final chapter on boundary work, I will look more closely at the entangled lives of animals-humans-microbes and the process of making some living beings killable.

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[Three] Managing Lives: who lives/who dies

Daily management practices articulate power: who lives vs. dies; who is protected vs. managed.

In animal husbandry and slaughter, animals, microbes and human beings come together in particular configurations with very unequal outcomes. The daily practices of slaughter produce boundaries between life and death, inside and outside, clean and dirty, but they also produce boundaries between varied lives and bodies, deeming some protectable and others disposable. Here I look again at daily practices of separating life from death, clean from dirty and inside from outside, but with a focus on how these same practices determine who lives and who dies.

The comings together of animals and humans position non-human animals as killable in contrast to human animals who are killers and eaters. With each repetition, these practices of killing animals and discerning their deaths make animals more killable. The repetition of practices, whether they are well-worn or anomalous, make subsequent repetitions easier to imagine and to accomplish. In the process of killing, humans emerge as killers and pigs, cows, goats, sheep, elk, bison, and other creatures as killable. I'll focus here on the practices for managing microbes on a kill floor: cleaning and killing practices that also sort out who should live and who must die so that others can live.

Visible nowhere but imagined everywhere, microbiological lives are lived on the outsides and insides of human and animal bodies. While animals' deaths are separated from life through intimate sensing practices, microbial lifedeath is regulated through impersonal managerial strategies. I have argued that repeated killing and

discernment of death in animals produces animals as killable. Here, I argue that the management of microbes frames microbial lives as manageable: infinitely replaceable and governable from a distance. These same practices of managing microbes to protect consumers simultaneously manage workers, making workers manageable and infinitely replaceable in the process.

The primary strategy for managing microbes in meat production facilities is a strange lovechild of space scientists, Pillsbury foods, and the US military. HACCP (pronounced “ha-sip”) stands for “hazard analysis and critical control points.” The approach was developed in 1959 in an attempt to avoid adding the insult of diarrhea-in-space to the injury of Sputnik. In collaboration with the US Army’s Natick Laboratory and Pillsbury, NASA worked to apply its engineering management concept of “critical control points” to the process of food production, with the aim of producing close-to-zero-risk food. The goal of HACCP is to “identify critical failure areas and eliminate them from the system” (Sperber, 2009), an approach extrapolated from the munitions industry’s testing of explosive shells. With munitions shells as with ground beef, one hundred per cent assurance through traditional testing would use up nearly all of the product--exploding every shell or testing every gram of beef for microbes would leave little or none for killing or eating. Applying systems engineering logics offered better control than random sampling and left more product remaining than sampling every single shell or patty. Through HACCP, risk management could be better engineered.

When glass shards were found in Pillsbury's Farina cereal in the early 1970s, staff microbiologist Howard Bauman applied his work from the NASA collaboration to the realm of earthly food production. In the 1990s, following an E. coli outbreak at US fast food chain Jack in the Box, HACCP rolled out across slaughterhouses and meat production establishments.

Today every US slaughterhouse and meat processing facility (as well as seafood and fresh juice processors)³⁶ must have a HACCP plan in place to be able to sell food to the public. For slaughter plants, the U.S. Department of Agriculture (USDA) (and some state departments of agriculture) make sure that every inspected slaughter plant has current and approved HACCP plans in place, and that the plan's steps are followed to reduce the risk of foodborne illness and other contaminants and adulterants in foods.

I argue that HACCP manages workers as much as microbes, and it does so first through employee trainings and HACCP plan development. Through these activities, butchers and inspectors are trained to have the right sorts of imaginations and attitudes, imaginations and attitudes I have developed alongside them. For two days in 2013, a dozen or so meat professionals and I--butchers, newly hired meat inspectors, a man starting his own sausage company--sat in a "HACCP, Sanitation and Auditing Workshop" provided by the university's meat science department and a statewide agricultural research institute. Our trainers explained how important food safety is: "We need to guarantee we're putting our best food forward." Understanding food microbiology was the first step.

The presentation began with Sun Tzu's quote from *The Art of War*: "If you know the enemy and know yourself, you need not fear the result of a hundred battles." (*The Art of War* Chapter 3, section 18.) If we understood the microorganisms and all the potential points of contamination in our production systems, we would be able to "provide clean, safe, wholesome food to the consumer." To know the enemy we had to learn to imagine microbes and to imagine them everywhere. We looked at pictures of *E. coli* 0157:H7, *Salmonella*, *Staphylococcus aureus*, *Campylobacter jejuni*, *Listeria monocytogenes*. *Campylobacter*, we were told, is kind of a wimp--it can't survive in most environments. But others, like *Listeria*, can thrive in temperatures where humans might not. All of them can make people sick. By knowing these enemies, we would be better able to manage them.

With images of these enemies in mind, we were taught to imagine them all over: "They're everywhere. . . all over your body," we were told. Shit became shorthand for microbe-containing material. All animals, human and non-human alike, are covered from head to toe in shit. Not only are we covered in shit, we are also full of shit. So the problem of animal slaughter becomes a sanitation nightmare: "You've got a water balloon full of feces INSIDE food!" (Cox). Here the flesh of living animals is imagined as food while the organs that keep the animal alive are Trojan horses packed with microbial enemies. We were taught to imagine microbes on the inside and outside of these edible animals and all over ourselves.

Even in the most perfect slaughter and processing conditions, we were told, microbes that travel on human hands can still contaminate food and make people sick.

“Imagine a cow in a sterile field, slaughtered in a sterile facility, high-pressure treated [to eliminate microorganisms] and then a 16-year-old line cook doesn’t wash his hands. . . but consumers will blame the meat company” (Cox). Workers in slaughter plants and food production are taught to take on the personal responsibility of protecting consumers. As in restaurants, moralizing signs remind workers to wash their hands after using the restroom and butchers are taught to sanitize their knives and hands in equal measure. But the deck is stacked against them. They are working with shit-covered, shit-filled animals that will be prepared and eaten by shit-covered humans. And even if it isn’t their fault, they will be blamed if the microbes win.

Butchers are taught to imagine microbes through photographs at high magnification, then told to imagine them everywhere, and imagine worst case contamination scenarios. The strategies for determining whether microbe lives and deaths are being managed well are usually after the fact: periodic testing for the presence of *Listeria* on the surfaces of the processing plant, regularly sending samples of meat to test for the presence of *E. coli*, a documented outbreak of human illness that is eventually traced back to the plant. In the daily work on the kill floor, shit, hair, guts, and hides become tangible, visible stand-ins for invisible microbes that are present right now.

Microbes are imagined as a population that is always living and dying, not as individual organisms. The goal with most meat is not to kill microbes (that typically only happens with cooked products). The goal instead is to manage microbes’ relative rates of living and dying. It’s massive population control on a micro scale. As was

explained in our HACCP training course, we aim to keep microbes in a “lag” phase: where the proliferation and death rates are relatively balanced (Cox). For every million *E. coli* who die, a million or so more are produced. In poor living conditions like cold temperatures (your fridge) or extremely dry environments (a strip of jerky), microorganisms will not be able to proliferate quickly enough to greatly offset their rates of death. But in ideal living conditions, microbes can enter a logarithmic growth phase, reproducing exponentially and far outpacing their rates of death. When microbial populations are growing exponentially, they can quickly pass the threshold numbers that will make humans sick. Keep microbes from reproducing too quickly and you may be able to protect consumer health and lives.

HACCP training pushes butchers and inspectors to imagine microbes as tiny enemies and consumers as a nation to be protected. If microbial control is an art of war, consumers are set up from the start as the imagined nation of people and values: families, wholesomeness, a vision of America that must be defended. Butchers work to imagine this community that needs to be protected alongside the imagined microbes who must be managed. Imagination may seem at first glance like an insignificant component of these management systems. But it is the foundation for ethical-political distinctions between bodies that are made variously protectable and replaceable. On the kill floor, the imagined enemies are the target of daily work, and the imagined consumers are imagined and inscribed as protectable. As I will describe in more detail later on, workers are taught to imagine enemy and nation, but they themselves remain unimagined and unprotected in the process.

In addition to HACCP training, each slaughterhouse has to develop its own unique HACCP plan. To develop a HACCP plan, a plant must first identify all the potential chemical, physical, and biological hazards at each stage of its processes. Everything from contaminated spices to shattering light bulbs are potential hazards in meat processing. But on the kill floor, the primary concerns are biological. For any identified biological hazards, the plant has to choose a way to reduce the likelihood of the hazard. While it sounds like a broad requirement, most slaughter plants choose the same one or two control points for their HACCP plan: spraying the carcass with hot water and/or acid plus a visual inspection for the presence of hair or fecal matter. Plants must reference scientific reports to support the claims in their HACCP plan, and most plants will cite the same studies provided by the US government as an appendix to the HACCP requirements. Though HACCP plans may not vary much from kill floor to kill floor, each plant is still forced to develop its own plan.

The hope is that the process of developing a HACCP plan will push owners and employees to think more deeply about the inherent risks within their particular production line, and to take responsibility to mitigate risk. The HACCP training course and the process of developing a plan are both designed to change the way owners and workers think and work. Not only are they pushed to imagine microbes and consumers in particular ways, but they are pushed to take on the right attitudes of personal responsibility and paranoia. Through HACCP training and plan development, workers are trained to develop an appropriate sort of paranoia, the sort that NASA's

space shuttle engineers might model: identifying and testing any potential weak points to avoid a cataclysmic disaster.

HACCP is a performance-based management and evaluation strategy. Like Louis XIV's activities for nobles in the gardens of Versailles (Chandra Mukerji, 1997) and the more contemporary performance assessments of K-12 teachers,³⁷ this is an exercise of power that commands subjects to perform particular exercises: exercises that force them to figure themselves as a particular sort of subject, figuring new power dynamics and possibilities for being in the process. While HACCP's explicit goal is to decrease the likelihood of human illness by managing microbes, it implicitly manages workers in the process.

The gardens of Versailles, performance assessments, and HACCP are all human management strategies: technologies that work to produce a particular sort of subject through material, embodied exercises (Foucault, 1995, pp. 152-153). HACCP is in a subset of such practices that are enacted largely through paperwork. As scholars focused on paperwork and other "little tools of knowledge" (Becker & Clark, 2001) have articulated, these seemingly innocuous bureaucratic objects produce particular systems of power and control (Hull, 2003; Joyce, 2010; C. Mukerji, 2011). In the case of HACCP, the demands of producing and maintaining paperwork force a set of repeated performances that control and manage slaughterhouse workers: making them take on personal responsibility, watch each other, and submit to excessive distrustful watching.

Both workers and microbes are seen as a potential threat to food safety and the health of imagined future consumers, and the systems for managing microbes manage workers as well. HACCP and its associated paperwork operate as training grounds: teaching workers to think and behave in a certain way and as modes of impersonal rule: exercising systems of control from afar. As Gina Neff has declared, paper pushes people (Neff, Fiore-Silfvast, & Dossick, 2014). I have described that HACCP training and the process of developing a HACCP plan push workers to develop the right sorts of thinking and imagining and the right feelings and attitudes toward food safety. But once butchers are trained and HACCP plans are written, the daily demands of microbial management push people in other ways. Paperwork demands performance.

Maintaining paperwork on a daily basis pushes workers to do new things: take temperature readings, spray carcasses, inspect for the presence of hair or feces. And at each step along the way, forms must be filled out. If the HACCP plan says every carcass will be sprayed with water that is 150 degrees Fahrenheit when it hits the carcass, then the workers will have to regularly measure the temperature of the water spray with a thermometer and record the reading on a paper log. But the most onerous paperwork demands are for documenting things gone wrong. Any time something happens that falls outside the HACCP plan for slaughter (such as a carcass falling onto the floor or the water temperature being too cold), corrective action must be taken to regain “control” of that critical point. These corrective actions require more paperwork: clear documentation of what was done to correct what went wrong. A carcass that fell on the floor might have a thin layer of flesh trimmed off wherever the

carcass made contact with the ground. If the water spray was not hot enough, any carcasses sprayed since the last satisfactory temperature reading might be re-sprayed with water that is sufficiently hot. Paper pushes workers to perform specific actions and to produce more paperwork.

The practices of paperwork also force workers into the right systems of surveillance and control. It is never enough for one person to take a temperature reading: both the instrument and the individual are always suspect and subject to calibration and verification. Workers are made to watch each other and to submit to being watched. Their reports are rarely trusted without confirmation from another person. And as I will describe from the experience of one slaughter plant manager, even more elaborate lines of workers watching workers watching workers are built to satisfy the requirements of HACCP and the department of agriculture inspectors who watch the slaughter.

Most of the small plants I visited have good relationships with their state or federal inspectors, built over many years of working together. But others, particularly ones where redistricting or a change in personnel had recently pushed a new inspector into the plant, had a tenuous or even adversarial relationship. Each plant does things slightly differently, and each inspector interprets and enforces the same federal and state statutes differently still.

The manager of an organic chicken slaughter plant described the arrival of a new USDA inspector who interpreted the rules of HACCP management differently. While the HACCP plans are approved by a department of agriculture central office,

the day-to-day implementation is evaluated by the on-site inspectors for compliance. When a new USDA inspector arrived, he didn't think their method of air-chilling chickens rather than placing them in an icy bath was in accordance with federal requirements. You don't need a degree in microbiology to imagine that placing all the chickens in the same ice water bath is a more likely way to spread salmonella from bird to bird than hanging them up separately in a refrigerator, but this inspector didn't see it that way – he hadn't seen the air chilling method (common in Europe but less common in the US) and so he shut down the plant for several days at great expense to their finances and reputation.

The poultry slaughter facility already had an employee testing each critical point--recording temperature of the final water spray at the start and end of the day, for example--and another employee double-checking the measurement and initialing his agreement with the first person's measurement. But this new inspector wanted a third employee to then review the measurements and initial them yet again. "So you want me to have a guy watch a guy watch a guy?" the poultry plant manager asked in disbelief. "Yup" was the inspector's reply. HACCP forces workers to watch each other and become accustomed to always being watched in ever more elaborate chains of watching.

HACCP was originally designed to protect astronauts, not to produce happy or safe workplaces for freeze-dried ice cream manufacturers. In its modern application, HACCP focuses on food safety for the benefit of consumers, sometimes at the expense of workers. While worker protection is a concern--for the business owner and for the

federal Office of Safety and Health Administration--these “OSHA” representatives visit sporadically or when a report of unsafe conditions is filed. The agricultural inspectors are the primary live bodies performing inspection and supervision in the slaughterhouse, and they are on the kill floor more than any other governing agency and even more than the business owners and managers of the plant. In the name of managing microbes and protecting future consumers’ health, inspectors build new systems of watching and managing workers. The department of agriculture inspectors who oversee HACCP are there every slaughter day, looking out for the welfare of future consumers.

At times, the health of imagined future consumers can be directly at odds with the health of slaughterhouse workers. The floors of small US kill floors are typically concrete or an epoxy blend. During the process of slaughtering animals, the floor is often covered with blood and globs of fat that act like wet banana peels if they get under a worker’s boot. A textured floor is a far better choice to prevent slips and falls on the job, and many kill floors have some sort of texture added to increase boot grip. But a textured floor is also a wonderful choice for microbes. The architecture of small peaks and valleys is harder to clean completely, and microbes can form a biofilm of dead bodies stretching from peak to peak on a textured surface. Beneath this biofilm, microbial colonies can grow happily, protected from daily blasts of water and disinfectant. A perfect floor for protecting consumer health would be smooth as glass; a perfect floor for protecting workers would have a varied, high-grip surface. While it is possible to imagine systems that protect both consumers and workers, concrete

material choices (in this case, concrete material choices about materials like concrete) can pit consumer and worker interests against one another. HACCP sides with consumers.

I have described food safety protocols as managing workers as much as microbes in several registers. Workers are pushed to imagine microbes and consumers in particular ways, to hold the correct attitudes of personal responsibility and paranoia, to perform particular tasks, and to watch and be the subjects of excesses of surveillance. I have argued that animals are made killable in the practice of slaughter, but workers, like microbes, are neither killed nor protected by microbial management practices that government and business owners have established. They are managed, and are inscribed as manageable: controllable and highly replaceable.

HACCP is based on army engineering operations management strategies. In military planning, both soldiers and enemies are imagined as constantly dying and infinitely replaceable. The systems and protocols for managing microbes similarly assume that both the workforce and its microbial enemies are replaceable bodies. In larger slaughter and meatpacking facilities, with turnover rates that can exceed 200 per cent each year (Fitzgerald, 2010, p. 64), workers are highly replaceable and frequently replaced. The small facilities I visit have varied turnover rates: in some the same butcher has been there fourteen years, and in others the cast of characters changed during the few weeks I was there--one employee was in then came out of rehab, another started work to try to save his organic dairy farm, and yet another was in and out with a back injury from falling on the slippery floor. HACCP plans are written not

with employees' names but--as with military and other management protocols-- with rank and title. Even if Kevin has been the head butcher for over a decade, he would be listed by title, not name, so that the plan as written will be accurate even if he is replaced.

It may not seem logical that a consumer protection movement would come at the expense of workers' rights and well-being, but that is precisely what has happened for slaughter and meat safety in the US. Consumer protection is founded on an imagined public. Though workers are present on the kill floor, they are unimagined, and the imagined public outside its walls is the primary target for protection.

As with Sinclair's readers whose stomachs turned rather than their hearts, contemporary concerns about meat and animal slaughter focus on everything but worker well-being. Local, organic, grass-fed, animal welfare, and humane slaughter; fears about pink slime, imported meats, and cancerous eyeballs hidden from the inspector--workers are still left out of the imagined community of consumers and animals that must be protected. In her research in California strawberry fields, Julie Guthman finds the same pattern of non-concern: while the industry has shifted away from using some toxins that threaten consumer health, the fumigation of fields prior to planting, which affects workers but doesn't get into the edible berries, continues (Guthman & Brown, 2016). As in the slaughterhouse, lives worth protecting and those that are easily replaced are carved out in the daily processes of production.

Lifedeath in the slaughterhouse is multiple: a multidirectional jog from sentience to brain death, and perhaps back again; a simultaneous mass of deaths and

births that must be imagined and managed. And in sensing and managing these lives and deaths, the possibilities for whole categories of being are made. Through tactile, embodied practices, animals are killed and made killable. Through imagination and management practices, consumers are protected and cast as protectable while microbes and workers are managed and made manageable.

Contemporary forms of power have been described as separating who may die from who must live (Foucault, Bertani, Fontana, Ewald, & Macey, 2003, p. 254); as determining who is disposable and distinguishing who may live from who must die (Mbembe, 2003); as excepting some living bodies from the body politic (Agamben, 1998); and as managing populations by making some unimaginable as human (Butler, 2006, p. 98). The categories I have described--killable, protectable, manageable--bound bodies through repeating daily material practices. On a slaughterhouse kill floor, the attempts to separate messy lifedeath into discrete categories and controllable imaginaries articulate possibilities for living-dying. The specific practices of classification and management produce political realities for humans and non-humans alike. Power, like death, is not unidirectional and does not operate on a single scale. It nests, it overlaps, it is enacted through deeply intimate interspecies performances, regimes of imagining, and tangible paperwork that demand particular practices.

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Boundary Work – CONCLUSION

I came into the slaughterhouse trying to understand what was happening there and was immediately met with subject-object monsters: pigs wearing their hides as a cape, pigs attached at the head but divided in half from anus to neck (of one mind but two bodies?), and later headless cows who were still alive. The daily work of slaughter puts human bodies in communication with the nuances of pattern and difference each animal body brings: it is embodied knowledge-work with humans, tools, and animals all determining what happens next: knowledge is bodies learning with bodies. Mind-body and subject-object divisions were out from the start, but as I spent more time in slaughterhouses, I started to follow the threads of other classic modes of difference, and found them to be messy in different sorts of ways.

Cleandirty insideoutside and lifedeath are all entangled dyads that remain tangled up all the way through. Cleandirty may be separated for a particular site, location, and iteration of slaughter: here we remove the ligament at the back of the leg, there we have automated foam sprays across the thresholds of spaces – each of these solutions solves the problem of defining clean through good enough daily practices. But if clean and dirty might be contingently articulated as separate from one another, they are never separated fully from inside and outside. And the flips, moves, mobilities, inside-outs and headstands of slaughter queer even these entangled contingent boundary-makings again and again. Lifedeath remains as one word – an extended happening without a clear line across the middle. The extended time of ending life or beginning death, even for a particular animal, even in the context of just

one site's agreed-upon definitions of "dead enough" and dead enough for what, remains just that – an extended time. Even for a caring butcher querying a cow with his finger standing in for her severed brain stem, the precise moment of death is elusive.

What we come to claim as boundaries: life from death, clean from dirty, remain unresolved, whether we agree or disagree about where they begin and end, what constitutes their contours. Things exist in suspension. They come together, congeal, in solid enough forms that are good enough for now. The boundary between life and death is not a wall but a process of coming to agreement, which always means mis-understandings and different definitions. For animals and humans on the kill floor, lifedeath is fleshy meaning-making in mis/understanding, together. Coming to agreement, not to understanding but to agreement: always anchored to those present and the particular circumstances of the particular here. Coming to agreement is a motion, a set of flows. It can be good enough to declare something: war, a constitution, a death, a new name for this or that. Agreements that are good enough to make something happen, living "yes"ses that remain lively and partial, sites for new sorts of coming-to-agreement, mis-understandings, and doings.

Out of this mess of still-tangled boundaries, I hope to offer two things: first, some new figures for imagining boundary. And second, some diagnosis, however partial, of the present and imagined futures the work of these butchers and my work as a researcher sit within. I earlier articulated some geometries for imagining boundary that push beyond a wall or line: Lefebvre's gastrula, Grosz's Mobius strip, Fausto-

Sterling's nesting dolls, Karen Barad's tangles that can be cut. From the small kill floors, I have added alternate geometries of boundary: contra Barad, unresolved tangles that are never resolved; via Ingold, paths traced in living lives; contra Lefebvre, carcasses without organs, and from the animals and butchers I've spent time with, practices of separating life from death in intimate attunement with dying animals.

Francisco tickling the medulla, stepping in, wiggling a finger into the gaping neck hole, stepping back again: I offer Francisco and these animals as a non-geometric figure for imagining boundary differently or not at all. There is no life and death here, but only dead enough for this particular next happening. There is no clear moment where life ends and death begins, but simultaneous doings: dying and sensing, producing one another. Francisco's work is boundary work: laboring at the threshold of lifedeath, and working to determine when some sort of change has happened, when some sort of boundary, perhaps, has been crossed. But the question that matters is this: where are we now? And where are we now? And where are we now? There is no border wall present. Only where/when the animal is, gauged by its responses to the provocation of a tickle.

This is what I mean by boundary work: what emerges and congeals for us as boundary is made up of always emergent, contingent acts that make meaning and difference as they unfold. Boundaries are not fixed cultural forms even within a specific site or event; they are emergent good-enough accomplishments of agreement

between all sorts of actors in the scene – iPhones, spray timers, headless cows, butchers, notions of a good life, published animal welfare standards.

In a 2013 essay for *Cultural Anthropology* (Murphy, 2013), Michelle Murphy asks why now? Why are scholars across the humanities and social sciences so taken with fluid forms, flexibility, emergence, the inchoate, at precisely the moment that these tunes are hummed as the theme songs of global capitalism? Elsewhere in the same forum, Katie Stewart dismisses an interviewer’s question – one I have been asked as well: if you are so attuned to attunements, to worldings and unfoldings, what about durable social forms? How can we have Racism in America if the world is constantly becoming? I am tempted to begin my response as Stewart does “Seriously?”³⁸ But I also want to take the question seriously, as an opportunity to more clearly articulate the relationship between the durable and inchoate as I understand them to intra-act.

The concept of microaggressions emerges out of Psychologist Chester Pierce’s work on racism in the 1970s. What Pierce originally calls “offensive mechanisms” and then “micro-agressions” (Pierce, 1970) are seemingly small daily actions in the world: offensive maneuvers that *enact* racial inequality. I borrow again from Tim Ingold’s notion of lines not as a series of points, but as paths traced through movement in the world. Using Ingold’s framing, each microaggression, each performed practice could be understood as a tracing. Movements along well-worn paths may trace deeper grooves and make certain forms endure. Racism in America is a particularly familiar path with daily tracings adding to its heft and objects with varying lifespans--

legislation, highways, economic systems--tracing their own deep lines. With this framing, any path walked might be familiar or revolutionary, but grooves and ruts are durable and guiding forms.

But the radical promise of understanding the world as always in a process of unfolding is that in action, even seemingly small action, there is the possibility of alternate worldings. Other paths might be walked. While maximum flexibility, emergence, and flights of rapid response might be primary aims of contemporary capitalism facing rapid technological change and an uncertain planetary future, this does not preclude the radical promise of those frames for imagining and making futures otherwise. Paolo Freire captures the radical promise of unfolding everyday acts in his classic *Pedagogy of the Oppressed*. For Freire, education is a site of liberatory potential, allowing for all sorts of otherwises. Freire insists that we understand education not as a process of enculturation, conserving the norms of existing societies, but as sites of radical liberatory promise (Freire, 1970).

There may be a closer connection here, not only between emergent action in the world but specifically between boundary-making acts and possible imagined futures. Mary Douglas herself grapples with daily difference-making as acts of producing possible futures. Douglas explains in a 2002 printing of *Purity and Danger* that the battles over boundaries are themselves battles for conflicting visions of “the good community, whether it is a vision of stable continuity or of sustained radical challenge” (Douglas, 2005, p. xx).³⁹ Boundary work, understood as persistent cultural

forms enacted (or attempted) through daily doing, is always connected to imagined possible futures.

Power, in the boundary work stories I've culled, is enacted through deeply intimate interspecies performances and regimes of agreement. But how can the slaughterhouse help us understand what is happening in the multiple and moving now? And what is the nature of this now?

Teetering – or feeling as though we are teetering – on the brink of species extinction: not only from atomic bombs, nuclear leakage, impending world wars, the coming apocalypse, revulsion at the Western world, random acts of violence or not so random acts of violence at the hands of police officers or the hands of school children – but acknowledge that the ways we have chosen to live are changing our planet irreparably and no technological solution might save us. This teetering is a dimension of feeling in what scholars have declared the anthropocene (Crutzen & Stoermer, 2000): a new era in which humans, we *anthros*, are the greatest force for geological change. The beautiful symmetry in this diagnosis is that the changes we have set in motion will make this planet uninhabitable – for humans at least, though insects and microbes, viruses and certain earthly others might still be here, might even be more successful at life and reproduction once we are out of the way.

But this is only one possible future, or several. Attempts to rally behind opposing visions of futures become particularly potent political forms in this NOW.⁴⁰ What should animal-human relationships look or feel like as we approach this unknown? If humans have indeed set in motion the planetary changes that will kill us,

our domesticated animals will likely be species that go extinct alongside us. We may be staring into the faces of cows on the big way out. But in the meantime, alongside peculiar and familiar flavors of anxieties, we are keeping certain species alive, caring for their bloodlines, and killing their individuals. Donna Haraway describes the need to respond: rather than responsibility, we should think about response-abilities. In Donna's words, "perhaps the question is less about responsibilities than response-abilities, and that is a non-innocent symbiotic affair, for better and worse. Our industrial meat system cultivates a suite of microbial response-abilities, and vice versa, to say the least. Then, to paraphrase an old Russian revolutionary, what is to be done?"⁴¹

If Francisco can be both person and figure, reminding us that it is hard to put your finger on the boundary between life and death, and your finger might be the best tool if you ever want a hope of discerning the now and the then, of figuring whether a happening has happened, perhaps he can also be a figure for the anthropocene. Here I'll offer Francisco yet again, and I hope he wouldn't mind, as a figure for ethical being in uncertain times of living and dying. Francisco tickling the medulla might help us imagine futures that acknowledge shared and deeply uneven vulnerabilities to what will come. Do not shy away from what seems gory: stay with the animal as she dies, keep your bodies close and get your hands in there to ask the right questions. Make all that is happening that is hard as easy as it can be. I cut here to a quick scene in Anna Deveare Smith's *Let Me Down Easy*, her one-woman show based on interviews about death: and when I go, "*let me down easy*" (Smith, 2008). As much as is possible in the

face of systems we have built that offer impenetrable horror, stay present and focused: tune in most closely to those who need it most, show up each day and keep the place clean.

SECTION II – HOW BODIES COME TO MATTER: CARVING MEANING IN FLESH

Meaning-making is a (performative) material process.



Figure 1. Photograph. Copyright 2010, Debora Spencer.

In this section, I focus on the bodies on the kill floor as they interact in practices of knowledge and meaning-making. Whereas the first section focused on how boundaries are made between dichotomous pairs--what I called the difference between X and X'--the chapters in this section all deal with meaning carved out of the world: X being defined and understood as X, separate not from its opposite but from *all* that is not X. In other words, whereas the last section dealt with how difference is made between life and death, clean and dirty, inside and outside, in this section I am concerned with how a brisket is carved out as brisket, how a butcher reads signs of illness in animal flesh, and how pig tissue can stand in as a representation of a human vagina. This is not about carving broad strokes of difference between something and its opposite, but instead focused on how something becomes meaningful in and of itself and in comparison to other somethings on a rubric or scale. Here I am dealing with the sort of meaning-making involved in language: islands of meaning rising out of an ocean of matter. And the sort of meaning-making involved in evaluation: understanding something by comparing it to what's better or worse, bigger or smaller.

Across these next chapters, I focus in on meaning-making in several modes, working to understand the material details of how bodies come to matter and be meaningful. I argue that the bodies of animals, humans and knives are instantiations of knowledge and they come to be (multiply) meaningful through daily performances. As I will describe, these bodies – pigs, cows, elk, microbes, butchers, researchers, and tools are all *bodies of knowledge*.

Between the two chapters of this section I perform a peculiar sort of cut: simultaneously claiming that knowledge and meaning are more entangled than we typically understanding, and simultaneously cleaving between them to distinguish between these next two chapters. In most accounts, knowledge and meaning are distinct. A classic Western philosophical understanding of knowledge and meaning, stemming from Aristotle's writing on metaphysics, would locate knowledge as that which coheres to the (human) *mind* and meaning as that which coheres to representations of *things*.⁴² But in my work, knowledge is not just located in the human mind, and meaning is not just assigned by human beings through representations. Instead, I understand knowledge as distributed (Hutchins, 1995) across human bodies, animal bodies, and all manner of objects and environments. Without Descartes' alleged slice between body and mind, the traditional philosophical notion of knowledge explodes, raining the capacity for knowing all across a scene. Knowledge, in my analysis, is a lacing together or coagulation of experiences, meanings, understandings, responses, accomplished by human-animal-object "knowers" in interaction.

Allowing more power to matter and to non-humans in a scene also screws with a classical understanding of meaning. Rather than understanding meaning as a human game, attaching meaning to a representation which is in turn attached somehow to a 'real' thing in the world, I understand meaning as a standing forth,⁴³ accomplished, again, by objects-animals-humans in interaction. My analysis and mode of theorizing focuses more on matter and backs off of representation (save for representations of

vaginas, which you will encounter on the coming pages). I am concerned, instead, with matter, action and interaction. This grounding in the material world and material doings does not eclipse representation entirely, but it rethinks representation itself as material action: the representation of a human vagina, which as I'll describe looks sort of like school supplies in a bottle cap, stands in for human vaginas because of its material properties and actions, not because of any resemblance or association.

Training the spotlight on action and interaction as meaning-making performances both unseats the central role of representation and pushes meaning and knowledge closer beside one another. Again, in my analysis, *the bodies of animals, humans and knives are instantiations of knowledge and they come to be (multiply) meaningful through daily performances*. Knowledge and meaning can be located in and between bodies, enacted through performance.

Though my work pushes knowledge and meaning closer together, the division between the two is a rough division between the two chapters that follow. The first chapter in this section, Chapter 4, foregrounds the nature of *knowledge* as it is enacted by and wrought from bodies. I argue that all of the workers on the kill floor are knowledge workers – the butchers, inspectors and lab researchers, who each cut into bodies with knives and fingers. Human butchers transform the animal's body and the parts that served that animal into differently meaningful, useful parts to serve all sorts of human needs. The protective hide becomes a shoe, belt, jacket; the tender bit of muscle that didn't get used much becomes a tenderloin; the knuckles become gelatin; unused organs, scraps and bones become food for animals kept as pets; all sorts of

other medical and industrial byproducts are culled from the body parts. Inspectors cut into animals' lymph nodes, probe their heart valves and squeeze kidneys and intestines seeking signs of systemic illness or disease. And lab researchers come to the kill floor to collect animal parts that become objects of knowledge in all sorts of research projects. All of these humans are knowledge workers, working with animals' bodies in different ways to know the body and make new knowledge. Knowledge is embodied by humans-animals-tools in their interactions in daily practice.

But what does it mean to say that an animal's body is a body of knowledge? I explain that knowledge is instantiated in the details of animals' bodies: animal bodies provide a material script for how to disassemble the body; and body parts become experimental models for understanding human and animal diseases and growth. The chapter deals with questions of knowledge (and meaning) following in the paths of laboratory studies scholars and writers who have tried to make sense of the nature of knowledge. The questions I work through are largely the purview of philosophy of science and materiality.

In the second chapter in this section, Chapter 5, I focus primarily on the nature and processes of *making meaning*. Whereas the prior chapter is located in a lineage of STS scholarship, this chapter is more legible as a work of semiotics and communication theory. Here, I explain meat cutting as material-semiotic work. In the process of butchering, animal bodies are divided into legible 'cuts' as knives are used to master the world and carve out meaning. Just as Sarah Klein claims her researcher-subjects are theorists of phenomenological time (Klein, 2014), and Eduardo Kohn

argues Amazonian women are epistemologists (Kohn, 2007), butchers are philosophers of ontology and semiotics. Butchering is always a process of knowing, naming and making so: it blends the epistemic-semiotic with the ontological. Cuts of meat are culturally specific forms of meaning but they are recognized and materialized each time a carcass is broken down into smaller parts. As one meat expert explained, “we as man have cut here, taken our knives and gone: this is a [chuck roast].”

Butchers do ontological work in the process of cutting. And they understand the transformation of animal to edible and the ontology of named parts better than most of us. They understand that you can’t have a tenderloin *and* a filet mignon: cuts make meaning in fleshy matter, and one cut often precludes another. Drawing a particular line might make another line impossible.

Next, I focus on how animal bodies are taken as objects of knowledge for trained judges to look at, touch, and taste, making bodies and body parts meaningful and knowable in new ways. In the final sub-section of the chapter I focus more closely on knives as bodies, considering how they make meaning by cutting and how they carry information from all that they’ve cut through. I explain that knives are dulled by hides and knife edges are materially multiple – sharpness is a question of alignment as much as crisp metal angles.

Across all these sites and stories, I argue that knowledge is materially instantiated in the details of bodily matter. Knowledge is embodied by more-than-human bodies. I explore how knowledge and meaning are grounded in the material details and functions of the body itself, whether that be a fleshy or a metal body.

[Four] Making Knowledge: butchers, inspectors, researchers

Butchers, inspectors and researchers are all knowledge workers, making sense and knowledge out of animal flesh.

Butchering is skilled knowledge, embodied by humans, animals and tools in interaction.

Butchers

Butchering as skilled knowledge; animals as mnemonics

In this first section, I focus on the interactions of butchers and animals, arguing that butchers are knowledge workers, and animals' bodies are scripts and mnemonic devices. I explain that butchers in a small slaughterhouse are skilled workers who work in concert with each animal's body, interfacing knowledge of how-to with the peculiarities of each body. I explain that butchers learn to follow lines and signs in animal's bodies, using the body itself and holes cut into it as material mnemonic devices that help them in the process of knowing the animal's body as carcass and as meat.

“Not just a guy off the street”: the skilled knowledge of butchering

Butchering in a small slaughterhouse is skilled work. Unlike large disassembly lines, where each worker might make the same cut or move over and over (with skill and speed no doubt), butchers in very small slaughterhouses typically have to handle all parts of the process: from guiding animals off a truck and into their pens to moving them without complaint to the kill floor, stunning, sticking, raising them up, removing the hide and organs, splitting the carcass in half, inspecting for contamination, measuring water temperatures, filling in whatever paperwork their

HACCP plans demand. In plants that only slaughter one or two days a week, those butchers are likely part of the cutting room staff as well – breaking down carcasses into cuts of meat, grinding beef and pork, perhaps even making sausage and cured products.⁴⁴

The process of transforming a living animal into a clean, edible product, much less one that customers will recognize and admire, requires a great deal of training and knowledge. In an interview with the meat sciences professor at a large agricultural university, we talked about the complex work these butchers do -- in his words, "what's making that a skill, not just a guy off the street." For many years, a small butchering training program was run out of a school in southern Minnesota. But in the early 2000s, it closed down.⁴⁵ Where there had once been a steady stream of qualified skilled butchers to staff small meat markets in the area, small business owners found themselves struggling to find good workers, and in at least one case, doing the slaughtering for several years by themselves. In many of the plants I've visited, owners still struggle to find and keep good butchers. As I've described previously, I have spent time in several plants where butchers are in and out as they enter rehab for drugs or alcohol, and owners work to support them not only out of obligation or service to the community (though those are strong motivators for some), but also so that they might preserve their limited labor force – oftentimes, there isn't a good replacement available. Butchering is difficult and highly skilled work, and in this section, I focus on the details of the work itself. What is the nature of the skillset

required to be a good butcher? What sort of knowledge is butchering? What distinguishes a good butcher from “just a guy off the street”?

Butchering is embodied knowledge. It is not an abstraction without anchor, not a ‘view from nowhere’. Nor is it located firmly within one human individual. Butchering is a mode of knowledge and skill that is anchored at the intersection of human bodies, animal bodies, and tools. A skilled butcher does not ‘know’ alone. He displays a mastery of how to see, read, and respond to the particularities of each animal body using his own muscle movements and knives in concert with the animal’s material form. In this section, I describe butchering as embodied, tacit knowledge, then explore how butchers learn to see and do, learning in and with the world of animals’ material forms.

Tacit, embodied knowledge

Polanyi describes tacit knowledge as knowing more than we can tell (1967, p. 4). Skilled work, including art and technical labor, are modes of tacit knowledge that, in Polanyi’s words, “combines elementary muscular acts which are not identifiable, according to relations that we cannot define” (p. 8). In the case of butchering, these muscular acts – pull here, while shifting your body weight like this; cut this deep, twist hard at this angle--are all enacted in relationship to the animal’s body. A skilled butcher might not be able to precisely describe the way he anchors his body against the weight of a cow as it is lowered to the cradle, nor how the pressure from the cow’s body calls him to respond with an equal pressure of his own. But this sort of call-and-

response relational performance between the skilled practitioner and the world can function seamlessly without being verbally described.

A skilled butcher has a deep knowledge of the animal's body, and knows how to respond to the material form of each animal as it presents itself in the process of disassembly. Some pigs have much thicker hides, and an experienced butcher will gauge how hard and deep to cut into each unique animal to remove a thin layer of skin without taking too much fat or muscle with it. In my experience working with butchers, they are very capable and willing to describe the thinking and coordination behind what they do. As Polanyi allows, it is not that we are incapable of describing what we know, we just know a whole lot without having to verbalize the knowledge and we make connections without make sense of the connections. It is not that we are necessarily incapable of telling, but that this knowledge does not require explicit narrative form to exist. A skilled butcher makes the connection between a thick hide and the precise angle or sharpness or movement of blade he needs to approach it with. That connection between the material world and requisite movement exists without needing to be articulated in narrative form. More likely than not, the butcher learned it through observation and interaction with the world, not by having it described to him verbally. Good butchering takes practice.

Tacit knowing is broken down, in Polanyi's analysis, to a series of known implicit relationships between one set of terms and another. He gives the example of human faces and expressions – though we may not be able to articulate the precise details of how we recognize a familiar face, we do recognize it, and associate the face

implicitly with what we know of the person. We may not be able to describe out loud with precision how a fleeting expression on another's face communicated heartache – but we make the connection all the same. In the case of skilled muscular work, the practitioner knows that a particular sort of material form demands a specific sort of physical move. Though it might seem ridiculous or impossible to articulate the details of how a pig's hoof shape led a butcher to slice a bit deeper before breaking at the knuckle, the butcher⁴⁶ *knows* the animal and the required muscular response. The specialized skill that distinguishes a good butcher from a guy off the street lies in connecting the material details of an animal's body to the required muscular action at every step from the pens to the cooler and beyond.

Skilled butchers answer a complex set of implicit questions presented by a whole animal's body: What first? Then what steps? In what order? What part? At what angle? How hard? Where on the animal's body? How deep? With what knife? More experienced butchers are always anticipating possible differences from animal to animal and things that could go wrong. As they work, they implicitly answer and respond to a complex set of questions that their many experiences allow them to stay attuned to. They ask and answer not only: What do I do now and how, but also With what goals and what concerns? To avoid what possible eventuality? A butcher who has felt an animal drop off the rail might recognize the slight hiccup of vibration as the carcass he is pushing falters, look up, pull the animal back, and continue pushing, making sure the roller many feet above has not skipped off the rail. An inexperienced participant like myself might find her chin poised perfectly for the kick of a stunned

bison while trying to help drag him into the buildings – the space I found to “help out” from was of course empty as no experienced butcher would work near a stunned animal’s legs.

Butchers learn from the world, from the animals’ bodies, and from experience. Butchers are skilled knower-doers, and they implicitly read each animal’s particular material body to guide the process of disassembly. Ultimately, butchers and animals together accomplish the work of slaughter, a practice of repetitions with always-slightly-different material realities: a heavier cow, an abscessed belly, a thicker or thinner hide. Butchering is a form of tacit knowledge that resides at the intersections and interactions between human and animal bodies. Butchers work with the material world and know with the material world. Animals’ bodies provide a material script for disassembly.

“follow that line there”: Learning to slaughter

Teaching and learning are ongoing on many small kill floors. Even a butcher who works alone and has decades of experience will encounter and navigate new challenges as he goes. But on most small kill floors I’ve visited, there are two or more butchers working together, learning from the animals’ bodies and from one another as they work. At the local university’s kill floor, a new crop of undergraduate student-workers enter each fall and each summer, as other students graduate or leave for summer break. With slaughter happening there just once in a typical week, these butchers-in-training are always learning. More experienced workers coach the less

experienced as they go. And in some cases, inspectors who have been on the job for many years offer tips to newer butchers and to students while they work.

At a small plant that usually slaughters only once a week, I recorded video as one butcher, who usually doesn't work on this part of the process, struggled with how to break off a pig's hoof at the elbow joint. Pausing, the butcher turns and asks another, "where's the magic spot again?" The more experienced butcher moves his hands along the animal's leg and then gestures with his knife to demonstrate the correct angle to maintain while saying "...this meets this [gestures along leg]...keep it at that angle [holds knife so it touches the place that should be cut and maintains the knife's angle to the body for a moment]." Just as the skill of slaughter is a form of tacit knowledge, known with and through the material world of the animal's body, slaughter is taught and learned through muscle movement and gesture using the animal's physical body. An experienced butcher needn't know precisely which part meets which (though he likely does), but he is able to identify the intersection point and map a generalized knowledge of how to hold a knife in relation to that point onto the particular, specific shapes and angles of each individual pig. Learning the skill of butchering requires a mastery of the signs animals' bodies present and attending to those signs with the right muscular movements.

Seeing like a butcher⁴⁷

The knowledge of butchering does not only depend on a right reading of an animal's body, but a deeper ability to map generality onto each specific case (just as a

surgeon or neuroimaging researcher must), and to follow that mapped map, inevitably changing and re-reading the body as new parts and layers are exposed. Over and over, I heard one butcher or inspector say to someone less experienced, “follow that line there.” To the untrained eye, pigs and cows are not covered with visible lines. But to a trained butcher, the animal’s body has seams, lines, and angles. By working alongside skilled mentors and the bodies of many animals, butchers learn to see the animal’s body as a roadmap for its own disassembly.

In her book *Handling Digital Brains*, Morana Alač describes the process of learning to read an fMRI image. In one scene from her fieldwork videos, an experienced practitioner turns to a trainee and asks, “So if you look here what can you actually see...” then adds “...and it takes quite a bit of training to start and actually see the maps in this (brief pause) noisy data” (p. 97). In her analysis, Alač emphasizes that the object of interest, the fMRI brain scan, contains maps that can only be seen through careful looking by a skilled practitioner. The trainee may not be able to “see” the maps yet, but the maps are there. Similarly, experienced butchers and inspectors are able to point to lines, seams and angles on an animal’s body, pointing out to learners both where the line is on that body and where to find it on future animals’ bodies. Novice butchers may not be able to locate a cutting map in each animal’s body—but the more seasoned can teach them how.

The trainer in Alač’s scene uses a pencil to draw a visual diagram of the ‘map’ a skilled viewer should be able to read from the brain image in front of them (101-105). Butchers use the tools at hand – knives, hands, their human and the animals’

bodies to draw similar maps on the animal's flesh or through gestures above its body, teaching where the lines are and how to follow them. While the practitioners in Alač's scene compare a tangible generalizable map (a pencil and paper drawing of what brain regions should look like in general) to a particular object for interpretation (this particular brain scan), butchers enact both the immediate and the general case at once on the animal's body. "Follow this line here" with a gesture along the animal's body, or the cut of a knife, demonstrates both *this* line here on this particular cow and also *this* line that you should be able to identify on cows (and pigs and goats) to come. Just as Alač argues that the comparison of a general map to the particular instance at hand "organizes the messy world of brain scans into a meaningful domain", the skilled butchers' gestures help organize the animal's body, rendering the body meaningful. As Alač describes the interactions between old-timer and novice as "reasoning and knowledge acquisition in the laboratory" (105), the novice and old-timer interactions on the kill floor display reasoning and knowledge acquisition in slaughtering.

As learning to read neuroimages takes place in the laboratory, learning to butcher takes place on the kill floor. While a gross anatomy course or meat sciences night course might help a butcher understand some aspects of the work, butchering must be done to be understood. At an annual state-wide meat processors conference, I listened to a meat sciences professor discussing the ideal learning environment for professional butchers and meat processors. Rather than hold their annual workshop in one of the hotel conference rooms or a classroom, he had hosted the training session (on making shelf-stable products like jerky and cured sausage) in the cutting room of a

meat market some thirty minutes from the conference hotel. It was worth the travel and hauling in bleachers, he said, because he was better able to keep butchers' attention and interest in that space. He explained that butchers learn better when a class is held in a working meat processing plant – "it's got to relate to their everyday" (Cox, 2014).

Learning to see like a butcher, developing the 'professional vision' along with skilled muscle movements, takes time, and a great deal of practice and repetition. At the university kill floor, I watched as brand new student workers cut a hoof off for the first time, and as seniors about to graduate, who had maintained this as their work-study job for several years, cut with more confidence in their last days before graduation. Elsewhere I encountered pairs of butchers who work together, splitting the tasks so that the more experienced does the precision work, the one who grew up with animals guides them in from the pens, the younger butcher does the heavier lifting, or the new guy sprays the carcasses and washes the floors. More often than not, when I was invited to help out, I was a sprayer and washer. On some kill floors, the owners didn't want me to help even in that way lest their insurance or OSHA representative walk in. Occasionally, a knife was placed in my hand, or I stepped in when others were absent, and helped to cut and skin the animals. While I trust I could kill my own meat and break an animal down in I had to, it wouldn't be pretty. I have next to no skill and extremely limited vision compared to the butchers I've worked with. But I noticed a moment in my fieldwork where I started, at least to a small degree, to learn to see like a butcher. For months I attempted to write the steps of

slaughter as they were performed in front of me using vague verbal maps of the animal's body -- usually my guesses of what part it was based on its analogue to a human body: cut off at the 'elbow' or 'ankle', cut from the neck to the belly, etc. But there is an entry in my field notes where the language clearly shifts. On that day, many months into fieldwork, I wrote "trim off around hind legs and [illegible] running up the middle of the cow *on the seam* [emphasis added]." After many days of observing slaughter, I too had started to see the raw expanse of an animal's belly as a seam line – an invitation to cut up the middle, following that line there.

Handholds and other mnemonic devices

The animal's body as it exists provides a script for right seeing-doing in the process of disassembly. But butchers change the animal's body as they work with it, revealing new layers and parts, cutting and marking the body to aid the process of disassembly as they go. Here I explore these cuts as material-semiotic devices: markers and handholds that help a butcher know where to go and manipulate the animal's body into a knowable, disassembleable object.

Some butchers will intentionally cut tears in the animal's body to guide them. On one kill floor with two butchers, the more experienced of the two would always take on the difficult task of evenly splitting a cow carcass into two perfect 'sides' of beef. Though the less experienced butcher had been doing the work for a decade or more, the one who was slightly more senior learned to butcher as a child alongside his father, and had a keener eye and steadier hand as he worked. I would watch in awe as

he stood before a headless cow hanging upside down, and used a knife to cut a line from the base of the hanging neck upward toward the spine. He would then turn to the top of the animal, steadying an electric saw that hung from the ceiling, weighted on a pulley, so that it rested at the center of the animal's crotch, right between its legs. Next he would turn on the saw and guide it slowly down using gravity and his own body for balance, splitting the spine perfectly in half. As he got closer to the neck, the slit he had cut at the start became a visual guide for where the saw should travel.

Butchers make particular cuts to make the animal's body help them in the process of disassembly. The slit in the neck to guide a splitting saw is one example. Another sort of cut is also common: a slice through hide that forms a handhold that butchers can use to move and manipulate the animal's body. These handholds, sometimes torn by accident while removing a hide; sometimes cut on purpose to help carry a head to the trash or pull a hide off the animal's back, help butchers disassemble the animal.

I have previously described the method one small slaughterhouse uses of removing the cow's entire head so that it bleeds out quickly.⁴⁸ But I did not describe what happens next. For a moment, the head hangs by the hide and muscle at the back of its neck while blood spills from the veins. The butcher punctures a hole through the hide at the back of the neck, and puts his hand through this as if it is the strap that hangs above a car door, allowing a passenger to hoist him or herself in and out. Holding the head through that newly cut handhold with the left hand, the butcher uses the knife in his right hand to slice the head off completely, severing that last bit of

flesh, and leaving the head to swing down to his side, still held in the left hand through the handhold. The butcher can then transfer the head to the inspection table so the teeth (to determine age) and lymph nodes (to check for the presence of systemic disease) can be examined and any required parts – the tongue and cheeks most often – can be trimmed off and included with the rest of the meat from the animal. After inspection and trimming, the butcher can put his hand through the same strap-like handhold, and carry the head to the offal bin for disposal.

Most kill floors I've visited are too small to have a large scalding tank for pigs, so all animal hides, including pigs', are removed with a knife. Working quickly, it is common for a butcher to accidentally cut slices through the hide of a cow – and even more so a pig – as he removes the skin from the animal's body. For some time I thought that all these cuts were accidental, and used opportunistically by butchers to lift and rotate the pig's body slightly so he could get at another part of the animal. But I realized, over many months of watching live, and through re-watching video, that some of these cuts are accidental and others are intentional. At a plant that gets money for its cow hides, butchers try hard not to cut through the hide as they are skinning. But pig skins are worth less, and are usually included in the weight of offal the rendering company hauls away each week. More cuts in a pig hide make no financial difference for the slaughterhouse. Some butchers will intentionally cut handholds into the pig's flesh to help manipulate the animal on the cradle, to pull the whole animal, wheeled cradle and all, to another part of the kill floor, and to provide a good grip and

anchor point to pull off the rest of the hide where it is still attached to the animal along the spine once the pig is hanging from the rail.

These handholds help the butchers to disassemble and make sense of the animals. Here I argue that disassembling an animal's body is itself a way of knowing the animal. Separating a body into legible, edible parts is a material process that reveals the animal's body as a particular sort of knowledge object: not only an object that guides the process of how to take it apart, but an object that can be taken apart, understood, and consumed: a known object in multiple senses.

Just as dissecting a text or memorizing its lines might be ways of knowing a written object, taking apart an animal and distinguishing its parts are ways of knowing a body. Distinguishing here has dual meanings: material and semiotic. Distinguishing is both a knowing process: mentally separating *x* from not-*x* and a material process: separating *x* from not-*x* with a knife's blade. As butchers break down a carcass in the cutting room, they simultaneously make sense of and make separate parts: they distinguish and they distinguish at once. Cutting and knowing are drawn together with metal on flesh.

Taking disassembly as a material knowledge-making practice, these handholds can be understood as material mnemonic devices: places to hold onto in the process of knowing the animal body and working a named subject into an edible object.

Russian psychologist Lev Vygotsky talks about a zone of proximal development: an arena of tasks that an individual cannot achieve on his or her own, but is capable of accomplishing with outside assistance (Vygotskiĭ & Cole, 1978, p.

86). Vygotsky believed that this level of capability – what we can achieve with the aid of others – is a better measure of where a child is developmentally than simply measuring what the child can accomplish alone. I turn to Vygotsky not for his understanding of child development, but for his insight into how individuals learn and accomplish skills in concert with others and with the world. Beyond childhood, we are all knower-doers, developing capacities and skills over time on our own and with the assistance of other people and material aids. Handholds cut by butchers on the kill floor are one type of material-semiotic aid.

The work of Wood et al. extends Vygotsky's work to include the idea of "scaffolding": temporary modes of assistance that a knower can stand on top of to *get someplace new*. By watching mothers encourage and aid three to five-year-olds as they worked with blocks, Wood and colleagues honed in on the importance of general encouragement and specific guidance to help young children accomplish challenging tasks. As Wood (1975) puts it, this sort of assistance allows people to complete "*elements of the task that are initially beyond the learner's capacity*" (Wood, Bruner, & Ross, 1976, p. 90). Scaffolding puts [learners] in a position to achieve success in an activity that they would previously not have been able to do alone.

I argue that humans cannot slaughter alone. Animals take part not only as a passive substance, but as a guide. Butchers manipulate the animal's body to make guide lines and handholds: temporary infrastructures that they as knower-doers can stand on to accomplish something that they could not achieve alone. The handholds cut into animals' flesh act as material mnemonics, helping butchers to know the

animal's body by taking it apart. These handholds are like grooves in a stone wall that a rock climber can use to get a grip as she travels. These particular cuts provide places to hold onto as butchers traverse the animal's body, transforming it into a known, distinguishable, consumable object.

Butchering is not unlike rock climbing, passing hands across the expanse of animal flesh while butcher and animal traverse together from life to death to standardized commodity. These butchers carve literal handholds as they make and make sense of the animal's body as a set of knowable, sellable 'cuts'.

Butchers aren't the only knower-doers on the kill floor. They work side-by-side with federal or state meat inspectors and sometimes with lab scientists who have come to collect body parts. For a butcher, inspector, and researcher, animal bodies demand different moves, cuts, and forms. In the case of gathering pigs' bellies from the kill floor, there is material conflict in defining "good." These pigs' bodies are governed by competing standards simultaneously. For the researcher, a thick belly skin with a large layer of fat on it is ideal: it is easier to get swabs into the cracks and infect this tissue with *staphylococcus aureus*--the bacteria they study in her lab. But for the butcher, the thinnest layer of skin possible is ideal: that fat should end up on the muscle side of the cut to make good thick bacon. At the university, they don't just use a knife to separate the hide--they have a pneumatic (air-powered) blade that whirrs as it spins, separating a layer of skin so thin you can see through it. While the butcher wants a thin skin and fatty belly, the researcher wants a thicker skin with some fat still

on it. Side by side on the kill floor, researchers and butchers are carving out the same object to get the right tools for different jobs (Casper & Clarke, 1998).

In the two segments that follow, I focus on animals' bodies as knowledge objects in a different context: for inspectors on the kill floor and in a different setting: in research laboratories that gather animal parts from the kill floor. Here, the definitions of what makes for a good cut for researchers can be very different from – and sometimes in conflict with – what butchers, consumers, and as I'll describe later, judges, seek for edible meat.

Inspectors



Figure 2. Still image from video by the author: Stainless Steel Inspection Table – End of Day. Copyright 2014 by Kara Wentworth.

A state department of agriculture inspector and a lab researcher work side-by-side at this stainless steel inspection table, bolted into the ground in the center of a slaughterhouse kill floor. Body parts materialize as meaningful on both sides of this table. Though they are discarded by the butchers,⁴⁹ the animals' internal organs are precious knowledge objects for both the inspector and the lab researcher. Here I will describe two sorts of bodies of knowledge that emerge from the animal's bodies. First, bodies like the cervix and vagina that lie on the researcher's side of the table, being trimmed and bathed in fluid to become stable models⁵⁰ for understanding human and animal life, death and disease. And second, bodies like the heart, lungs and intestines that lie on the inspector's side of the table, where they are squeezed, probed and sliced to find records of the animal's health.

One day, standing near the table, I overhear the inspector saying to the vaginal lab researcher "I can't cut it like you do" as he tries to trim extra tissue off the cervix and hands it over to her. The two of them share this stainless steel table each day, divided by a low wall so 2/3 belong to the inspector and 1/3 to the researcher and her plastic vials. The same animals' bodies become different bodies of knowledge for the inspector and for the researcher as they make different sorts of cuts in flesh. Animal bodies are bodies of knowledge in multiple simultaneous iterations as different parts materialize and come to matter.

In the smaller of the two sections of stainless steel table, the bulk of a pig's internal organs are splayed out in front of a Minnesota Department of Agriculture inspector. He uses a knife just like the butchers' to locate and slice open each lymph

node looking for signs of systemic illness. He holds each kidney in his two hands, bending it until the pressure pops the thin membrane it is encased in and he can feel the smooth surface of the organ tissue itself. The animal bodies are knowledge bodies in multiple simultaneous iterations as different parts materialize and come to matter.

An inspector's work starts before the first animal is killed. He has to perform an antemortem inspection, looking at every animal to be slaughtered while they are still alive. At this point, inspectors make sure the animals are ambulatory – able to walk on their own – and that there are no external signs of illness. Protocol dictates that if you suspect illness, you take the animal's temperature, but several inspectors explained that the temperature is rarely the sign they look to as an indicator of illness. One inspector told me he had never taken an animal's temperature, and another said that her suspicions of illness were usually confirmed by the fact that an animal let you stick a thermometer in its butt – the temperature itself might further solidify the suspicion. But animals expressing external signs of serious illness are relatively rare at the plants I've visited. I have not once seen an animal held from slaughter on suspicion of antemortem illness. Once the animal's body is opened, it's a whole different story.

The inspector has to identify all of the lymph nodes in the head and neck of each animal, locating the small lumps among similarly colored tissues, and bisecting each with a knife to look for signs of systemic infection. A seriously discolored or infected lymph node could mean that illness has spread throughout the lymphatic system, and the carcass might need to be condemned. After months of watching

skilled inspectors find each node, I could still barely distinguish the shape and guess where the nodes might be on an animal.

The bulk of the inspector's work happens after the animal is skinned. Butchers will pull the innards out of an animal, placing them on an inspection table. Often, the innards come out in two separate units – the offal: lower organs including the bulky digestive system, and the pluck: the upper organs of the circulo-respiratory systems. For an animal hung upside down on the rail, the lower organs usually come out first. The inspector runs his hands along the lengths of intestines, feeling for worms or other signs of illness. I was invited several times to squeeze the intestines with my bare hands to learn what huge living worm occupants feel like. The gallbladder is cut off of the liver and held like a full cup of water as it's moved away and disposed of to avoid spilling bile. Once all the internal organs have been inspected, the inspector lifts them into the offal bin where they are kept for the rendering company to pick up.

When the “pluck”—the connected heart and lungs—arrives on the table, the inspector carefully examines the animal's heart, putting his finger through every opening – a diseased heart, like lymph nodes, could be a sign of systemic infection spread through the circulatory system into edible parts of the animal. Once the heart and lungs are inspected, they too go into the offal bin. Kidneys are often left inside of a cow – they are an edible organ that increase the hanging weight and therefore the amount of money earned on that animal. Whether attached to the animal or on the inspecting table, the inspector will squeeze each kidney so that they pop out of their

thin membrane, and will observe and feel the surface of the kidney itself with his whole hand and fingers.

Once all the nodes and organs have been inspected, the inspector conducts a final inspection of the organless carcass. At this point, the carcass is considered meat – it has been sprayed with water and possibly with an acid wash as well, and it is about to go into the cooler to be stored. This final inspection is one of the most important steps for food safety, and is the one “critical point” every slaughter plant’s HACCP plan *must* contain. The inspector visually inspects for any signs of contamination – a small bit of hide that wasn’t removed, a single hair that stuck onto the carcass, any visible piece of what could be dirt or feces or could have dirt or feces on it. If he finds any points of contamination, a butcher or the inspector will use a knife to slice a very thin piece of flesh off, removing the contaminated spots.

Finally, the inspector stamps the carcass. To stamp the carcass, an inspector will sometimes pass over the area he is about to stamp using his knife as a squeegee to remove excess water or acid and get a neater stamp impression. Still, these stamps are wet and often run or smear slightly, but they are a deep permanent dark blue and their meaning is clear.

Each slaughter facility has to pay for its own stamp or stamps. A round stamp indicates USDA agricultural animals; a triangle means USDA-inspected wild game. Each state that allows the state department of agriculture to inspect meat sold within state lines has its own stamp outlined in the shape of the state. The stamp has an abbreviated version of the phrase “inspected and passed”; on USDA stamps, this

appears as “*INSP’D & P’S’D.*” Every stamp has the establishment number within it, the number assigned to that plant when it was given a ‘grant of inspection,’ approval of its basic paperwork and protocols allowing that plant to process meat for sale.⁵¹ The inspector typically has a locked box or locker within the plant where he or she keeps the plant’s state or federal inspection stamp. Only the inspectors have the key, so no one in the plant could stamp meat that wasn’t inspected.

Some animals require additional inspection steps. For elk, an inspector has to take a segment of lymph and the brain stem and send it in to a central laboratory so the government can keep track of illness in wild game.⁵² As I’ve described, cows’ ages are estimated by examining the number of adult teeth in the cow’s mouth, and a cow that seems to be over 30 months of age is treated by the butchers and inspector as if it has BSE (mad cow disease). Any animal that raises the suspicion of systemic inspection may need to be held for further inspection by a licensed department of agriculture veterinarian.

On top of all of the per-animal inspection work, inspectors have particular tasks they need to accomplish each month. For the Minnesota Department of Agriculture, the supervisor will send out a monthly checklist, including whatever extra inspection tasks need to take place. If for example current federal legislation required E. coli swab testing to take place twice each year, the supervisor might include that on the February and November monthly checklists. If HACCP plans needed to be reviewed once a year, or paperwork double-checked monthly, those tasks would appear on the monthly checklists as well. Inspectors work through these checklists to

get all the necessary materials gathered and steps completed on each kill floor they visit. For small slaughterhouses who only slaughter under inspection once every week or every two weeks, one state inspector will typically rotate between many plants. That inspector then needs to complete every task in every single plant. This can be a lot of work to fit in just 50 days of inspection a year as opposed to 2-300 days.

The animal's body carries information about its life and death, materially inscribed in flesh. Was the animal well cared for? Was it ever sick? Was it forced to live outside when it should have been given shelter? Organs can carry signs of ante-mortem illness. An animal's liver might have spotting or streaking of blood visible on the organ. This might be evidence of illness during life, quite likely a urinary tract infection. But it also could have been caused during slaughter – as one butcher explained to me, the impact of the electrical stun can cause a similar blood-spotted appearance. The body records signs of the steps and impact of death as much as life. Slaughterhouse inspectors are forensic specialists of sorts, gathering material evidence from the animal's body during autopsy to determine whether the animal was healthy enough at the time of death to be edible.

In one slaughterhouse, the inspector had me wrap my hand around the intestine to feel huge intestinal worms – a foot in length or more it seemed, with two of their bodies overlapping in the section I held. This producer was raising organic pigs but didn't properly care for the animals. They were forced to live outside in mud without any shelter from weather or flooding. Some of the pigs she had brought to this

slaughterhouse in the past had to be condemned because they were too diseased to be fit for human consumption. The butchers and owner had spoken with the pig farmer, who was relatively new at it, but she didn't seem to change her practices at all. These particular wormy pigs were not condemned because the illness was confined to the intestines. But I would not want to be paying extra for that organic pork at a grocery store. Reading the differences in feeding and handling practices alongside butchers and inspectors makes the question of "what makes good meat" a whole lot more complex.⁵³ The sorts of knowledge of proper handling and disease prevention passed down through generations of pig farmers might be as valuable an input into making good meat as the organic feed another producer is using.

Meat carries certain markers of the animal's life experience long after the time of death and all the way to the deli case. In the Anderson and Harrison volume *Taking Place*, Emma Roe describes that animal sentience – the animal's ability to feel – is materially located and readable in lamb's and pig's bodies in the slaughterhouse. In both examples, acute stress in transport and just prior to death are the "stuff" of sentient materiality. A stressed-out pig's body will maintain a higher pH after the animal has died, breaking down muscle faster and leading to a more acidic piece of meat. The slight shift in acidity makes water molecules less able to bind to the pork, so the pork appears pale and mushy, as if too-wet meat is exuding out of its surface. This "PSE" (pale, soft and exudative) pork is a major concern for the pork industry and can seriously reduce profits – pork that doesn't look the way consumers expect it to is less likely to sell. This very real material impact of the animal's feelings in the

moments prior to slaughter is a major factor in the success of Temple Grandin and other animal welfare-focused reformers. Stressed animals mean profit loss; poor animal welfare can impact the financial bottom line. Roe describes the problem of pork, much as I've described, in her article on animal sentience. But although she uses a burger as her entrée into the paper, she doesn't consider the somewhat different case of beef.

For cows, a lifetime of sustained stress causes a different sort of 'meat quality' issue. Living near a highway, being prodded with electrical prods, or years of being a blue-ribbon show animal at local and state fairs creates a low level pervasive stress that exhausts the animal's chemical capacity to respond to stressors. These animals can present as "dark cutters" after slaughter: with a pH too basic to properly break down muscle after rigor mortis. The meat from these stressed out cows will appear dark and dry because its molecules are holding onto too much water, so less water appears on the surface. This dark dry beef, like the pale mushy pork, won't do well in the marketplace and can be responsible for significant financial loss.⁵⁴

Researchers

Meat is not the only useful object that comes out of a kill floor. Hormones and byproducts, including fetal calf serum, insulin, premarin, and others are collected en masse from the bodies of slaughtered animals. Nelly Oudshoorn and Donna Haraway have both described these sorts of knowledge bodies: materials that travel from kill floors to labs, animal bodies in the service of (human) medical knowledge and

treatments (D. Haraway, 2012; Oudshoorn, 1994). The small slaughterhouses I've spent time in are not collecting sites for large volumes of animal tissues or organs. But within local communities, the slaughterhouse is a source for infrequent or smaller quantities of animal parts. At one slaughterhouse, lungs were sometimes collected by a high school science teacher to create a smoking lung demo, showing students how smoking tobacco turned pink lungs grey. At another, a teacher would come in to collect several lungs at once, using them in a lab activity where students blow with a straw to see how lungs expand with air. These animal body parts would become bodies of knowledge for teachers and students to make sense of human anatomy, becoming the lungs that students might imagine inside themselves as they inhale (or don't).

One small meat market was collaborating with a local university's extension program to run a meat quality experiment while I was visiting. The goal of the experiment was to see whether there was a measurable difference in the quality of meat from pigs raised on a typical mix of corn and grains compared to meat from pigs fed large amounts of spent grain from ethanol production. A few dozen pigs had come to the facility to be slaughtered, and the employees were asked to make bacon and hams from the pigs to see how the look, texture and taste would be different between the control group of pigs and those fed spent grain. Bacon and ham are among the most common, valuable cured products, so the results of the study might have immediate impact on industry practices. It would likely be a lot harder to popularize a spent ethanol grain-fed ham if it didn't hold its shape and color or give as good of an

eating experience as other hams. Here, animal bodies became bodies of knowledge for farmers and pork industry advisors, providing legible material stories about their lives prior to slaughter, the sorts of stories that translate to the consumer as she shops, cooks, and eats the body parts.⁵⁵

On the kill floor based at a large urban agricultural university, most slaughtering is done on Tuesday mornings, when a state inspector is scheduled to observe. Slaughter for research is exempt from inspection – if no one will be selling or eating the animal's body as meat, there does not need to be a federal or state agricultural inspector present. But on this kill floor, they try to schedule all slaughter under inspection so that they can use the rest of the animal for meat. The manager of the slaughtering program, a graduate of the university who worked there as an undergrad, is tasked with balancing the finances so that the combination of money from researchers and meat sales can offset the cost of the slaughter program at the university.

Tuesday mornings can be busy days, with many bodies, including my own, coming and going on the kill floor. The inspector is always there before slaughter begins, as are the manager and assistant who run the slaughter program. Undergraduate workers, typically two to four of them, will saunter in during the first twenty minutes of slaughter and help out. We all wear white jumpsuits that we'll take off and throw in the bin next to the washing machine in the small changing room across from the kill floor entrance door. But other humans come and go as well – sometimes a graduate student comes in with a glass water bottle, asking the butchers

to hold its neck at the neck of a just-stuck pig to get the first fresh blood as it spills out from the dying animal. We think she feeds it to her fruit flies. Other researchers will come in occasionally to get a heart or a lung for their animals or experiments. Once or twice a year, researchers come down from the fourth floor to watch as their cows are slaughtered, leaving with a clipboard of information and a large hunk of cow thigh.⁵⁶ But every single Tuesday, one university researcher comes to collect pig cervixes and vaginas. These pig cervixes are hole punched to become model human vaginas – knowledge objects for learning about toxic shock syndrome. How do you make a functional model of a human vagina from pig flesh? It may not be quite what you imagine.

As butchers hang a skinned pig upside-down from the rails, they cut a seam from between its legs down its belly toward the ribs. They cut a circle around the anus (“bunging”), and tie a plastic bag to cover this end of the long digestive tube. If any feces squeezes out, it will be contained in the bag and won’t get all over the edible animal’s flesh. With a cleaned knife, they cut into the lower belly of the pig and separate the reproductive tract from the bottom of the digestive tract, disentangling the tubes with their hands. They then cut around the vaginal opening and pull the vagina, cervix and fallopian tubes out of the pig’s belly, walking a few steps away from the animal to deposit it on the larger section of the stainless steel table shared with the inspector in the middle of the floor.

The researcher then trims off the fallopian tubes and any strands of tissue that pull away from the reproductive organs. She uses a small silver scissor, like

something out of a travel sewing kit, to cut a several inch long piece of vaginal canal below the point where the cervix begins, and another tube about the same length that includes the cervix. Using a longer surgical knife, she cuts along one wall of each tube, opening the tube and flattening the tissue into a rectangle. She typically comes to the kill floor with four wide plastic test tubes sitting in a plastic tube rack and numbered “1, 1, 2, 2.” The test tubes are partly filled with a pink liquid medium, which she pours onto a rectangle of flesh before picking the flesh up with a metal tweezer and dropping it into the test tube. She does this four times, leaving the kill floor with the same four test tubes of pink medium, each now holding one rectangle of vaginal or cervical tissue.

As I watched her work each week, she described to me that this tissue was used to make a model of a human vagina, which her colleagues use to study toxic shock syndrome. The model is considered an “ex vivo” model, a model that is outside the body but still alive. Sometimes the medium she brought in test tubes contained antibiotics to immediately sterilize the native colonies of bacteria on the pig tissue samples, and other times there was no antibiotic present – it all depended on the demands of the specific experiments the lab would run that week. From the tissue samples she collected on Tuesday, she was able to make vaginal models for all of the researchers in the lab to use for the rest of that week. The model they have developed allows the tissue samples to exchange fluids and molecules across a semi-permeable membrane, continuing the essential life functions of tissue--staying alive--for up to a week. And then she returns to the kill floor the following Tuesday for more.

For months I imagined that these model vaginas looked something like--well--vaginas: a large fleshy space, a cavity perhaps. The researcher described that she had to hole punch the flesh into smaller pieces to make the model – still it was hard to imagine. Finally, I secured permission from the researcher and her colleagues to follow her and the tissue back to the lab to see how these scraps of flesh become meaningful objects for producing new knowledge about human vaginal infections.

On the day I visit the lab, I leave the kill floor as soon as the researcher is done cutting her samples. We retrieve our cars from different parking lots and I follow her to the lab, about 10 minutes away on another campus of the same university. We park our cars – hers in the employee lot, mine on the street, and she waits for me so we can ride the elevator up together. The building, unlike the university kill floor, is secured with magnetic card keys so my only way in is with someone who works there. This building is different in other ways too – on a busy street that looks nothing like the idyllic “farm campus” with its great lawns and brick halls – one of which houses the slaughterhouse we just drove away from. This building looks new, and we ride up in a clean glass elevator. Another few card key swipes and we are in the lab, sitting at the researcher’s workbench.

She punches out small round pieces of tissue using a metal punch with a plastic handle like a small pen, the sort that a dermatologist might use to remove a rogue mole. The metal punch looks to be exactly the size of a standard paper hole puncher, only in this case the little circles, are the valuable substance. She punches out dozens of these hole punch-sized pieces of tissue, leaving a geometric lace of pink flesh that

looks like something from the deep ocean. She shows me that each punched circle of flesh looks more like a little mushroom than a flat cylinder of tissue: the internal wall expands to make what looks like a little mushroom top, while the outer wall stays taught, small and firm – the mushroom's base. Using a scalpel, she carefully bisects every little flesh mushroom, discarding the base/outer wall and saving what was the inner wall of the vagina or cervix. She then carefully picks up each inner wall plug in turn, transferring them one by one so they are facing inner-wall-tissue-up on a small petri dish.

These petri dishes are multi-well plates – a plastic rectangle about the size of a trade paperback book with six little petri dish cylindrical divots lined up 2 x 3. These plates are common enough laboratory tools, usually made of a solid clear plastic throughout. But these plates are slightly different – the bottom of each petri dish well is made of a semi-permeable fabric matrix rather than the hard plastic of the rest of the plate. The small plugs of tissue are placed so that the side that just met the scalpel (the side that would normally be directly touching other tissue) touches this membrane base, while the other side (what would have been the exposed flesh of the inner wall of the vagina) faces up, ready for researchers to infect and study.

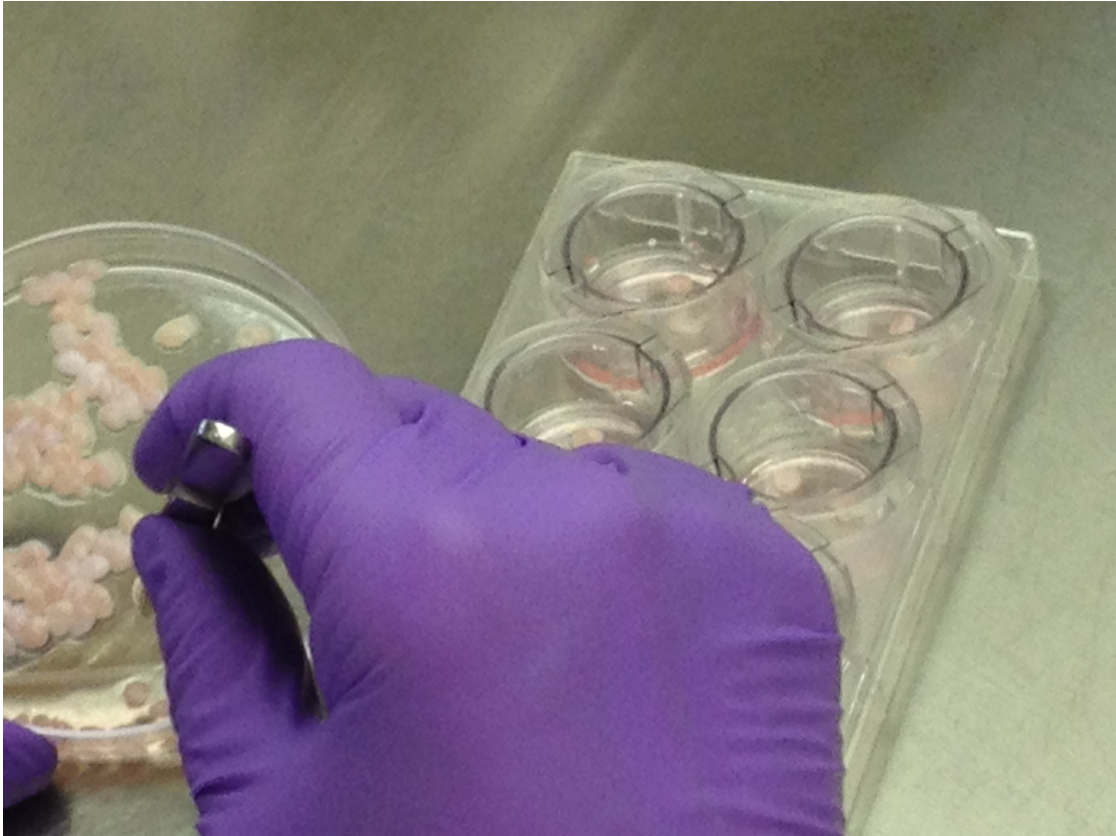


Figure 3. Photograph of researcher making a model of a human vagina. Copyright 2014 by Kara Wentworth.

These physical steps – cutting, placing in liquid, hole punching, slicing, placing on a fabric matrix – turn a living pig’s reproductive organs into a working model for human vaginas. The model looks very little like a human or pig vagina. It looks more like three shiny pink hole punches dropped in a clear soda bottle screw top. But it is functional similarity, not visual similarity that makes the model successful. The researchers explain that what makes this a good model is that it is highly predictive: what happens when they infect these little bottle caps with staph

infection and then treat them to prevent toxic shock syndrome looks a lot like what the results will be in a living pig, which looks a lot like the results on human vaginal tissue, which looks a lot like the results in a living human's vagina.

Depending on the experiment they are running, sometimes the 'native' colonies of microbes present on pig tissue samples are allowed to bloom on the vaginal models; other times they are killed with antibiotics prior to beginning the experiments. In the lab, researchers infect the *in vivo* tissue models with the specific strain of bacteria the researchers want to study, oftentimes a strain of *Staphylococcus Aureus* or "staph." Researchers are then able to test out different possible treatments to determine which might be successful at combating bacterial infections.

Through slaughter and the steps of processing these tissues, pigs' reproductive organs come to be knowledge objects that produce generalizable knowledge about microbial infections and human illness. These porcine cervixes and vaginas are bodies of knowledge, transformed through physical steps into sites for producing new knowledge about other bodies.

Cow muscle cells are bodies of knowledge for understanding living cows

Another lab on campus visits the kill floor to collect cow muscles. Through a different series of steps, these researchers transform large chunks of cow thigh – a decent-sized roast – into cellular models for understanding the impact of hormones on cattle growth. Like the vaginal research lab, this lab has chosen to use a working model outside of the living animal's body as their primary mode of experimental

research. Cellular and tissue models usually have a faster turn-around time than experiments conducted inside a living organism. When the chosen model uses cells or tissues in a small petri dish, it is also possible to run many more experiments side-by-side and to run them faster than one could when the whole organism is the model. Studying life outside of the living organism allows researchers to observe results on a cellular level and in a matter of hours or days rather than weeks or months.

In the case of the cow lab, like the vaginal tissue lab, using a model made of animal parts rather than whole living animals allows researchers to run a new set of experiments every week. In this lab, they are measuring the immediate impact of growth-promoting hormones on the cells themselves. In a living cow, researchers would have to wait for months to determine the organism-level difference in weight gain caused by hormones. And they would have to wait until after each implanted cow was slaughtered to remove a muscle tissue sample and learn more about the impact of those hormones at the cellular level. By using an in vitro model, these researchers are able to conduct new rounds of experiments every week: plating cells on Friday and letting them replicate over the weekend, then establishing experimental conditions for each plate of cells on Monday. By Thursday, they have new data.

Because they work at a cellular level, rather than at the level of tissue or organism, this lab sends far fewer animals to the slaughterhouse each year. Compared to the vaginal tissue lab that sends two pigs every week, this lab sends a half dozen cows just once or twice each year. From those 6 thigh muscles, they are able to process and freeze enough small vials of muscle cells to conduct weekly experiments

for a year or more. Through their experiments, these researchers try to better understand how added growth-promoting hormones impact living cows at a cellular level. By understanding the mechanisms of growth-promotion and identifying the ideal types and ratios of hormones, the lab can help the cattle industry maximize its output with minimal inputs. In other words, if a cow can grow faster, it can be slaughtered at a heavier weight and/or sooner than it would be otherwise. Experts within the cattle industry argue that this is a great boon not only economically, but ecologically as well. Cows that grow faster take up less space (or take up space for less time), eat less feed (requiring less grain to be planted for cattle), poop and fart less (decreasing the methane gas emissions), and can feed our growing population with fewer resources.

Like the pig lab, these researchers try to have their animals slaughtered under inspection so that the rest of every animal can be sold as meat. But because they want to have the cows be about the same age, and only have the personnel to process one cow thigh into frozen cells at a time, a couple of the cows were slaughtered on a Wednesday, when the state inspector was not present. Slaughter without inspection is perfectly legal for research purposes, and it is also legal to slaughter without inspection for edible meat so long as that meat isn't being sold. This is the principle of custom slaughtering: if the person who owns the animal before it is slaughtered is the one who is getting the meat back, and he or she plans to eat it themselves, or feed it to family or non-paying guests, then it is fine to slaughter and package the meat for consumption without having an inspector on hand. That logic – if you own it before

it's slaughtered, you can walk away with the meat, led me to buy a cow one Tuesday morning, the day before its uninspected slaughter was planned. The plant only charged me their per-pound processing fee (about \$2.99/lb) for whatever cuts I wanted, including the tenderloin, which was going for \$22.99/lb at my local food coop at the time. For a grass-fed eight month old cow never treated with hormones, it was a great deal from a consumer standpoint. I made a very inexpensive and tender beef wellington and still have a freezer half-full of that cow as I write this almost a year later.

Each day that a cow was slaughtered, two researchers from the lab would ride the elevator down to the basement level slaughterhouse floor, and enter around 9 am with a clipboard and a wheeled cart. They timed their arrival to be after the pigs had been slaughtered but while their cow was still alive. The metal cart would hold a sterilized knife and meat hook and a small metal box – the sort you might find at a hotel buffet, holding the scrambled eggs, only smaller – resting on ice. Using a cellular phone, one of the researchers would start a timer at the moment the shot from the bolt gun fills the space with echoing sound. She'd mark that time down on a clipboard, along with the weight of the cow and the number on the cow's plastic ear tag. From that moment of recorded death, she and her colleagues have to collect and process the muscle in order to stay within the protocol that they describe in their publications. That time includes rolling the stunned cow onto its side after it is stunned, getting a chain around its ankle and hoisting it up, sticking its throat, waiting for it to bleed out, lowering it onto a cradle where it can be cut, removing its hide, then

using the sterile meat hook and knife to cut a large chunk of thigh muscle, finally placing it in the chilled metal box. The 30 minutes also includes the time to wheel the cart down the hallways to the elevator, up to the fourth floor, into the cell culture room, putting the muscle through a meat grinder, weighing it into portions, and finally getting it into a medium in a test tube so that the muscle cells can be isolated. It is a lot to do in thirty minutes, and much of the work is done by the butchers and at the pace their work and each particular animal dictates. Once they get up to the cell culture room in their own lab, it is all hands on deck as the two researchers who collected the thigh are joined by two more colleagues. They all work quickly against the clock to get the tissue into medium in time.

Though the organism has been dead nearly 30 minutes by the time the mechanically ground tissue enters their medium, these cells will stay alive for days and really for years: once they are placed in small vials and loaded into trays in a tank of liquid nitrogen, they are kept frozen for a year or more. Each week, researchers in the lab take out several of these small vials, bring them up to room temperature, and begin a set of experiments with these living cells. In the protocol they use in this lab, a researcher warms the cells by placing the vial in a warming water bath and then plates the warmed cells, depositing a small amount in each 1.5" circular divot on her 12-well plastic plate (this time with ordinary, hard plastic bottoms). Researchers place the cells in a life-giving medium of fetal calf serum— a technological cousin of the cow muscle cells, gathered not from the local campus slaughterhouse but from a large

scientific materials distributor. Fetal calf serum is used as a medium for all sorts of cells, this lab just happens to be bathing the mother's muscle in the fetal milk.

The schedule and protocols for these cells is developed to meet the needs and schedules of both research companions – the human researchers and the cells. Cells are usually warmed up on Friday and placed in an incubator to replicate over the weekend. 72 hours later, when she returns to work on Monday, the researcher treats the cells with some combination of growth-promoting hormones, usually estrogen, testosterone, or a combination of both. Most of the experiments in this lab are focused on cell growth: what combinations of hormones lead muscle cells to grow faster. They add thymidine (the T in ATGC) tagged with radioactive material to the cell cultures. Once cells have been treated with the thymidine-radioactive element, they are given a few hours more of life before the cells are fixed and then lysed – split open to emit the contents of the cell. Just like the butchers on the kill floor, researchers call this kill step “harvesting.” By measuring how much radioactive material is contained in the cells on the plate, they can determine how much thymidine was used to make the DNA for new cells. More radioactive material contained in the cells means more cell growth happened.

While the pig tissues are used to understand human-microbe interactions, these cow cell experiments are focused on the same species from whence they came. These researchers are using cow cells to better understand cows. By experimenting with different combinations of growth-promoting hormones, they can offer more insight into the mechanisms and ideal application of hormones in beef cattle. Through their

experimental protocols, these cow muscle cells become preserved bodies of knowledge, ready to be thawed and used to better understand muscle cell growth in cows.

Cow muscle cells and pig reproductive tissues are bodies of knowledge

The cow muscle cells and the pig tissue samples are bodies of knowledge, and knowledge is grounded in the material details and functions of the body itself. In the cases I have described here, smaller bodies are isolated from the entire organism's body: organs, pieces of tissue, cells. These body parts are bodies in their own right, living on after the animal has died and carrying out the functions of life for days or even years after the organism's death. As these body parts are handled by lab researchers, they become knowledge-producing objects. The vaginal and cervical tissue and cow thigh muscles I have described here are bodies of knowledge that researchers work with to produce new knowledge about whole organisms including humans, microbes, and cows.

These animal bodies are knowledge objects, and all of the humans I've described are knowledge workers – butchers as much as researchers and inspectors. They make different sorts of cuts in the animals' bodies, rendering different sorts of meaningful bodies of knowledge out of the same organism.

Knowledge is embodied, I argue, by more-than-human bodies. And knowable, meaningful objects come to *mean* and be known through interactions between all of the actors in the scene, including various human beings, animal bodies, body parts,

tools, and objects. Through processes of manipulation from cutting handholds to hole punching tissue plugs, animal bodies come to be known, come to be meaningful, and come to matter in new ways. In focusing on materiality and interaction, knowledge and meaning are deeply entangled and harder to wrestle apart. But in the section that follows, I turn my attention more fully to the question of meaning, asking how butchering unfolds as a material-semiotic process.

[Five] Semiotics of Slaughter

In slaughter, knowing and making-so (epistemology and ontology) are simultaneous material practices.

Semiotics of slaughter (inspired by Martha Rosler's *Semiotics of the Kitchen* (1975)):

A – apron
B – butcher (boots, bison, boning knife, break room)
C – cuts, custom slaughter
D – deer season
E – E. coli 0157:H7
F – Food Safety Inspection Service of the USDA
G – gambrel
H – hoof, HACCP
I – inspector
J – jowl
K – knife
L – Listeria, locker
M – meat market, microbe
N – node hook
O – offal
P – pens
Q – quitting time
R – rail
S – stick, stun, stamp, summer sausage, smoker
T – trust
U – uterus
V – virus
W – weasand
X – xenogenic
Y – Y-shaped stunner
Z – zero tolerance, zig zag



Figure 4. Still image captured digitally from Martha Rosler's film *Semiotics of the Kitchen* (1975). Copyright 1975 by Martha Rosler.

Martha Rosler, in a 1975 video performance introduces us to the “Semiotics of the Kitchen.” She stands in a small kitchen, filmed in black and white, visible from the waist up, and presents to us one by one the materials and meanings of a woman’s rightful place: “Apron...Bowl...Chopper...” With Ladle, she scoops and flings imaginary soup out of the frame of the recording; after Knife, she returns to lift two sharp objects, gesturing with her full body, “U,” “V,” “W,” X,” “Y,” “Z.” She drops her head back at Y, slashes the air with Z, then crosses her arms somewhat awkwardly, tips her head to the side and gives a half-shrug.

I begin this chapter with an homage to Rosler in this script for *The Semiotics of Slaughter*. As in Rosler's piece, these words hold power – they capture a semblance of *things* but they vibrate with terror, the potential to kill, to trap, to enact a fast or a slow death. Things are linked to words; to a simple representational meaning (Apron \leftrightarrow the cloth covering she presents on camera); to all the associations that viewers and Rosler herself might attach to the object; to a meta-awareness of this whole performance as recorded as already-performed, as captured and framed with something resisting capture and a world beyond the frame, or in this case, beyond the page. This as-yet-un-performed script for *Semiotics of Slaughter* is likewise a tangle of meanings, pointing to the complexity of any semiotic act.

This chapter returns again to the overarching question of this project: How is meaning made in practice? Here, I follow the contours of knives hands and hides as butchering enacts semiotic cuts separating *x* from all that is not *x*. As I will describe, the question of knowledge: what is known, and ontology: what *is* are addressed together with the traces of a knife's blade. And, perhaps more surprisingly, the knife's blade acts as a ledger, where traces of performances – past cuts cut – are recorded as material-texts.

Cuts

(Categorizable bodies and body parts)

Semiotics of cutting

Taking an animal apart is a mode of knowing the animal and makes the animal knowable in new ways. This is a carnal sense of knowing aside from the biblical

bestial connotations: butchering means knowing an animal's body inside and out, making new sense of the structures that once served the organism in life. Here I argue that butchering is a material-semiotic process: cuts of meat are simultaneously identified and cut; known and made. Breaking an animal down into cuts of meat makes new objects knowable and materially real at once. In the process of cutting, meaningful sub-parts emerge from the whole as knowable and real objects. Knowing a brisket is a process of cutting that simultaneously makes it so.

Cuts of meat are a set of agreed-upon categories and standards that are particular to a time and place. This system of classification is both locally and historically contingent. The classic cookbook *Larousse Gastronomique* (Montagné & Turgeon, 1977) labels the cuts of meat emerging from the loin of a cow as “club steak,” “porterhouse steak,” and “sirloin steak” in the American style; as “filet,” “faux filet,” “chateaubriand,” and “romsteck” emerging from the “aloyou” in the French style; and in the English style as “sirloin” emerging from the “sirloin.” This is not just a problem of naming the same cut in different languages; these are distinct cuts of meat, cut from differently understood primary components or what American butchers call “primal cuts” of the cow's anatomy. A cultural preference for steaks in the US versus tender roasts in France is an aspect of the cross-cultural difference in cuts, but the understanding of the animal's body and the way it is divided into edible parts goes beyond just language and cooking traditions. The animal's body is fundamentally mapped and understood differently. The French “bavette” and “onglet” are cut from a

middle portion of the cow's side that isn't separated out in America. Following 'that line there' is not universal.

In the US today, national trade organizations oversee the official set of cuts of pork and beef that are marketed to consumers. The national cattlemen's association, funded by the "beef checkoff" program that adds a small premium to the cost of each cow sold for meat publishes charts of beef cuts; the Pork Board publishes charts and guidelines for labeling pork. As consumer taste preferences and cooking habits shift, these organizations modify the names and cuts to better market more of the animal. In 2013 the Pork Board renamed a number of cuts, introducing the "New York chops" and "ribeye chops," aligned with comparable and familiar cuts in beef. The pork and beef organizations also introduced a new system for labeling cuts of meat. A label now includes the official name, the animal, where the cut is from on the animal's body and what sort of cut it is, and a brief description of how best to prepare the cut. For example, a new label might read "Porterhouse Chop/Pork, Loin, Bone-in/Grill for best results." Some labels include more detailed instructions for temperatures and cooking strategies, hoping to provide a bridge to a generation of cooks who don't know the first thing about cooking meat.

Here I focus not on the negotiations and "invisible work" (Bowker & Star, 1999) of determining which cuts shall be cut, but instead on the everyday practices of butchers as they carve those cuts out of each new carcass. This is a practice of carving through muscle, sawing bone, and making abstract agreed-upon categories real on/in bodies. Each animal is slightly different, and butchers learn to negotiate legible

standardized cuts out of each unique body. Butchers are *sorting things out* with knives in flesh.

Breaking a carcass down into cuts is a process of knowing and making at once. Butchers simultaneously recognize a particular cut and make it so, using fingers, eyes, and blades to identify and carve out each legible cut. This knowing-making is a material-semiotic sorting practice, making legible objects through physical cuts in the world. Cuts are made as they are made meaningful. As a brisket is carved out, it simultaneously comes to be (brisket *as* brisket) and comes to be meaningful. Cutting is a process of knowing. ***Meaning and matter are made simultaneously as knives carve material-semiotic distinction between parts that were whole.***

In Judaism, there is a notion that the world has been shattered into many tiny pieces, and some of our work as humans is gathering these pieces to put the world back together. These gathering, sense-making practices are called “tikkun olam.” I think of this often while quilting – taking whole cloth and dividing it into a mess of scattered pieces, then stitching them together to make a new whole cloth. In the process of breaking an animal down into cuts of meat, the practice is reversed. Cutting becomes a way of making sense of the world and making meaning by cutting. Those new cuts live their own stories, becoming the prize-winning bacon, or the whole roast at a family gathering. Butchers make the whole cloth of each animal’s body into recognizable cuts that consumers can do something with.

“Cuts” of course refers both to the slices made by a knife and to the matter that is carved out and made legible by those slicings. Some cuts (slices of the knife

making portions of meat) preclude other cuts (portions of meat and the slicings they would require) from existence. Some cases are obvious – you can't have a long slender tenderloin roast if you cut it along its length into small tenderloin steaks. Whether cutting meat or any other substance, cutting a whole piece into smaller pieces means you don't have that whole intact any more. But there are other cases that are less obvious without some understanding of a cow's edible anatomy. You can't have a porterhouse steak (which contains several muscles that run along the length of the animal's upper back) and also a tenderloin from the same side of beef. Cutting a porterhouse means slicing straight through the tenderloin, perpendicular to the tenderloin's length, so what could have been a small round tenderloin steak remains attached to the bone and forms one part of the porterhouse's meat. Just as you can't dance in two weddings with one tuchus (or ride two horses with one ass),⁵⁷ you can't sear a porterhouse and bake a wellington with one side of beef. Carcasses can be carved and made meaningful in different ways, and certain cuts always preclude others. If the material body is going to come to be and be meaningful in some particular way, it will not be able to exist or mean in other ways. Cutting is always a semiotic choice, manifesting some realities and not others.

Cutting is, I claim, a process of knowing and making at once. Butchers identify cuts as they make them in the body, following certain lines and sawing across others. In cutting, butchers make it so. The steps that take place in a cutting room after a carcass is wheeled out of the cooler are described by some as 'secondary butchering' in contrast to the primary butchering that turns animal-to-carcass on the

kill floor. In the cutting room, a side of beef or a pork carcass is first cut into ‘primals’: large sub-portions that follow the gross anatomy of the animal’s body. These primals are then dissected into legible retail cuts, recognizable to consumers at a meat counter. Cutting meat is natural-cultural work, and cuts of meat are natural-cultural objects. Butchers read each animal’s anatomical body to make cuts, aligning that body with a cultural standard – developed over years of butchering and cooking and now maintained by meat marketing councils.

Butchering is a practice of *knowing* and of *making meaning*. In cutting meat, epistemology and ontology are one. Philosopher-physicist Karen Barad uses the phrase onto-epistemology to capture the inseparability of practices of knowing something and something being *so*. In my analysis of the practice of butchering, knowing and being so, making and making meaning are all deeply intertwined, and enacted together in complex performances of humans-butchers-knives on kill floors and in cutting rooms. In this next section, I focus on expert knowers who find new sorts of meaning in cut flesh, then zoom in on knives as meaning-making bodies.

Judging

(identification and evaluation practices)

Cutting meat into legible cuts is a mode of knowing the animal’s body and making meaning in flesh. In the process of cutting, butchers are expert knower-doers who carve out meaningful shapes. Once they are carved, carcasses and cuts of meat become objects for analysis by a host of other experts: high school and college students and professional meat judges are trained to identify, evaluate and compare

carcasses, cuts and preparations of meat. Carcasses that hang in a cooler are graded based on a visual analysis of their fat-lean ratios into USDA “grades” of beef. Once carcasses are broken down, individual cuts and cured products become objects for analysis and comparative judging.

On a Monday morning in early spring, I watch hundreds of high school students wearing navy jackets stream out of buses and vans as I walk from my car to the university kill floor. This day is known as the “blue plague” on campus – these streams of high schoolers become swarms as they occupy many of the departments on the agricultural campus. I catch a quick mental snapshot as two vans pull up to the curb in front of me and dispense more navy-coated teens: they trickle across the idyllic grass and brick campus past a sculpture of two enormous cows in repose.

These are the Future Farmers of America; they are all members of the “FFA” club at their high school. Their jackets look like varsity athlete letter jackets only cut with less puff; more business, less bravado. Later, when I get closer, in the hallways, in the cooler, and then on the kill floor, I see they are corduroy. Sort of a cropped, zippered, collared dark navy corduroy straight-cut jacket. They are cut like a barn work jacket – they don’t get any tighter or have ribbing at the hip or sleeves, just a simple thick corduroy jacket with golden letters across the back “M-I-N-N-E-S-O-T-A.” And below it, a patch announcing the school they come from. Some patches have up to three names, like “Chanhassen-Roberts-New Prague”: towns and schools, I imagine, that must be small enough that they pull from several neighboring communities to run the FFA club.

FFA students have many areas of expertise, from wildlife management to plant science to meat judging. Over thirty different meat judging teams have come to the university slaughterhouse to compete against one another. Students work individually, and their scores are combined to determine which team has the most skilled judges. A week prior to the visit, five cattle and six pigs were slaughtered in preparation for the event, and four sides from each species now hang in the cooler. The other sides have been cut into retail cuts – cubed stew beef, rump roasts, ribeyes and top sirloin filets – forty cuts in all, which sit displayed on long tables in one of the chilly cutting rooms. I come to watch and be an extra adult body overseeing this flow of high schoolers from coolers to kill floor to cutting rooms where they evaluate hanging carcasses, name retail cuts of meat, and judge hams and rumps.

When I get to the women's locker room, I put on a white lab coat instead of the white kill floor jumpsuit I am usually wearing. This lab coat makes me match with the meat sciences professor and the two men my age who run the university kill floor. The coat will lead me to be read as an expert and asked questions I can't answer several times in the day. I see that the university employees in white coats are wearing hairnets and hats. I try to find a hairnet where they are usually stored in a box on top of the ice machine down the hallway, but the spot is empty. I ask the meat sciences professor who tells me they're all in the classroom, so I walk back down the hall, across the kill floor and through another short hallway to the door at the bottom of a large lecture hall. The lights are off and someone – a high school teacher and FFA leader it seems – is giving instructions on how to bubble in a bubble sheet, projecting

his progress as he goes with an overhead projector on the white screen behind him. I am grateful when the meat sciences professor walks across the room to retrieve me a hair net, saving me from disrupting the scene.

Eventually the lights are turned on and a half dozen teachers try to corral the students into 8 groups of 16 or so. “If your team number is low, come down on this side. The numbers are 1-40...if it’s high, come down this side” If you are person 1 on team 1, come down here. Person 1 on team 3 takes forever. As I stand in the hallway I start to see these future farmers. Up close, I realize their jackets aren’t the only thing that is blue. They all wear navy ties, men and women alike, some patterned and some solid. They are not as physically recognizable as the football players or dance team might be – they are short, tall, gaunt, round, smooshed in with a small piggish nose. Most appear white, except for three or so students. The first group slowly lines up and is led away by a petite female teacher in a lace-edged top to their first station, retail cut identification. I end up following one of the final groups to assemble into the cooler, and the door is shut behind us.

There’s tension in the air. I have no idea what to expect. “On your whistle,” the meat sciences professor says to the apparent leader of the event, the guy who taught us to bubble a bubble sheet. I expect a whistle and instead it is a voice “OK – begin!” In the cooler, sixteen students spring to attention for a few minutes. Hanging with us in the cold space are four hanging sides of beef and four hanging pork carcasses. The group I am standing with is evaluating the pork. A few shorter girls move in close to the carcasses, walking around them and making notes on their paper,

seeming to evaluate each one. The guys mostly hang back, leaning against the wall of the cooler or standing slumped as if they're leaning on an invisible wall. I don't know what they need to mark down but I realize after watching for several minutes that they only need to declare a winner. I look at the orange bubble sheet of a young guy next to me. I see the faint mark of an erased answer: 3, and then a darker bubble filled in: 4. I look back at the carcasses and don't even know what to look for. I see mottled skin, varied amounts of belly fat. OK, pig number four seems to have nice marbling – ripples of white fat throughout the pink muscle – perhaps that's the sign of a winner.

I follow along as the groups spend ten or so minutes at each meat judging station, evaluating pork and then beef carcasses, then ranking hams, pork loins, beef rounds and beef ribs. Finally, they walk through the cold cutting room and try to correctly identify each of the retail cuts of meat laid out and numbered on the tables. Here they had to fill out a table with four columns for each object. Next to the number on their paper table corresponding to the number next to the cut of meat on the physical table, students record the species (b for beef; l for lamb; p for pork), the primal cut of the animal's body it came from (breast, brisket, chuck, flank, ham/leg, loin, plate, rib/rack, round, shoulder, side/belly, spareribs, variety meats or various meats). Next they name the specific retail cut from a list of 99 numbered options. I won't list them all here, but they range from "Tip roast, boneless" to "Arm Picnic, whole" to "mock tender roast." And finally, as any good butcher or meat counter employee should be able to, they list the recommended cookery methods for that cut (D for dry heat, M for moist heat or D/M for dry or moist heat).

Later on, the meat sciences professor walks me through each event, explaining what to look for and the basic standards for judging. For pork carcasses, you are looking for trimness and muscle bulge. A good ham has less subcutaneous fat and more muscle mass. He teaches me to stand back from the table and blur my eyes, to just gauge the ratio of red (muscle) to white (fat). Judging loins, you visually compare the width of the loin (x axis) to the height of the loin (y axis) and you look for a shadow. The presence of a shadow means that the loin and other muscles are larger. For beef ribs, the quality grade matters most, and trimness and muscle are considered secondarily. As the expert judger explained, you first check for the grade of beef – based on marbling is this beef USDA choice, prime, or select? Once you have determined the grade, you “break” on trimness and muscle – that is, any cuts that are grouped into the same grade would be secondarily ranked on their trimness (not too much fat) and muscle.

In several events, students had to answer a series of questions, comparing objects to one another and determining which was a winner for a number of different criteria. For the beef roast, they were asked “(1) which round has the coarsest marbling? (2) which round is the lightest muscled? (3) which round has the greatest area of exposed lean in the rump face? (4) which round has the deepest center? (5) which round has the brightest colored lean? Here each answer is scored as correct or incorrect, and students earn points only when they correctly judge the winner based on each criterion.

In other events where particular cuts are being compared to one another, students are scored out of fifty points based on their ability to correctly rank the cuts. When the experts set up the contest, they determine a ranking (such as 2, 4, 1, 3 for these hams) and decide how much distance there is between each piece. If one ham is really clearly far below the other three, they would set the scoring up so that a student who puts that terrible ham in third rather than fourth place would lose more points than a student who mixed up the top two hams with one another. There is a different point spread between hams depending on how clear the superiority gap is between them. For this set of hams, switching 2 and 4 (putting 4 in first place when it should have been put in second) would have led to three points cut; switching 1 and 3 (putting 3 in third place and 1 in fourth) would have led to four points cut.

Meat judging is a serious event, and judges –whether at the high school, college or professional level – are able to read the specific identity, grade, and relative value of each cut of meat based on a complex set of criteria and standards. While the criteria and attention to detail are connected to consumer taste preferences and what will sell, this knowledge is codified around shared standards used across the US. While a butcher or meat market owner might know exactly what a perfect brisket that will fly out of the case at his shop might look like, they may not know all the grading criteria and judging standards that trained judges depend on.

In meat judging, cut identification, grading, comparisons and rankings are all ways of making sense of animals' bodies as knowledge objects. The material details of flesh contain information – color, shape, ratios, sizes – that trained experts can

discern. In this next section, I describe judging that combines these modes of analysis with another way of knowing the animal's body – tasting. Here I will describe meat judging at the annual state convention for meat producers, and judging that takes place at barbecue competitions. In each of these settings, animal bodies are taken as objects of knowledge for trained judges to look at, touch, and taste, comparing objects to one another and declaring a winner. The process of judging reimagines and remakes animal bodies through classification and comparison systems that meld objective standards of practice with necessarily subjective judgment. In these next cases, judges learn to read animal bodies with their mouths.

At the Minnesota Association of Meat Processors annual convention, meat judging is an important part of the weekend. Many of the small meat market owners who attend will have worked for weeks or months perfecting new recipes and methods to enter products in one or a number of categories of the contest. Everything from traditional wursts to creative new flavors of bacon finds its way onto the judging floor, where judges work in secret, analyzing the appearance and taste of each product.

Pam, who works for the pork council, invited me down to the judging floor to taste some of the samples and help them judge. While the judges for most of the contests are professionally trained evaluators who adhere to precise standards and expectations for each judging category, the state pork board marketing team is evaluating a new, more free-form category in the competition. For this category of “specialty pork”, the pork board judges aren't beholden to established standards of shape, appearance, and classic taste that define what makes a good bacon or ham.

Instead, they get to choose what tastes best, and what would be a good new idea for selling more pork. As I arrive toward the end of their process, I hear the group of three judges narrowing down and ranking their top three products. One of the first place contenders is a blueberry breakfast sausage patty that all the judges loved. To my taste buds, this is a classic Minnesota flavor – sweet and greasy without much spice. I can't imagine it going very far in a Texas contest.

At barbecue spring training--a day-long event for barbecue competitors, judges and enthusiasts--judges and award winning pitmasters describe how they do what they do. At these barbecue contests, competitors set up for many hours – often overnight to smoke and prepare prize-winning briskets, chickens, pork ribs or other cuts of meat depending on each contest's guidelines. There are a number of different national standards organizations that license contests, and the set of large contests held in Minnesota adhere to the Kansas City Barbecue Society's format and rules. At spring training, we listen to a panel of trained judges explaining how barbecue judging works. One judge describes judging as a mix of standardized judgment and subjective opinions, saying, "we're all trained in the [bbq judging] class...but we're all humans."

Barbecue judges rank each object for presentation and for taste. These are separate scores out of ten points, meant to be determined separately. A judge is not supposed to taste anything until she has already ranked it for presentation. This principle applies across any meat judging contest that evaluates looks and taste both – they are intended to be separate ratings. But as one judge explained, they are difficult to uncouple. As he said, "usually what looks good is gonna taste good." Whether this

is because good looks are an effective stand-in for good taste or because good looks sway the judge to believe the taste is better is unclear. But the distinct traits of appearance and taste are deeply connected. The judging standards that the FFA students used are built in part on this relationship: the grading of choice beef and prize-winning loins should be connected to an improved tasting experience. But in some categories, a perfect specimen may be just that – like the giant pumpkin that wins at the state fair, perfection in appearance may not translate to the sweetest pumpkin pie.

Whether hanging carcasses, anonymous retail cuts, loins, bacons, creative pork products or the perfectly smoked brisket, cuts of meat are read and ranked by experts who are trained to know animals' bodies in particular ways. Animals' bodies are bodies of knowledge containing detailed information about meat quality and the skill of preparation. Meat judges are expert knowers, reading animal flesh through sight, touch and taste. Judges make cuts in knowing: producing tiers of relative value that distinguish some flesh from others. Judging is a semiotic process of assigning meaning and difference across knowable objects. Judges, like butchers, inspectors, and researchers, are knowledge workers, making semiotic cuts (though they may not make material cuts) in animal flesh, thereby knowing the animals' bodies and making those bodies meaningful in new ways.

Knives

In this last section, I want to consider the knife as a body: its details of shape, its ability to take on a human as a living appendage with shared motives. Add this

knife-body to the list of bodies of knowledge on the kill floor: butchers' bodies that know how, animal bodies that guide and teach, parts that become knowledge objects in new configurations outside the body. Knives are bodies of knowledge in their own right, bearing the marks of the bones and hides they rub against, maintaining their own lengths and angles so butchers can do what they couldn't do alone.

Knives make meaning by arranging and separating matter. Cuts are semiotic acts. Here, I want to focus on the knife as a material entity, as a body. As I'll describe in this section, a knife's edge is a complex, multiple entity that is dulled by the objects it slices through. Knives are bodies of knowledge in multiple respects – as a deciphering tool used to make and understand an animal's body as carcass and cuts of meat, and as a ledger, bearing the marks of encounters endured over a span of time just like human and animal bodies do. And a whole body of knowledge surrounds knives: how to care for them, maintain and remake their blades, how to behave around others' knives, and how to choose the right knife for each task.

Knives and humans know together. As a butcher moves her body and holds the knife just so, at a specific angle to the animal's body, the particular pose is maintained by three bodies together: animal-human-knife. Knowledge of *how* to butcher is embodied by the body of the animal, the butcher, and--as I argue here--the knife blade. Michael Polanyi describes tacit knowledge as knowledge that is extended by the tool. Though he is not focused on whether objects themselves embody knowledge, he sees a walking cane or pencil as extensions of tacit knowing. Tacit knowledge for Polanyi is a relational knowing. In his example, we are able to

combine details of facial features into facial recognition seamlessly, without analyzing the curve of a friend's nose each time, butchers combine small muscle movements and angles of blades into a swift and clean cut or a well-trimmed brisket.

This embodied knowledge or 'knowing more than one can tell' (Polanyi, 1967) that Polanyi describes is composed of knowing and making many of these sorts of relational connections. The embodied knowledge-practice of butchering is made up of a complex series of relationships between angles of animal bones, slight shifts of one's own body weight, movements of wrist or shoulder. Small muscle movements are combined without struggle into a comprehensive, complex performance. Out of this performance, meaningful objects emerge. A brisket emerges out of the process of tacit knowing undertaken by human, knife, and the material world--specifically, the animal's material body. Knives are tools for knowing the object and for making the object come to be. The practice of knowing with knives is always an ontological practice of making as much as an epistemological practice of knowing. And in this knowing-making, humans animals and knives remake one another's' capabilities and know together.

Natasha Myers (2008) describes a similar sort of human-tool co-knowing as a reconfiguration of practitioners' bodies. Myers focuses on the practices of protein crystallographers in making and using models of three dimensional proteins – models that she argues are embodied; not isolated in either the mind or the outside world (p. 166). Instead, this is a form of what Myers calls "corporeal knowledge" (p. 167). In her analysis, these humans' bodies are reconfigured as they know in concert with

technological prosthetics and tools. In Suchman's reading of an early draft of the piece, which she references in her *Feminist STS and the Sciences of the Artificial*, Myers' work

“explores the transformation of body boundaries that occurs as molecular biologists incorporate knowledge of protein structures through their engagement with physical and virtual models....The process of learning those structures involves not simply mentation but a reconfiguration of the scientist's body, as “protein modelers can be understood to ‘dilate’ and extend their bodies into the prosthetic technologies offered by computer graphics, and ‘interiorize’ the products of their body-work as embodied models of molecular structure” (in press). The result, she proposes, is a kind of “animate assemblage” of continually shifting and progressively deepening competency, enabled through the prosthetic conjoining of persons and things. (Suchman, 2008)

I cite Myers through this longform quotation to include Suchman's phrase “prosthetic conjoining of persons and things,” a beautiful summation of Myer's work and how it builds on earlier work by Polanyi and Merleau-Ponty (1962). Following Suchman, I argue that butchers and knives are prosthetically conjoined, extending one another's capacities and knowing *how* together. Knives, butchers and animals together form what Myers calls animate assemblages of competency. This competency is built across the bodies involved and requires them all: metal bodies and fleshy alike.

Knives are bodies of knowledge in another respect as well: they don't only make meaningful objects but they are also ledgers of meaning themselves, bearing the marks of each cut they've made. We typically say that the knife makes the cut, that the knife restructures the shapes of things and makes new things come to be. But here is what butchers know: *the knife is cut by the hide*. Each swipe of hide-against-knife

shapes the blade, making it dull. Knife blades are record-keepers; their metal is inscribed as they are inscribing flesh.

There is an entire formalized and informal body of knowledge around knives. Knowledge of knives – how to use them, clean them, maintain them, and sharpen them, are an essential part of butchering know-how. As one butcher explained, "I had no cutting experience prior [to starting this job]. But I know how to keep a knife sharp -- that's the most important part."

Though a knife blade appears to the naked eye to be a solid piece of metal with smooth surfaces that meet in a sharp point along the edge, these bodies are more complex. I thought knives were solid, strong pieces of metal with rubber handles but on knife day in our meat sciences night class, I learned knives are multiple: their blades made up of tiny metal burrs that go in all different directions. A sharp knife has its burrs aligned, extending one plane of the two-sided point of its edge. Sharpening stones make this point and align the burrs as they go - first pointing one way, in line with the angle you've sharpened on side A of the knife, then pointing the other way, in line with the angle you've sharpened on side B. Once you have a good plane on each side, a finer sharpening stone can help get those burrs lined up rather than bent or curled over. Sharpening *steels* are used more frequently for ongoing maintenance, realigning the burrs when they get out of whack. Sharpening steels don't actually cut a sharp edge, they merely realign the burrs on the existing edge.

Butchers will often wear a scabbard, a metal or plastic solid fanny pack of sorts, attached around their waist with a chain. It looks like a simple desk organizer or

a long narrow metal pan for baking book-shaped cakes or a magazine rack you might hang on the wall only to hold your bills. This scabbard will usually hold two knives – one for cutting hide, one for breaking bones, and a steel to sharpen both. Sharpening steels are long – longer than most knives, and I often see these hanging from a chain attached to the waist-chain rather than placed in the compartment with the knives. In between animals and in between cuts, butchers will grab the handle of the sharpener and run the length of the blade along its length (or vice versa) holding a steady angle where the knife edge meets the sharpening steel, flipping the knife over so first one side of the edge meets the steel, then the other. Not everyone does this exactly the same way – pointing the steel up or down, straight out away from them, parallel to the floor, holding the knife or the steel stationary while moving the other against it. The sharpening steel is narrow - an inch or less, so the line of motion is a moving diagonal, with one end of the knife's blade making contact with the starting end of the steel, and the far end of the knife's blade making contact with the farther end of the steel at the end of the motion. It is a move-and-swipe. And the angles between the steel and blade (held almost parallel but not quite - about twenty degrees off of parallel) must be about the same on the two sides of the blade. Swish, swash, swish, swash. These frequent sharpenings are necessary to maintain a sharp blade to get the job done.

Sharp knives make work easier. As one butcher said – “this is a good job when your knife is sharp but when your knife is dull it's the worst job in the world.” Butchers put a great deal of time and care into keeping blades sharp. But a dull blade, according to some butchers, can be better for certain ways of knowing the animal.

Most of the small slaughterhouses I've visited are too small to house a scalding tank that pigs can be dipped in to loosen and remove all the hair from their skins. Instead, most of these small slaughterhouses skin the pig just as they skin the hide off a cow. When skinning a pig, accidental (and intentional, as I describe in *handholds*) holes through the hide are an inevitable result of sharp blades in flesh. Pig hides aren't worth much and butchers want to cut off thinner skins leaving more weight on the carcass. Some butchers prefer a sharpened skinning knife for this process, letting the blade do the work as they gently guide it along the shape of the animal's muscular outline, parting skin from fat and muscle as they go. But other butchers prefer a dull blade for this process so the weight of the knife and their body cuts through the tissue rather than the mere touch of a blade. With a slightly dulled knife, they might be less likely to accidentally nick and puncture the skin.

I've argued that slaughter is an interaction of butchers, animals and knives, with the material body of the animal guiding and participating in the unfolding performance as much as the human and the tool. Dull knives allow the animal body to affect what is happening even more. These thicker flatter knife edges can follow the line between muscle and skin, carving neat concentric arcs of fat out of the animal's body. A duller blade placed between skin and muscle may be able to 'follow that line there' more faithfully than a sharper blade.

Knives are bodies of knowledge, used to make the animal's body knowable, maintaining angles and shapes in concert with butcher-caretakers, and keeping a material record of events along the way. So what does it mean to have sharp knives?

Knives are tools of perception, tracing, and making. Knives are tools for both knowing the object and *making* the object. In the process of cutting, an object comes to be in the practice of knowing: a brisket (a culturally specific standard form) is found as a butcher and ever more dulled blade emerge from the melee of many cuts. A sharp knife is a well-maintained human-tool assemblage capable of following lines in the material world and cutting new ones: knowing and making the world so.

How Bodies Come to Matter - CONCLUSION

I have argued that butchering is an embodied form of knowledge, embodied not only in the butchers' bodies, but shared among the details of an animal's material form, the angles of knife blades, and the muscle memory and depth of knowledge of human butchers. Knowledge of how to butcher is materially embodied in flesh and metal.

I've described butchering itself as a practice of knowing: cutting and trimming a brisket simultaneously identifies and creates the brisket. Butchering as knowing-doing blurs boundaries between epistemology (knowing) and ontology (being); the brisket is both known as brisket and made to be a brisket in the acts of cutting. In cutting an animal's body into cuts of meat, the animal's body is made knowable and is known in new ways. The animal is made into recognizable pieces of meat for consumers, chefs, and expert judges. And the animal is divided into separate parts that become objects of knowledge for inspectors gauging health and laboratory researchers producing new knowledge about human and non-human bodies.

Across these examples, my primary argument is this: **Knowledge is materially instantiated in the details of bodily matter. The animal body in its material specificity collaborates intimately with human cultural forms, knives, and real live butchers to guide the performance of slaughter: killing, bleeding, skinning, gutting, and breaking down a carcass into cuts of meat.**

My primary theoretical contribution here is a queer rethinking of Judith Butler's articulation of how bodies come to matter. Butler focuses on how bodies

come to matter with a particular focus on how bodies come to cohere as gendered. In her account, bodies are not born with gender identity or even with meaningful sex. Instead, through everyday performances: wearing a certain sort of clothing, carrying one's body a certain way, acting in particular ways in the world, a person constitutes oneself as a knowable, gendered object. What appears to be a coherent singular 'identity' is really the cumulating of disparate performances. More broadly, the human individual is *constituted* through performed activities. Butler expands the "conventional view of acts to mean both that which constitutes meaning and that through which meaning is performed or enacted" (Butler, 1988, p. 521). For Butler, a performative act is not an expression of pre-existing meaning; instead meaning comes to be through the acts of performance. She combines this expanded notion of constitutive acts with a theater definition of "act" as shared, within a broader performance, and of temporal duration (1988, p. 525).⁵⁸

In my analysis, I follow Butler's expansion of action (and, in my emphasis, interaction), to be constitutive of meaning and worlds. While Butler is focused on human beings and bodies, mine is an account of how more-than-human bodies come to matter. And rather than focusing in on seemingly singular, coherent meaning like identity, I am making sense of multiplicities of meaning – messes of meaning in flesh that spill out of bodies.

In this early essay and in two books that follow it –*Gender Trouble* (1990) and *Bodies that Matter* (1993) –Butler focuses on gender as constituted through acts. She describes gender as "a corporeal field of cultural play...[not] a natural or linguistic

given” (1988, p. 531). Gender is not a fixed boundary but is produced through material lived performance. Butler describes apparent difference and symbolic order (in this case the categories of male v. female) as artifice, produced through constitutive performances. Performative, she explains, means “dramatic and non-referential,” “real only to the extent that it is performed...” (p. 527). In her definition of performance, Butler rejects both a structuralist model that understands overarching structures to be imposed or inscribed upon individuals and a traditional notion of individual subjective agency and free will. Instead, as she describes, “the gendered body acts its part in a culturally restricted corporeal space and enacts interpretation within the confines of already existing directives” (p. 526). The first section of this project, *Boundary Work* follows Butler’s logic. Rather than taking boundary-transgression and boundary-policing to be signs of the strength and importance of boundary, I follow Butler in taking these as indicators that these boundaries are “only socially compelled and in no sense ontologically necessitated” (p. 528).

In working to understand how bodies come to matter and how knowledge materializes in interaction, my work sits in the middle of a debate between Butler and philosopher-physicist Karen Barad. Barad cites the debt she owes Butler, but critiques Butler for developing a notion of performativity without dealing with the details of material mechanisms for making gendered bodies. Barad seems to think that Butler does sufficient work on how the outlines of material bodies are sculpted, but doesn’t consider the materialization of the insides of bodies at the atomic level (and presumably the levels of hormones, organ systems and etc taken to be ‘inside’ as

well). Barad further criticizes Butler for not allowing enough space for agency (Barad, 2007, p. 177) and for sticking to a simplistic notion and incomplete assessment of “causality” of materialization (p. 151).

It is difficult to read Barad’s critiques of Butler without hearing Sara Ahmed’s (2008) criticism echo in the background. In her article “Open forum imaginary prohibitions: some preliminary remarks on the founding gestures of the ‘new materialism,’ Ahmed criticizes Barad and others for claiming they are a much-needed material intervention in a time when theory has focused too much on discourse. Barad is one of Ahmed’s most cited offenders. In both the article and book chapter versions of her argument, Barad opens by insisting that “language has been granted too much power,” (Barad, 2003, 2007) and it is time to reclaim matter as mattering. Barad’s call for a return to matter sounds like precisely the sort of critique Butler responded to (quite effectively, in my reading) in *Bodies that Matter* (1993). The trouble here lies in a circuitous argumentation loop between calls for a return to matter (away from the linguistic turn) and calls to understand matter as implicated in and through symbolic systems (away from the ‘naiveté’ of materialism).

In my reading, Butler’s gendered bodies are enormously agential, operating under constraint but materially self-fashioning their bodies and selves. Though Butler doesn’t take Barad’s Bohrian approach to causality, I believe she produces one of the most nuanced descriptions of how the social, linguistic and material manifest through acts of performance (see especially Butler, 1993, pp. 65-67).⁵⁹ In my reading, Butler explains how bodies come to be gendered through material-discursive activity,

implicating matter and signification together without reducing or enslaving materiality to language nor vice versa.

In short, I disagree with critics, Barad included, who claim Butler's work is *merely* discursive. I read Butler instead as offering a version of material-semiotics that necessarily passes through discourse. In contrast, my material-semiotic theory works as much as possible in the flesh and matter of bodies themselves—pigs, people, cows, knives—taking these bodies in interaction as meaningful and *as* knowledge.

So what? What are the implications of thinking fleshy (and metal) bodies *as* knowledge? Of claiming that meaning is made *in* flesh itself?

I borrow a phrase here from Donna Haraway in her book *When Species Meet*. Writing about a writer's interactions with his dog, she describes the “fleshy, meaning-making details of worldly, face-to-face love” between human and animal (2003, p. 35). In a 2014 workshop at UC San Diego, fellow science studies program members and I participated in a panel organized around the phrase but taking some liberties with the punctuation.

The concept of “fleshy meaning making” weaves an alternate worlding of knowing and being, where bodies of organisms and bodies of knowledge are not taken to be outside or inside one another. The Cartesian divides (and its iterations in psychoanalysis, neuroscience, linguistics and beyond) between knowledge located in a mind/brain/body and the outside world “beyond” are no longer sensical frames for what is or what is known. We typically think of flesh as material, tangible, of the body and meaning-making as representational, structural, of the mind. Fleshy

meaning making melds mindwork with bodylife, troubles attempts to separate thought from soupy organ, and refuses to privilege fleshies who think their capacity for meaning-making sets them apart from the pack. “Fleshy meaning making” defies the split between matter and language, between matter, understanding, and bio-bodies. Fleshy meaning making is lively.

In the stories I’ve gathered here of knowledge and meaning on the kill floor, meaning is made in flesh, by flesh, and through interaction of fleshy (butchers, pigs, cows, eaters) and less fleshy (knives, microbes) bodies in concert. I position fleshy meaning making as a sort of varsity version of “material-semiotic”, which insists that meaning making practices are inherently material but also inherently lively, thick, messy and gendered. Flesh is not merely material but is *insistently* material, it is animate or fetid. It is often where it is not meant to be: it is excess, beyond skin and bones of outline or argument. Fleshy meaning making denies the possibility of any account of bodies, discourses, or power without the materiality, the fleshiness, of bodies: their anatomy and physiology, not only their meanings and makings.

SECTION III – THE INTIMATE POLITICS OF SLAUGHTER: MAKING WORLDS

Much more than meat (and difference and knowledge) is being made in the practice of slaughter: lives, livelihoods, visions of the future.

This final section offers yet another cut into the question of how meaning is made in practice. While the preceding chapters dealt with how difference is made (how x is separated from its opposite, x') and how bodies matter and come to be meaningful (how x is known and brought forth as separate from all that surrounds it and in comparison to what is around it), this final set of chapters is focused on how shared cultural meaning is made through daily practice and interaction. I hone in on shared and cultural meaning-making: people making meaningful lives and worlds. Here I travel back to the kill floor and beyond the slaughterhouse to follow shared practices of making meaning in meat worlds. I explore how people, in interaction with animals and tools, make the worlds we live in and carve out meaningful lives and livelihoods in and around slaughter.

This section is focused, in short, on social analysis. Whereas prior chapters focused largely on the movement and interactions of animals and human bodies, here I trace the contours of lives lived— what are people doing, what sorts of relationships are they building and what sorts of stories do they tell to make their lives and worlds hang together with some semblance of meaning? How do you learn not to be a butcher or inspector or cattle rancher, but to be a person in these worlds? How do we make a life? And how do we make different lifeworlds?

I argue that much more than meat is being made in the practice of slaughter. In

the first chapter in this section, I conduct a socio-cultural history of slaughter, arguing that animal bodies work as a script for industrial capitalism. Using the work of historical geographers and oral histories from the Ford archive, I trace the progression from disassembling pigs on a small scale to the massive disassembly line at Swift's packinghouse in Chicago, and from those packinghouses to Ford's mechanized assembly line. As I'll describe, Ford's first use of conveyors was inspired by breweries transporting grain; but it was a trip to the packinghouses that offered a vision of how those conveyors might be used to assemble a motor more efficiently. Ultimately I argue that the material form of a pig's body – its weight, its layers, and its ordering of parts is a foundation for modern industrial capitalism.

In the subsequent chapters, I argue that slaughtering animals is generative not just of boundaries, meaning, and industrial capitalism, but of livings and lives. Out of deaths, again, lives are made and made possible. Liveliness, hope, feeling, and visions of the future all bubble out of any mesh we might try to draw around slaughter. The stories that follow in those chapters were not ones I set out to write, but ones that bubbled up hot in the cracks between my own attempted analytic cuts. These stories are human, they are connective, and they are filled with liveliness – a will to live and to imagine better futures. Through these stories I have begun to make sense of how human social difference – sexuality, class, race, political affiliation, are built and rebuilt through practices of intimate interaction and material repetition, much like the other modes of difference and meaning I've focused on in prior chapters. Across all of the chapters in this section, I argue that **slaughter is a practice that makes worlds**.

**[Six] From Swift's moving animals to Ford's moving parts: How pigs world
industrial capitalism**

Animals' bodies act as a material script for the process of disassembly.

The assembly line, "bringing men to a halt and putting things in motion" was inspired by animals' bodies and enacted with women's docile bodies.

This chapter is a socio-cultural history of slaughter and assembly-line production. In the context of this larger section on how interactions between humans animals and things *make worlds*, this chapter takes an historical look at how animals, humans and tools interacted in new configurations, performing slaughter at a massive scale, and eventually inspiring the first assembly line. The performance of slaughter, based in animal-human-tool interactions, responding to the demands of the animal's body, pushed humans into experimental material configurations (standing stationary, side-by-side) and novel social arrangements (deskilled workers on a factory floor). The material practices of slaughter and the bodies on the kill floor and shop floor inspired and enacted industrial capitalism as we know it. This chapter is the first of three attempts to understand how worlds are built out of slaughter. While the next two chapters work from contemporary stories of human and more-than-human world-making, this chapter looks to historic data to understand how bodies in performance make socio-cultural, economic and political worlds.

In 1913, a Ford motor company employee visited the massive slaughter and meatpacking facilities of Chicago, the same ones made famous by Upton Sinclair's *The Jungle* less than a decade before. That visit was a primary inspiration for the first assembly line at Ford. Disassembly inspired the assembly line.

This story has been told many times, and is recounted in histories of American industry and capitalism, business texts on innovation, and theories of organizational behavior. But in the popular imagining, whether or not the slaughterhouse visit is mentioned, one great man named Henry Ford is typically cast as responsible for the birth of the assembly line. Here I trace the details of the birth of industrial assembly using oral histories and images from the Ford archive along with Ford's autobiography and published histories of technology. I argue that it wasn't one great man nor even several men who engineered the first assembly line, but that pigs' bodies and women workers both played key roles in developing the system of assembling parts on a moving conveyor. Even when the slaughterhouse to car factory story is told, it begins at the moment a Ford employee visited Swift packinghouses. Rather than starting at the 1913 visit, I explore the origins of the Swift company's *disassembly* line, arguing that the weight and material construction of the animal's body inspired the use of hooks, then overhead rails, and eventually mechanized rails like the ones used at Swift meatpacking in Chicago. I argue that the animal's body works as a script for industrial capitalism. By tracing the evolution of practices from disassembling a single animal's body to the mass assembly of industrially produced goods, I chart historically how the material process of taking apart animal bodies is redeployed to put together all sorts of objects from cars to iPads.

Ford's biography and the oral histories of Ford Motor Company employees agree that the Chicago packinghouses' disassembly lines were a primary inspiration for the first Ford assembly line. But how did the packinghouse disassembly line

develop? Early in the history of large-scale animal slaughtering in the U.S., butchers used gravity, hooks, and eventually wheeled ‘rail systems’ overhead – non-mechanized tools to move the heavy bodies. Those wheeled rail systems were then mechanized in Chicago’s packing plants in the late 1800s, where an unprecedented scale of slaughter took place each day. As I retell this story starting with the pig’s body, I’ll argue that the animal’s body itself – its structure, shape, ordering of parts, weight – served as a script not only for how to disassemble an animal’s body, but for Ford’s assembly line and industrial capitalism more broadly. I’ll also reveal a new insight based on the Ford archive’s oral histories and images – the important role that women workers’ docile bodies played in the development of the assembly line. In short, industrial capitalism is borne out of bodies: the material bodies of pigs and the docile bodies of women workers.

From the animal’s body to Swift’s disassembly lines

Long before the first industrial revolution, animals were commonly hung from stationary hooks while being butchered. In the 1840s, large packing plants in Cincinnati moved those hooks onto wheels that hung from rails overhead – first from the kill floor into the coolers, and then across the entire process of disassembly. In the 1860s, Chicago outshined Cincinnati in meatpacking volume, and Armour then Swift started to use a mechanized overhead rail. In 1913, William “Pa” Klann, a Ford engineer toured the Swift plant, returning to Ford with new ideas for how engine parts could be assembled on a moving line.

I argue that the material details of animals' bodies inspired the early technologies of disassembly. The disassembly of animal bodies necessarily happens in stages, working from the outside to the inside of the body, and often from the top to the bottom so that gravity can help remove the weighty organs. Because slaughter has always been a process of taking apart bodies larger than a human can carry alone, gravity has long been employed to help. A stationary hook hanging from overhead is a fixture in even the most basic spaces dedicated to slaughter. This sort of stationary hook at one fixed point might be found today in the garage of a deer hunter or as anthropologist Geoffrey Hughes describes in field notes from a community slaughter structure in Jordan, a place where people can bring animals and slaughter them themselves.⁶⁰ The image below, dated from the 14th Century BC, illustrates a stationary set of hooks used at a meat carving table. As the leg is shown hanging upside down, it is not unlikely that the animal would have been hoisted onto these or other hooks to aid in disassembly.



Figure 5. Painting, artist unknown. “Tacuinum Sanitatis (Sheep Butcher).” Circa 1400. PD-100-old.

In the United States at the start of the nineteenth century, domesticated animals were mostly slaughtered close to the place where they would be eaten. Cattle began to travel live, by rail, to the far reaches of the railroad system where they could be slaughtered and eaten fresh. But pigs were being slaughtered in a central location where the meat could be packed in salt barrels and preserved for transport and later

eating. From about 1818-1862,⁶¹ Cincinnati reigned as the primary site of centralized pig slaughter. Referred to as “porkopolis”, the town was the site for some of the first radical shifts in slaughter practice.

In Charles Morris’ history of American industry, he describes that the early Cincinnati packinghouses used a stationary hook system, just as small slaughterhouses at the time would have used. But with many more pigs and many more men, a system of divided labor developed. As a pig’s body progressed through the steps of butchering, the entire body would be lifted off of the stationary hook in front of one man and moved over to the stationary hook of the man next to him. From Morris’ account, it seems that a division of labor and sequencing of steps took place in the packinghouses with this stationary hook system, even before moving rails were added.

In the 1840s, after the addition of refrigeration, Cincinnati packing plants added a wheel to the top of the hanging hook so that the carcasses could be rolled from the slaughter space into the cooler with ease (Morris, 2012). Extending that rail system to include wheels on the hooks used for every step of slaughter was a somewhat logical next step, though it was not implemented until about twenty years later. If the animals could be moved easily over the threshold from kill floor to cooler, why struggle with lifting the animal on and off of different hooks by hand in the rest of the plant? An illustration from around 1873 (see following figure) shows the sliding rail system that travels across the ceiling throughout the plant. In historian Morris’ account of the Cincinnati packinghouses, this early disassembly line, though it was not mechanized, spearheaded several of the great leaps of mass production. As he explains, “rethinking

the sequence and content of manual operations to fit the space-time units available to each worker was a big step toward the rational factory” (Morris, 2012, p. 205).⁶²

While the Cincinnati packinghouses are a feat of human ingenuity and design, pigs’ bodies themselves suggest many of the adopted strategies and simple technologies for disassembly. Pigs’ bone structure provides a natural “hook” that the animal can hang from: the space between the tendons and the bones on the hind foot offers a sort of flesh-and-bone loop that a metal hook can be placed through and can support the animal’s weight. Pigs are heavy – 200 pounds or more, and though they were initially lifted from one hook to another, their weight alone might suggest the use of simple machines like pulleys and wheels. Pigs’ bodies are nested structures with weighty organ systems inside. They must be taken apart in multiple steps, and it is logical to use gravity to help remove the organs rather than reaching in and removing them over and over again. Pigs are living creatures with their own designs; it makes sense for humans to outnumber them and slaughter just one or a couple at a time and pass those on to another butcher. The alternative, a one-man-one-workbench approach where 100 butchers walk into a pen, each try to grab and kill a pig and slaughter it from start to finish might not be impossible, but it sure would be challenging. In sum, the material details of animals’ bodies– the weight, ordering of parts, complex shapes – acted as articulate matter, guiding human action and in this case the direction of civilization and development.

Not only did the Cincinnati packinghouses make great strides toward developing the rational factory, they had already accomplished each of the key principles of assembly that Henry Ford outlines in his autobiography.

“The principles of assembly are these:

- (1) Place the tools and the men in the sequence of the operation so that each component part shall travel the least possible distance while in the process of finishing.
- (2) Use work slides or some other form of carrier so that when a workman completes his operation, he drops the part always in the same place – which place must always be the most convenient place to his hand – and if possible have gravity carry the part to the next workman for his operation.
- (3) Use sliding assembly lines by which the parts to be assembled are delivered at convenient distances.”

My Life and Work (Ford & Crowther, 1922, p. 80)

As the graphic that follows illustrates, each of Ford’s principles of assembly were at play in the Cincinnati packinghouses, before they even traveled to the more famous packinghouses of Chicago. Tools and men stood in the sequence of disassembly, slides were used to drop pig parts from place to place, and moveable (though not mechanized) sliding overhead rails delivered the pigs to be disassembled to each worker’s station.



Figure 6. Pork Packing in Cincinnati. Cincinnati, O. : Chromo lithograph published by Ehr Gott & Krebs, c1873. Courtesy of Prints & Photographs Division, Library of Congress, LC-DIG-pga-03169. PD-100-old.

The Civil War brought a new massive buyer of packed meats: the union army. As William Cronon and Gary Fields both describe, the middle of the 19th century was the end of growth for the river-based transportation system that fed Cincinnati packinghouses, and the exponential growth of Chicago's rail-based industries (Cronon, 1991, p. 230; Fields, 2004, pp. 98-102). The new rail road system put

Chicago at the center of a transportation infrastructure poised to support centralized production and distribution. In Chicago, Armour and Swift slaughtered cattle and pigs on a scale far beyond what had happened in ‘porkopolis.’

Armour meatpacking adopted the overhead rail system in place in Cincinnati packinghouses, and as the Armour company did with innovations from other industries, combined and improved the practices. Around 1908, Armour mechanized the rail system, making carcasses roll by workers at a steady pace.⁶³ From the 1860s to 1920s the big Chicago meatpacking companies dominated the national meatpacking industry, maximizing profits and operating at a higher volume than economies of scale would likely have supported. Thanks to their stranglehold on the industry and legislation, they were able to maintain this high level of production and centralization beyond what the market would have ‘naturally’ allowed (Cronon, 1991, p. 254; Morris, 2012).

1912-13: From the packinghouses to the Ford Motor Company’s assembly line

William “Pa” Klann worked as a machinist and supervising engineer at Ford Motor Company from 1905 – 1928. In the transcript of his Ford oral history interview, a 407 page typewriter-typed document with the questions asked by the interviewer removed, Klann describes the birth of Ford’s famous assembly line. From his telling, the shift from a one man-one workbench model to an assembly line with moving conveyors was a slow process, driven by the desire to increase daily output and inspired in large part by the disassembly line in Chicago’s packinghouses.

The Ford Motor Company was using moving conveyors in their foundry long before they thought to employ them in assembly. According to Klann, a man named Larry Gregory, of a local brewery, originally suggested the moving conveyors to Ford by pointing them out to him in a brewery equipment catalog. Breweries would use the moving conveyors to transport large quantities of grain from the first floor where they were received up to the higher floors and into their brewing tanks. With Gregory's encouragement, Ford bought conveyers from the brewing supply company and installed them in their foundry, where sand was heated to make parts. Before the conveyor, men in the foundry had to shovel sand onto each die mold. Once the conveyor was installed, the sand would move by overhead, and men could pull on a chain to allow some sand to fall down into the mold. Rather than using their bodies, the conveyors allowed them to use gravity to move sand into place.

Klann describes that trips to the foundry were one primary inspiration for him and his colleagues who built the first assembly line. Klann claims several sources of inspiration for their assembly line experiments: experience with conveyors in grain elevators and breweries and, significantly, the Chicago stockyards. Historians of technology have added that a number of industries inspired the use of interchangeable parts, including guns, watches, and bicycles (an origin point for standardized machined parts). But the use of moving conveyors to transport parts seems to have its origin in the industries Klann listed, and the use of conveyors in Ford's foundry. While historian of technology Hounshell hypothesizes that Ford employees may have seen or worked on a canning line (or perhaps there was one at the Chicago

packinghouse Pa Klann visited), neither he nor I have found strong evidence that this connection inspired the assembly line. This leaves only the Chicago packinghouses as a primary model for the movement of object to man – the shift from mobile people to mobile things that sets Ford’s moving assembly line apart from the many modes of manufacture his contemporaries had developed.⁶⁴

In at least three sections of his interview, Klann recounts his trip to the Chicago stockyards, explaining that it was the primary inspiration that motivated him to try an assembly line. Though Ford and employees allegedly attempted to engineer an assembly line in 1908, the project never came to fruition (Hounshell, 1984, p. 239). In Klann’s telling, when he saw how Swift’s packinghouses were using a moving conveyor to disassemble pigs he was able to envision how a car motor might be assembled on a moving line. He told his boss about what he’d seen and got to work experimenting with moving assembly.

We saw these conveyors in the Foundry and we thought, “Well, why can’t it work on our job?” That is where we got the idea from, from the conveyor in the Foundry... I will say we got a lot of ideas from the sand conveyer first.

They also killed pigs on conveyers at the Swift Company before Ford ever got them. I know that I went down to Chicago to the slaughterhouse myself. I came back and said, “If they can kill pigs and cows that way, we can build cars that way and build motors that way.”

I told Martin [Klann’s boss P.E. Martin the superintendent at the time] what I saw and he said “I don’t believe it.” I said, “All they lose is the scream and that is used for advertisement. If they can do it, we can do it.”

“Well, see what you can do,” he said. So I started out to do it. I just saw it on a trip to Chicago and I came back with this idea. They had conveyers long before we did. We combined our ideas on the Huettelman and Cramer grain, machine experience, and the brewing experience and the Chicago stockyard. They all gave us ideas for our own conveyers. (22)

With going to Chicago and seeing this slaughterhouse I got the idea that I could put a lot of jobs on these conveyers. In fact, they were all that way later but we had to work them out. The first one I started to work out was on the motor assembly putting the crankshaft in. That is where I broke a man's leg... (25)

I went to Chicago and after I came back I said "My gosh, they hang pigs up on a hook and then they knock their heads in an ice box to cool them off and then they chop them open. That goes on a belt conveyer and it is carved up."

Martin said, "It's a simple thing, isn't it?" I said "Sure, it's simple."

So the magneto coil was assembled on a conveyor over 200 feet long. That was the very first belt conveyer for assembly. Then the motor assembly came next. Then the next one was the transmission assembly and the next one was the magnets to the transmission. That actually came fourth in the series. (51)

Klann remembers that it was the magneto coil that was first assembled on a conveyor, not the fly-wheel magneto as Ford claimed in his 1922 autobiography. Hounshell makes a big deal of pointing out another male historian of technology's error on this point, mislabeling a photo and confusing the fly-wheel magneto with the magneto coil, which are two different components of the engine assembly. But neither Hounshell nor any other historian's account I've found discusses the detailed contents of the page in Klann's oral history where he describes the magneto coil assembly process just before it became the first car component assembled with a moving assembly line. Rather than deriding either of their lack of car knowledge, I want to focus in on this overlooked page, which describes the work of women plant workers who used a manual assembly line format before the mechanized line was introduced.

While the men who worked on engine assembly were stationed at separate workbenches, walking to fetch the parts they needed for each stage of the job, the

women assembling the magneto coil were seated together at large tables. I can't say for sure if they chatted as they worked, but this 1913 photo from the Ford archive suggests that a happening like a camera crew could have pulled everyone's attention for a moment. I imagine the crew asking these women to 'just proceed with your work as usual' while everyone else stopped to watch the commotion.



Figure 7. Photograph of Women Workers Assembling Magnetos at the Highland Park Plant, circa 1913. Courtesy of The Henry Ford Archive, THF99642.

In Klann's account, this women's work was the first job put on a moving assembly line. The women worked side by side, passing their work to the next woman to complete each progressive step. While the slaughterhouse may have inspired the assembly line, it was a group of women working together at tables like the ones above who first moved their work onto an assembly setup. While pigs' bodies inspired disassembly, it was women workers' docile bodies, already in safe, stationary, seated positions working on simpler tasks, that were the site of the first assembly line. We may never know what the logic was for seating women in this way,⁶⁵ nor why the first assembly line was developed for the magneto coil process. Perhaps this was seen as simpler 'women's work' and it seemed like an easy set of tasks to experiment with first. Perhaps it was because these women were already using somewhat of an assembly format, passing coils to one another for taping. We know from Klann's account that these women were already passing each coil to a man to solder because women were not allowed to do the soldering. Regardless of the mechanisms of inspiration, women's docile bodies were the very stuff of Ford's first assembly line.

Though Klann's reminiscences were recorded thirty years later, his account is extremely detailed, specifying exactly which part of each building was used for each subassembly, and laying out the precise details of production steps. Klann mentions that neither Ford nor several of the other supervisors were on the floor watching or assisting with the first assembly line productions. While historian of technology Hounshell has suggested that Klann's account might be flawed since it is contradicted by some others' reports, I am more inclined to trust Klann's account. Klann was on

the floor each day coming up with and testing new processes for production and the others simply were not.

The spirit on the work floor at Ford sounds from Klann's and other accounts like a play room for ingenuity and experimentation driven by the ever-pressing demand to make more, faster. Klann and his colleagues experimented with making more and more parts by machine. To some extent, they moved machines around so that the products they produced were closer to the place where the workers would need to access that part. Early in his career with the company, Klann was often brought in to do a job and told to "see...if I could make more parts on the machine than the other men could make. Of course at the time we knew nothing of time study but it was a good start." (5) By his own and historians' accounts, Ford was not concerned with employing Taylorist strategies to improve worker output. He was interested in putting out cars and putting out more and more of them using whatever configurations of men, machines, and strategy could produce the most. While Taylor used science to perfect the movements and timing of the human worker, Ford turned away from workers to machines, using engineering to do men's work more precisely and more quickly. Ford gave more power to the machines, including the moving conveyors, and to the things themselves, taking away workers' ability to self-regulate their timing and movements and, for many workers, their right to walk from place to place between tasks.

Ford's assembly line famously animated objects and immobilized workers, putting, as historian David Hounshell emphasizes, every *thing* in motion and bringing

humans to a halt. This legacy of powerful machines, mobile objects and stationary workers has become the model for assembling all sorts of objects and organizing all sorts of workplaces under industrial capitalism. Though historians of technology seem to have left this out of the story, women were the first Ford assembly line workers, and women were positioned as docile bodies in the factory long before the assembly line brought male workers to a halt.

The process of assembling cars, moving from small parts to a whole, was possible to imagine and do in a one-worker-one-workbench format. Once the car was complete it could be moved out of the factory on its own force. But disassembling a large animal poses a similar set of circumstances in the opposite order: the animal can walk *into* the factory on its own force, but in the first step it is killed, and becomes a literal dead weight that must be taken apart. It would take a great deal of physical effort to carry heavy dead pigs to each man's workbench and have him separate all parts of the animal and sort them in bins. As I've described, the weight and aliveness of the pig alone makes the one-man-one-object format illogical for disassembly. It would also be a traffic and logistical nightmare as snouts, skins, organs, ribs and so forth would all have to travel from the many work stations to be gathered together someplace else. With a factory like Ford's where the work was to assemble smaller parts to make a whole, it was possible to carry small pieces to one location then move those mid-sized assemblages to a place where the entire vehicle could be assembled. Cars acted somewhat like living pigs in reverse: rather than ambling into the factory of their own volition and being disassembled, they could be driven out of the factory

once fully assembled. Perhaps if Ford's work had been *disassembling* heavy, immobile cars, more like just-killed pigs, they might have developed a mechanized line sooner. By reversing the process of disassembly – a process developed across a long history of humans working in concert with pigs' bodies – Ford was able to give life to vehicles and to their component parts.

Swift to Ford – CONCLUSION

While I have located this chapter in the section on making worlds through intimate interactions in slaughter, it also extends the arguments in the preceding chapters on “bodies of knowledge.” The story of Ford's assembly line highlights yet another way that knowledge is embedded in bodies, and connects that sort of embodied knowledge to the distinct realms of knowledge we more typically describe as “bodies of knowledge”:

Bodies in motion are knowledge vectors. In his essay in *Research in Organizational Behavior, Volume 24*, Hargadon cites one of the passages from Klann's account of how the packinghouses, mills and brewers inspired the first assembly line. He likens this assemblage strategy – assembling others' ideas to develop an innovative way of assembling things – to Kary Mullis' Nobel Prize winning invention, Polymerase Chain Reaction or PCR. It is an appealing comparison, and allows the author to articulate what he calls “recombinant innovation”: the parts are all there; put them together and you may have a revolutionary invention.

Here, Hargadon leans on Science Studies scholarship, citing Bowker and Star, Latour and others to describe how knowledge circulates. He claims that it is because of the fragmentation of social worlds that innovations borne out of new combinations become possible. In the case of the first assembly line, grain elevator repairmen might not talk to the engineers at Ford Motor Company nor to packinghouse employees hundreds of miles away. But bodies can travel: humans can visit and observe the systems and tools in place in another industry, and they can bring bodies with them: from a brewery catalog to the motor company's foundry. Bodies can also bring ideas – like Klann brought the highly efficient division of labor and moving disassembly line from Swift Meatpacking to Ford Motor Company, where it was re-engineered and shared across realms of knowing and practice to revolutionize industrial mass production.⁶⁶

Ford's assembly line, re-assembled and deployed across industries and continents, enables contemporary industrial capitalism to this day. Industrial capitalism, in this historical reading, is borne out of bodies. The particular matter of pigs' bodies and the movement (or lack thereof) of women workers' docile bodies. As I've described, the material specificity of pigs' bodies guided and continues to guide butchers' various strategies for disassembly. In the late 19th Century, railroads and army appetites consolidated mass disassembly in Chicago, where a Ford employee's later packinghouse visit helped shift the course of history. Perhaps most significantly, it was women, not men who worked on Ford's first assembly line. These women workers' modes of working – beside one another rather than each at a workbench, on

shared, simple work measured by the piece, rather than complex ‘skilled’ solo-authored engine assembly—lent themselves well to a moving assembly line. Perhaps not surprisingly then, the feminization of labor was accomplished by men overseeing women workers. In the development of the assembly line, things were set in motion and workers became docile. In transferring vitality to the assembly line and its moving parts, workers lost their vitality (becoming still) and vitalness (becoming replaceable) at once.

My insistence that the pig’s material body acted as a material script for industrial capitalism may seem to be at odds with my overarching arguments that boundaries, difference, meaning and worlds are made in daily practice. In a performative context, the metaphor of a ‘script’ is an ideal way to make sense of productive (dialectical) tension between what is determined and what is enacted. My strong claim is this: bodies and practices, scripts and performances, are in intimate relationship and conversation with one another. A script is a material something that can guide a performance. But a script is not fixed and is not a simple deterministic plan that can perfectly acted out in the world. Scripts are live and changing, and performances spill out from the scripts that inspire them. Performances are all excess; they are disappearing (Phelan, 1993) while being enacted. Performance resists capture. When I say that the pig’s body acted as a material script for the rationally organized factory and the assembly line, I mean that the body guides live, changing, contingent performances – performances of people, animals and things that could have been otherwise and could still be otherwise. Scripts push and guide but they are not

directly made manifest through performance. The relationship between an actor, a scene, a play, and a script is always dialectical – pushing and straining. Scripts constrain but they do not pre-determine. The particular material configurations of a pig's body as a living object-to-be-disassembled, alongside particular arrangements of men, women, industries, and demands, enacted a performance on the Ford Motor Company's factory floor with irrevocable consequences for the socio-cultural worlds we live in today.

Chapter 6, in full, is currently being prepared for submission for publication of the material. Wentworth, Kara. The dissertation author was the primary investigator and author of this paper.

[Seven] The Intimate Politics of Slaughter

"...the ability to consistently care for our animals, to be part of the whole industry, our commitment as a family...It's not just what we do for a living, it's what we do for our life"

- Hereford cattle breeder @ Beef U UMN 2013

Making a life in meat worlds

While the prior chapter looked historically at interactions between people animals and objects, this chapter and the one that follows are located again in the present day of my ethnographic fieldwork. Here I trace social interactions and material configurations from fraternities to cold cut trays, and from kill floors to homes and back again. Along the way I ask how work and interactions (performances) in meat worlds are not only ways of making a living, as the cattle breeder explains in the above quote, but ways of making lives and worlds.

One slaughterhouse that was among the most welcoming is part of a Midwestern land grant university, and the rail on its kill floor extends from the holding pens to the coolers and then down a long hallway and across the front of a large modern lecture hall. There the rail raises and lowers so it doesn't block the view of images projected onto the big screen at the front of the room. When the rail got stuck mid-way between the up and down position, non-meat science faculty were indignant, and facilities management had to step in after some time to repair the rail-raising and lowering mechanism. Not the sort of thing that needs fixing in most classrooms and lecture halls on campus.

The small university slaughterhouse is on the agricultural campus, one of three separate large parcels spread throughout the urban area all belonging to the same University. While there are a range of departments on this original land grant campus, from the design school to veterinary medicine, the campus's identity is based in agriculture. Research scientists who work in one of the other campus areas a couple miles away told me they all refer to it as "the farm campus."

On the kill floor, the two full-time employees (university graduates now in their late twenties to early thirties) and many of the male students who work part-time on the kill floor are members of the campus agricultural fraternity. None of my research relates directly to the fraternity, and membership in it should not help to identify folks I interviewed and worked with anonymously, so I will not attempt to cloak in anonymity by inventing an ethnographic pseudonym. The frat's actual name is so perfectly descriptive it would be a shame to do so: alpha gamma roe, or "AGR." From the limited stories these guys shared with me, and the occasional morning kill floor conversations about goings on the night before, I learned that drinking beer, as it is for most fraternities I've encountered, is a big part of social organizing and fraternity events. One former fraternity member shared that he had been a good kid in high school – good grades, an exemplary member of the 4-H⁶⁷ club and other organizations, and hadn't been into partying much. He came to the university planning to become a veterinarian but ended up joining AGR, drinking a lot of beer and not taking all the pre-med courses he had planned to take. Not long after graduation, his girlfriend at the time (now his wife) used a connection at the USDA to

get him a hard-to-land job as a federal inspector at a large cattle plant. The hours were grueling, with only a day off at Christmas. From there he moved back to the university kill floor where the pay is lower but the work is more humane (to humans, in his analysis, but arguably to animals as well).

Social life on the agricultural campus reaches a fever pitch each spring as “Minn Royal”, the Minnesota Royal approaches. I didn’t attend the events, but as undergraduates and former students explained to me, it’s a lot like homecoming week only focused on animal and agricultural events.

The meat lab manager on campus tells me that Minnesota Royal goes on all week - different stuff every day, and the meat lab is catering one of the events. They’re making pulled pork and supplying the rolls. With the smokehouses down during construction for Jack Links’ new R&D facility on campus, they are pulling small electric roasters out onto the kill floor to cook the pork.

As the meat lab manager explains all this, both of us hover by his office. He lingers - we both linger in conversation in a way we haven’t before: him always busy, kind but terse, awkward; me always asking for something, uncomfortable in the position of asker, awkward. This time feels nice. It’s a social time on campus, and our interaction feels precisely social.

The Block and Bridle banquet is a central event of the week. It’s a dressy affair that brings together students who work with or are connected to agricultural animals and horses. It is also one of the major sorority and fraternity events of the campus calendar. One of the female undergraduates who worked on the kill floor was

organizing the event in her Junior year. That week as we ran into each other getting changed in the women's locker room, I asked her more about the event – why it's called block and brindle, who would be there, what it was like. She put on a black crewneck sweatshirt with sorority letters appliqued in hot pink and told me she wasn't sure about the name, except that block referred to sheep, pigs and cattle – referencing a showing block or auction block perhaps? And bridle referred to horses. "Mostly livestock kids is what it really comes down to," she explained.

These formal human social groups organize people and distill ideas, feelings of belonging, the value of work, definitions of a good life, an orientation toward and with animals and communities. And as I'll discuss in more detail at the end of this section, these sorts of social groupings and gatherings also form way stations for microbes, viruses and vermin traveling between animals and places and expanding their own numbers and social networks. Making a life in meat worlds is never done alone; living and life-making are accomplished in concert with other people and animals, as the right ways of thinking, feeling, moving, caring, and imagining the future ferment.

Meat habitus

At the annual Minnesota Association of Meat Processors Convention, a new generation learns where to sit, when to stand, how to carry oneself during meat competitions, judging, and award ceremonies.

At the main awards show, McDonald's meats wins a lot of awards. There are about five or six small meat markets that each get over 5 prizes, and they are one of the winningest teams. Mr. McDonald goes up to receive an award wearing a mossy green button-down. He may be the slenderest person in the room besides his wife, plump-lipped, sitting next to him.

He goes up to the front to receive a plaque from the man in the suit when his name is read by the man announcing from the podium: Reserve champion: Steve's Meats. Champion: Grand Champion Meats. Reserve Grand Champion: McDonald's meats. Grand Champion: Morgan's Meats.

To receive the second or third award they are given, the head supervisor at McDonald's, a woman who plans to ride from Minnesota to the west coast then the east coast in a two-week summer motorcycling vacation, goes up on behalf of the company. Maybe it's for a recipe she's perfected, or a product she oversees, I think. And then, for about the fourth or fifth win, Mr. McDonald sends up his son, who can't be more than seven years old. They walk up together and he coaches his son with a hand on the back where to stand to receive the plaque, how to walk, briskly, to the two chairs, guiding him to sit (grand champion on the right; reserve grand champion on the left), or to stand (reserve champion on the left, champion on the right) behind the

chairs for the photographer who captures each set of champions with the category title: black lettering on a white sign propped at their feet each time.

The children's competition was a bit less formal. Twenty-something of them, ranging in age from two to teens, spent part of the afternoon arranging a deli tray of lunch meats and cheeses. I spoke to the organizer afterward: they all got the same sort of "-----." She tells me precisely what but it was not a set of words I could hold onto: something like A4 only not; a standardized naming system for retail meat packaging I assume. One of the youngest contestants just made a pile of meat with a toothpick sticking out of the top. Another made a face. Some of the older kids may help out in their parents' shops and can do the perfect arranging of a row of meats, then a row of cheeses, then a row of meats and so on, each line like perfectly fallen dominos. I see what they aspire to in the hospitality suite, where platters of blueberry and cheddar summer sausage with two or three other meats and four cheeses appear on seemingly infinite trays, aligned in stripes of meat-cheese-meat-cheese-meat. The summer sausages were all cut in half so perfect half-moons with flat bottoms formed the evenly spaced domino rows.

Habitus (Bourdieu, 1984) is not only a matter of reproducing the right sorts of behaviors and bodily movements, but also the right sorts of affects: the proper feelings and emotions for relating to people, animals, death, and whatever else presents itself. In my time on the kill floor I was schooled in the right ways of seeing, sensing, understanding and also feeling. As I'll describe here, when feeling overwhelmed me,

I turned to the people around me – butchers, agricultural students, inspectors, to try to understand how they felt and how I could learn to feel differently.

I see a cow sticking his head out of the holding pen onto the kill floor, sniffing and nudging the cut-off front right leg of the cow who was in front of him in line a few minutes prior. The hoof is gone, and this cow's wet snout is pressing against bloody muscle - coaxing? (Are you ok? Hey, get up!) Or just curious? How do we make sense of a gesture so holocausty, jarring and strangely familiar without imagining oneself inside the cow body?

In *Companion Species Manifesto*, Donna Haraway writes about singularity: animal rights borne out of relational interaction and achievements, the joy in realizing capability, forged naturecultures (D. J. Haraway, 2003, pp. 51-53). The singularities are what kill me - the stories I can't shake. Somehow the mass of deaths, the repetition and a story told in abstraction: then this happens to The Pig, is more easily incorporated into my body, no tremors. But some of these singulars are just shaky. Until I tell the story aloud some two three times, more and then it is just words and then it is out of me, and then I don't feel it while I tell it: I read from the script I spoke before rather than describing something in front of me all over again.

The same holds true for disgust. What is disgusting? What's gross? Fat that almost looks like it's dripping out of the anus is gross. The smells when a knife nicks a stomach or abscess are yucky and horrifying respectively. At home, when our dog is vomiting blood and mucus, that's gross in a way that picking up her poop every day simply isn't. Maybe Mary Douglas is right – shit in the wrong place is disgusting.

But the disturbance of singularities brings up more than disgust or revulsion, it is hard to look at, hard to think:

She says the word "elk" and I shudder: I had never seen an elk, I don't think - couldn't have told you quite what it looked like, would have had the same question she had: is it like a moose? And I can say now, it's more like a long-necked deer, a buck...

Because I saw it headless and swinging from its feet, thrashing like I'd never seen a dying body thrash: splattering the walls with blood whether from its slender long geometry: a thrash on a pig might not make such large circles: last words in Spirograph, red red red on the white concrete wall.

Say the word pig and I don't shudder. I think maybe of cervixes, of a pig that is many pigs and no single pig at once, of the steps of its slaughter, of visiting them in pens, I think of many pigs: many pigs, many days, many times.

But then there is the trouble of having only seen one elk. Say the word and I start to run a short mental single image reel of the elk, my elk, the one elk that I've seen slaughtered. The fact that this one elk is singular, that its gore stands out is a sign that I have learned to see right: seeing the same thing, or something similar happening slightly differently, pigs being killed, cows being killed, has been corralled into the part of my mind that does not worry: things are as they should be. Finally! I know how to see slaughter! This took years of visits and breaks in between and many many hours of watching. But out of that *ground* -- that ground which was all overwhelming figure before: smell and sound, horror, overwhelming, all of it, somewhat inseparable

in the experience of it even though I attempted these separating step-naming analytics once I got home -- the things I have never seen before are truly horrible every time.

"Oh wow, I've never seen that before" I find myself saying sometimes.

Sometimes it is an abscessed belly, another time it is large worms living, wiggling in the gut, another time it is a cow that doesn't die on the first shot and falls to its knees, staring up at the butcher, pleading – *please, quickly*, as he tries desperately to get a new bullet into the old wooden rifle. One time it is tiny pig fetuses throughout the reproductive tract of a pig being harvested for vaginal tissue: the researcher says "I'll have to make note of that" – she isn't sure if using cervical tissue from a pig that was pregnant at the time it was killed will impact their research results.

I talk to some butchers about how they feel. But I don't want to ask too much, I don't want them to be scared that my research is focused on the evils of slaughter – it's not. Mostly we talk about their families, about what they did over the weekend, about the state inspector's new baby and whether he and his wife are sleeping (they are), about the baseball game they played over the weekend and who won and who is good, about why and how they got this job, about how their dogs react when they get home (one young butcher's dogs would hide from him until he showered), about the wedding they were flying to in Vegas though they didn't want to and would much rather sit on the couch any weekend, about sending money home to their family in Mexico and how often they make it back to visit, about the new recipe for 'redneck bacon' that's gonna be just like their bestselling jerky.

When I start getting depressed in the winter I try asking them how they deal with the challenges of killing, of being around death so much, one guy who was working to save his dairy says he doesn't like slaughtering often – he'd do it for friends on their farms but he tries not to do it too often. Some of the women in the cutting room tell me they haven't been back to the kill floor in years, they pretend it isn't there, they just don't go back there: *Why do you want to be there?*

One guy tells me the first time he walked into a large turkey processing plant the smell of poultry slaughter made him hungry. A college senior explains that meat animals aren't pets, when people ask her how she can raise a cow and slaughter it she says – you know it's for food, that's how she thought of it as she raised her first cow in 4-H as a child, that's just how it is.⁶⁸

The family and sustainability

These next vignettes all come from social gatherings around meat that took place outside of slaughterhouses: in lecture halls, convention centers, at conferences, workshops, night classes, panel discussions, and visits to small family farms. Across all these spaces, the meat business is interarticulated with the business of growing and sustaining families. These families are, across the board, white and heterosexual, with men (or occasionally a husband-wife duo or owner's daughter) running the business. Heterosexual reproduction is the inevitable driver of business growth and of the constant need for increasing production.

The Hereford cattle breeder quoted at the start of this chapter gives voice to the notion that care for animals, membership in a broader meat industry, and commitment to family are deeply interconnected. In the stories that follow, I try to make sense of how these families are making not only livings but *lives* out of the lives, deaths and bodies of animals. As I'll describe, families teach their children how to be workers and business owners, they grow the business with their family's growth, and they define sustainability as increasing production and passing on a thriving family business.

Growing business; growing family

The head of the American Association of Meat Processors, the national organization for small meat processors, co-owns a meat business in Wisconsin with

his brothers. He describes their father having to add on a new arm of the business as each son came of age, so that the business could sustain them and their families.

In a similar fashion, Dave expanded his Minnesota meat market with the birth of each child. He has grey-white hair now, but you can tell which half of the employees are his children and close relatives: all redheads. As he walks me through the building on the first day he shows me the smokehouses, the cutting room, the kill floor, the hallway and the breakroom: some of the structures feel added-on like we might be sitting in a heated container ship or trailer outside a work site, only it's all attached.

Businesses are imagined as bodies that grow with the family. New arms are added to make the business profitable enough to support another child and, eventually, to have enough for that child to inherit, not in cash - selling the business would be a death of sorts - but in meat market.

But appendages are sometimes lopped off to focus a business and grow the torso. That's what the Goetz brothers did. Their father had added new arms to the meat market: a catering business, which their mother loved running, and a bed and breakfast mom and dad ran together. When they took over, the brothers lopped off appendages to focus on growing the main body of the business. Catering and B&B closed, and they went into niche meats: organics, grass-fed beef and bison. We didn't go into the niche meat business out of altruism, they told me as we hovered and tried to figure each other out in the vast hall of the St Cloud convention center. It was a

business decision. We saw an opportunity and niche meats was the way we could save the business and be successful.

They have been incredibly successful, now employing about 100 butchers, cutters packers and cleaners in their production facility, with slaughters scheduled six days a week. They are also opening a second business in Vermont, to the chagrin of some smaller-scale native Vermont butchers and chefs who have tried to get niche butcher shops off the ground themselves but don't have the sort of capital that Goetz now brings to the table. The brothers don't believe they could have been as successful if they had kept their fingers in the side businesses as well. Focusing on the slaughter and processing parts of the business and targeting niche markets have allowed them to grow many times beyond what their parents originally created.

The owners of many small meat markets aim to have a large enough business to employ all of their children not only through high school but through adulthood. Several of the meat markets I've spent time in are now supporting the third or fourth generation of human offspring. While some heads of markets pray that their children will have enough to support themselves and their families and will choose to maintain the business, others hope their kids will see the hard work and invest in other talents, choosing other careers. One owner hoped a young employee he'd nurtured might take over the business someday but that his own son and daughter would choose college and other work.

Passing on a family business is different from passing on land to subsequent generations. Land is a finite resource – to pass it on to one's children it must be

divided then subdivided with each new generation. But a business can continually expand, growing rather than shrinking with each round of births. If we take population growth at the local and global scale as inevitabilities, growing businesses alongside families makes sense. This same logic of coupled human reproduction and business growth is also shaping a redefinition of sustainability.

Defining Sustainability

At “Beef U”, a day-long workshop on beef provided by University of Minnesota Meat Science and the Minnesota Beef Council, a panel of ranchers, breeders and a veterinarian are seated before us at a long table. This hour and fifteen minutes is listed in our program as “The Beef Community - Beef Producer Panel Discussion.” About two thirds of the way through the hour, a woman on the panel, who married into a cattle-raising family and breeds cows with pure Hereford genetics, starts talking about “sustainability”: “My kids will be fifth generation on our farm. If you want to talk about sustainability, that’s real sustainability.”

In her analysis, preserving a heterosexual family’s livelihood and maintaining land under the private control and operation of one family line is REAL sustainability. The implication is that farm policy that is pro-farm and pro-farmer, that allows families to maintain a business and keep that business in the family, will support sustainability. In this definition, the sustainability of a heterosexual genetic family line parallels the purebred cattle lines this family cares for, sustaining a way of life.

Those ways of life - farming and passing down land and business through generations of straight white Minnesota men are what must be sustained.

Another farmer, this one of a cow-to-calf operation that raises calves until they are old enough to leave for auction and feed lots, riffs off the idea a few minutes later: people talk about this idea of "family farms" versus "corporate" or "factory farms": well, we are a family-owned business AND we're an LLC. So what does that make us, a family farm or a corporate farm? We're both.

He goes on: If we want to talk about "sustainability", the methods of farming that are scientifically proven, that are going to produce enough meat to feed our growing population, and are going to do it on less land: that's conventional [conventional agricultural methods as opposed to organic or grass-fed, etc.]. That's sustainability.

The 2015 National Academies Press publication "Critical Role of Animal Science Research in Food Security and Sustainability," written by the Committee on Considerations for the Future of Animal Science Research, begins with population growth projections. "By 2050 the world's population is projected to grow by one-third, reaching between 9 billion and 10 billion people." The opening paragraph continues,

With trade globalization, increased urbanization, and expected growth in global affluence, a substantial increase in per capita meat, dairy, and fish consumption also is anticipated. **Sustainably** meeting the nutritional needs of this population and its demand for animal products will require a significant research and development (R&D) investment so that the productivity of today can be sufficiently enhanced to meet the much heightened demands of the year 2050 [emphasis mine].⁶⁹ (Sciences, 2015)

Sustainability is defined here, as it is by the cow-to-calf family/corporate farmer and elsewhere in contemporary mainstream agricultural discourse, as sustaining human life: feeding a growing population.⁷⁰ It can also mean sustaining the natural environment, but the focus is on increasing production given the limited material resources of our planet. Population growth and increasing demand are taken as inevitable, and feeding humans is the priority. In the National Academies Press publication, research and development are the essential strategies to achieve the necessary increase in productivity.

In a 2014 Washington Post article on the environmental impact of meat, Tamar Haspel offers a different take: “No amount of bean-eating or Prius-driving will compensate for reproducing, and it’s the childless, not the vegetarians, who are more likely to save the planet. Which doesn’t mean that we should ignore the benefits of beans and Prii -- or that we shouldn’t have kids -- it just means that we should acknowledge that human survival takes a climatic toll.” (Haspel, 2014) Certainly it is possible to think otherwise – that actual population growth might be reduced to less than current models predict; that we as a global population might demand less meat, or the same amount, or we might demand that meat is produced differently, not more of it. But what is at stake is not just a definition or even a worldview. Our very investments in life and death, imagined futures, and perhaps most importantly, *family*-both the abstracted notion and one’s own fleshy kin--are driving these political and economic conversations.

Notions of family and sustainability intermingle with real fleshy reproducing humans in each of these stories. Raising animals for food mirrors family lines and privileges the flourishing of one's own future human children. The cultures of making meat cultivate particular sorts of habitus – learned bodily movements and practices, new ways of being and doing in social worlds. The process and growth of a small business itself sustains the family just as the growth of families sustains and grows the business. In the context of these family-owned businesses, “sustainability” is redefined as passing a business down through generations. In one definition, sustaining a business (an entity and a way of life with its repeated practices and doings) replaces and changes notions of sustaining a natural environment. When sustainability does refer to sustaining natural environments, business goals: efficiency, maximization, expansion of production, become the hallmarks of successful sustainability. Continual population growth is taken as inevitable, and continual expansion of production is an unquestioned goal. The only questions are what methods will maximize production, and what scientific and technical solutions can we seek through R&D.

Care/Queer Intimacies

"...The broad pastoral idiom of care for the flock is also paradoxically composed of the protection of animal life and control over animal death." (Franklin 2007, p 160)

Dean salts the floors before the first cows walk in from the cold, in the hours after a blizzard, into the narrow wrapping metal hallway formed by bars that usher the animals forward, bend to the left, and stop at the middle of the kill floor wall.

He and I are the only ones there - both butchers will be late this morning after shoveling out trucks and navigating the unplowed streets of this small Minnesota community. I win points for being a "Californian" who made it all the way down from the cities in this weather.

He is sprinkling an eco-friendly mix of salt and gravel for grip. So that the cows won't slip and get frightened when they move from walking on bright white snow in sunlight into the concrete indoors of the kill floor. The floors get slippery when there's snow out, or maybe there's snow stuck in the crevices of their hooves, and the salt mix, this should help them to grip the floor and keep walking.

There is tenderness in the way he sprinkles down this salt, a small handful at a time, watching carefully where it falls, and I come to tell this story to illustrate the care I've seen in these small plants.

But of course this care is macabre: to get the animal to its death more efficiently. And it is motivated or at least supported by other-than-purely-altruistic

factors: a cow that slips could injure itself and not be able to walk the rest of the way down the chute. Or it could get a bruise, which would need to be cut out of the muscle and discarded into the offal bin. Or it might be frightened, triggering a stress hormone response that alters the pH of the animal's muscle as it begins to die, changing the muscle's capacity to bind to water and making for dark, dried-out-looking beef or leaky pale pork.

What does it mean to care for an animal in a system that plans its birth for its death and harvesting? I write Donna Haraway a note about the piece I am writing and describe my favorite butcher, the one who cuts the heads off entirely and then tickles the medulla to test for sentience, waiting until there is no response before he continues. She writes back: "your favorite butcher is a hero."⁷¹

What is heroism here, in this system? What worlds and futures and caring practices right now are these people fighting for? Reproducing the white heterosexual family, one's own family, seems to occupy the imaginings and the goal-scape for most of these activities. But what other sorts of productions and imaginings might be possible?

Carving out space for a queer politics of meat, for a critical theory of lived everyday practices and systems of production more broadly first requires an unanchoring from the stories of white human reproduction as happily-ever-after. Queer couplings pose a threat to the sanctity of marriage and family. Not only to a status-quo, but to the guarantee of future generations that will reproduce in familiar ways and allow me to recognize my kin as self and outsiders as other.

Small businesses queer family relationships already: perhaps it is merely patrimony, taking two Mexican men in their thirties and forties into the fold, somewhat, of the red-headed family. But there is something queer about sharing mealtimes together, about hot dogs at 9:15am that your own mother didn't make.

[Eight] The Social Lives of Humans-Animals-Microbes

"E. coli happens"

-black crewneck sweatshirt worn by the state meat inspector under her lab coat and apron⁷²

E. coli happens – in animal and human digestive tracts and in the spaces that house eating and pooping humans and animals. Across cultural and spatial formations, humans animals and microbes are carving out ways of living and dying together.

In her ethnography of artisan cheese production in the US, Heather Paxson coins the phrase “microbiopolitics” to describe various “means of social regulation carried out through control of microbial life” (Paxson, 2013, p. 160) Paxson’s definition emphasizes the role of humans: we anthropomorphize the invisible critters, we decide if they are “good” or “bad” for mankind, and we “promulgate appropriate human behaviors and practices” in light of our analysis of how these critters can help and harm human lives. Paxson distinguishes between what she calls Pasteurian and “post-Pasteurian” microbiopolitical regimes: in the first, microbes are part of nature that can and must be controlled by humans -- increasing microbial purity can lead to cleaner social relations; in the second, microbes are part of natural-cultural entanglements, and humans work in concert with microbes. This post-Pasteurian ethic is evident among artisan cheesemakers in Paxson’s work and among the probiotic and fermented food enthusiasts working to improve the microbial profiles of human guts.

While meat production depends on microbial assistance to ferment sausage and decay beef, on the slaughterhouse kill floor, microbes are enemies. Microbes are managed through countless practices of cleaning, separating, doing things in the correct order, swabbing and testing. In slaughter, microbial purity is not and cannot be the goal. Shit is on the outsides and insides of animals and these animals and microbes are everywhere. Raw meat destined for human consumption will not be heated to the point of killing microbes nor treated with strong antimicrobial chemicals. Instead of microbial purity, humans aim to establish and maintain control over microbial rates of life and death. Management of populations is again the focus here.

As I've described, in the mandatory "hazard analysis and critical control points" (HACCP) training required for food handlers who work in slaughter and meat production, microbes are presented as enemies in a war to protect human consumers. Microbes become characters, and their stories and mugshots are reprinted and retold as moralizing lessons for humans all along the chain of food production and consumption. Microbes, or at least their caricatures, make humans do things.⁷³

Across all sorts of places and events - from sow barns to basketball games, pumping gas to high school banquets, church picnics to county fairs, humans animals and microbes tangle. Practices of gathering and sharing food, drink, experiences and spaces allow for particular possibilities for humans, microbes and animals. Risk is distributed disproportionately and non-innocently among livestock, workers, management, consumers, viruses and microbes.⁷⁴

Mysterious Poop Foam Causes Explosions on Hog Farms

Tom Philpott (Philpott, 2013)

From 2013-2014, 25% of hog operations in the upper Midwest were experiencing the problem of thick layers of bacterial foam bubbling on top of the pits of pig feces. In several cases, the shit exploded. Jokes about hitting fans aside, both human workers and pigs have been hurt in the explosions as researchers struggled to determine the causes of this new phenomenon. At least one researcher hypothesizes that feeding spent grain (a waste product of ethanol production) to pigs might be one of the factors creating conditions for this foam to proliferate.

More Insight into Link Between Gut Bacteria, Red Meat and Heart Disease

Meatingplace Editors (Editors, 2014)

Microbes in the human digestive tract convert particular nutrients found in red meat into metabolizing compounds that contribute to hardening of the arteries (atherosclerosis). Researchers who conducted the studies suggest that we might be able to intervene in the pathway or enlist more ‘good bacteria’ or probiotics to out-compete the bacteria involved. In the researcher’s words “the present studies may help us to develop an intervention that allows one to ‘have their steak and eat it too’ with less concern for developing heart disease.”

How Superbugs Hitch a Ride From Hog Farms Into Your Community

Tom Philpott (Philpott, 2014)

In a 2014 Mother Jones article, Tom Philpott describes two recent studies swabbing the noses of hog facility workers. Several days after leaving work, they still carried multiply antibiotic-resistant strains of *Staphylococcus aureus* in their noses. The author hypothesizes that this might be a way that “superbugs” – microbes that are resistant to one or more antibiotic strains – travel from hog barns out to the homes of workers and those living nearby. A second study compared nasal swabs from workers in hog facilities that use small doses of antibiotics to prevent infection to one that only uses antibiotics if an animal becomes ill. Researchers found that several workers at the higher antibiotic use facility carried multiply drug-resistant *Staph* while those at the lower-antibiotic-use facility did not carry resistant strains of *Staph*.

The Impact of PEDv [Porcine Epidemic Diarrhea virus] Continues to Grow

“Recent research has shown that convenience stores are also a great commingling place for PED. In study in Iowa, the floors of over 50 different convenience stores were swabbed and all tested positive for the PED virus. If a person goes into the store for coffee and a roll after selling a load of hogs, they risk picking up the PED virus on their shoes, which then could infect their whole herd at home. Therefore, consider by-passing the convenience stores if you plan on returning to the unit when you get home, or at least make sure you change shoes before going back into the operation.”⁷⁵

Feet are vectors for all sorts of things: for microbes, the foam that kills them, for Porcine Epidemic Diarrhea virus you track home from the floor of Casey’s General

store. One woman described the practices of congregating in a small community as a public health problem: *We all go to the same church, there are other pig farmers everywhere. At the high school basketball game. At the grocery store. You go to the 4-H events and - forget it.* She described the precautions her family started to take when they return home from an event with other pig farmers: *They all waited in the car and I went first. Opened the screen door and stripped down completely naked on the porch then ran into the house and into the shower.* Then each kid followed, one at a time, leaving their clothes and work boots on the screened porch so that nothing from the outside world of human interactions off the farm comes inside the house or later into their own barns.

PEDv, this stuff, it kills the pigs right away. So you have piglets being born and all dying, litters and litters of them all around you, it's devastating. I think they mean devastating to the business, and perhaps they do, but now, having been devastated by the deaths of animals a bit, I wonder if there is a double meaning here.

Anthropologist Alex Blanchette describes industrial hog production in the Midwest as refashioning not only hog lives and deaths but human social relationships and pathways: “vertical integration of the hog...was thus spawning forms of social reorganization as the corporation mapped out-of-work human relations onto the fissures of industrial animal life, creating microbiopolitical ruts and paths in regional circuits of sociality.” (Blanchette, 2015) In Blanchette’s analysis, industrial pigs as a species are privileged over humans, and human laborers with all their dangerous social commingling become a necessary risk in the project of maximizing efficiency of the

enormous imagined Herd. The ongoing threat of PRRS (Porcine Reproductive and Respiratory Syndrome) makes everyday mundane human social practices into biosecurity threats.

But humans are seen as vectors for microbial life and threats to animal (and human) health outside of an industrial production context as well. In a small slaughterhouse in 2014, a state department meat inspector tells me they are always trying to get people to understand the risks, whether or not there is a currently active epidemic of animal illness. “No!” she explains, “you can’t have a petting zoo at the county fair; the goats lick the kids’ hands and the kids lick their own hands.”

In May 2015, following an outbreak of avian flu in birds across the Midwest, the Minnesota State Board of Animal Health banned any live birds entirely from the many summer fairs. “As county fairs roll out across the state leading up to the State Fair at the end of this month, children who raise and study poultry for 4-H⁷⁶ competitions are scrambling to find creative ways to stay involved. Instead of bringing birds to the fairs, they are making posters, taking quizzes, demonstrating showmanship based on pictures or using stuffed animals. There also will be grilling and carcass competitions. ‘We’re going to have hundreds of grills lined up outside next to the coliseum,’ said Wendy Huckaby, University of Minnesota Extension Center for Youth Development Spokeswoman. In other words, the only bird you’re going to see at the State Fair is going to be a toy one or a dead one.” (Jackson, 2015) The article goes on to explain that the ban on live birds might actually be a boon to the youth poultry program participants: they can learn important lessons about biosecurity,

and thanks to industry donations, kids are eligible for up to \$80 for a successful presentation about avian flu compared to the usual \$6 for presenting their live chicken.

WI Campylobacter Cases at 21, List Compiled of Possible Sources

Cathy Siegner (Siegner, 2014)

In this story, a Wisconsin high school football team fell ill with bloody diarrhea and cramps, the signature of Campylobacter or “Campy.” For epidemiologists trying to trace the origins of the epidemic - and fast - (they claim the special request from the community to get to the bottom of things may speed the report), two factors make it harder: that Campy has an incubation period of 2-5 days, and that the football team spends a lot of time together -- it's not as easy as figuring out which church picnic all of the infected humans attended together.

Washington E. Coli Outbreak: Fairgrounds Dairy Barn was ‘Likely Source’ of Contamination

Cathy Siegner (Siegner, 2015)

In late April 2015, an outbreak of E. coli 0157:H7 was traced to a “Milk Makers Festival” at the Lynden, Washington fairgrounds. As of May 18, 22 cases of illness were reported with ten hospitalizations and no deaths. Over 1,000 elementary school children attended the festival on field trips. Those who fell ill were mainly first graders, plus at least one older child who was there as a helper setting up the fair. A slightly delayed round of infections followed the initial outbreak as it spread to family

members and those in close proximity to the infected kids. A month after the outbreak, the daily county updates explained that they still did not know the precise source of the *E. coli* contamination. One early article published in Food Safety News mentioned that pasteurized chocolate milk was given to the children on site (Desk, 2015), but nearly four weeks into the investigation, there was no confirmation that the chocolate milk might be the source of the outbreak. There was, however, an announcement made that at least one of the environmental samples collected from the scene of contamination is a match for the *E. coli* infecting these 22 patients (later 25 confirmed cases). A month following, an article revealed that the dairy barn, where live animals had been stored prior to the festival– was the likely cite of contamination (Siegner, 2015). The official final press release listed four areas of the dairy barn: “Manure bunker, Hay maze area, Bleachers by east wall, Bleachers by west wall” as all testing positive for the strain of *E. coli* shared by 25 infected people (Department, 2015).

Many food safety news stories follow the trajectory of the Washington State *E. coli* outbreak: a local community sharing food, bathrooms and spaces with other humans and/or animals leads to a regionally circumscribed outbreak of some microbe-based illness. But with a modern industrial food system shipping foods across several thousand miles of U.S.A., contaminated food can also travel long distances and affect eaters who are geographically and socially very far apart. As these cases won’t all be reported at the same hospital or to the same local health agency, it can be difficult or impossible to ever connect and make sense of geographically disparate cases. In the

2010s, new and rapid DNA sequencing allows disparate cases to be linked to the same origin point. If someone in central Texas and someone in Idaho each show up at a local emergency room with symptoms of infection by *Listeria* (listeriosis), the genetic markers of each patient's particular strain of *Listeria monocytogenes* can be added to a national database and those two cases might be linked. The combination of these increasingly rapid and affordable technologies with the FDA's new ability (initiated as part of the 2011 Food Safety Modernization Act) to not just strongly suggest but to *mandate* a recall means that it is now possible to trace and destroy contaminated food processed in a central location but distributed nationally, and increasing federal pressure to connect the dots and push for a recall as needed.

A 2015 ice cream recall by Blue Bell Creameries, a company that distributes its frozen product across 23 states and internationally, illustrates the challenges of globally distributed food products as sites of particular comings together of bacteria and people. In March 2015, five hospital patients who ate Blue Bell ice cream in a Wichita, Kansas hospital were diagnosed with listeriosis, and three of those patients died. *Listeria* was then found in the Oklahoma plant where that ice cream had been produced as well as at the company's main plant in Texas. Company CEO and President Paul Kruse issued the following statement in response, "We are heartbroken about this situation and apologize to all of our loyal Blue Bell fans and customers. Our entire history has been about making the very best and highest quality ice cream and we intend to fix this problem. We want enjoying our ice cream to be a source of joy

and pleasure, never a cause for concern, so we are committed to getting this right.”
(Creamery, 2015)

Blue Bell then laid off about a third of their employees permanently, furloughed another third, and rewarded those who stayed on to complete clean up and construction with pay cuts. In the CEO’s explanation, people had to be sacrificed in order to keep the business alive.

Food Safety Summit Kicks Off in Baltimore Without Incident

BY JAMES ANDREWS | APRIL 28, 2015

The 2015 Food Safety Summit kicked off early Tuesday morning in Baltimore, MD, despite riots damaging part of the city and the state’s governor declaring a state of emergency Monday night.

Violence broke out in Baltimore on Monday afternoon following the funeral of Freddie Gray, a 25-year-old Baltimore man arrested by police April 12 for possessing a switchblade knife. Gray died a week later after surgery for injuries to his spinal cord and larynx sustained while he was in police custody.

The first day of the summit, held at the Baltimore Convention Center and just blocks from Camden Yards, began with several day-long sessions that were well-attended in the morning. As planned, Tuesday’s main forum started off with a speech on the vision for an integrated food safety system by Michael Taylor, Deputy Commissioner for Foods and Veterinary Medicine at the U.S. Food and Drug Administration (FDA).

While some scheduled speakers canceled their appearances at the last minute, the summit proceeded without interruption for the remainder of the day. At one point, conference organizers joked that the few speaker cancellations just allowed for the afternoon’s networking mixer to begin an hour early.

Outside the annual food safety summit, protestors declared in the mantra of what some have called “black spring” in America, *black lives matter*. Within the food safety community, *which lives matter* is precisely the issue at stake. Food safety is a matter

of controlling populations: protecting some lives and threatening others. To a food safety engineer, human lives matter; harmful microbes and other threats must be reduced or eliminated. But which human lives are privileged by food safety regulation? Food safety infrastructures are built in part to support the more vulnerable humans among us: pregnant women, young children, the elderly, people living with AIDS and other immune-weakening illness, people living with cancer and undergoing immune-weakening treatments. While a bout of *E. coli* might mean pain and discomfort for someone with a strong immune system, it could mean hospitalization or death for those who are more vulnerable to infection. But these people are protected only in their roles as consumers. In order to be worth protecting, they need to be positioned in that privileged place within capitalist economic exchange. For food safety, consumers' lives matter. But workers are not imagined or protected in these regulations; in fact they are sometimes put at increased risk in order to protect future consumers. Microbial regulation is a matter of who lives and who dies, implicating microbes and different groups of humans as protectable or disposable.

In a 2012 article, Kelly Rafferty describes an art installation and performance piece in which artists and viewers are invited to take part in rituals of caring for--and then killing--pig tissue grown in the shape of small wings. In Rafferty's analysis, this sort of artwork is critical right now because "we need to radically transform our understanding of what is natural, human, and consumable in order to imagine and eventually create an ethical biofuture for tissue engineering". The relationships of care and time spent maintaining these non-human, not-quite-living beings are essential

as we find ourselves living in a more-than-human world with new ethical questions and calculations we may not yet be equipped to respond to.

Writing about some of the same critical art practitioners in a 2009 article, Deborah Dixon connects critical BioArt projects to Ranciere's analysis of the politics of aesthetics (Dixon, 2009). Dixon argues that both Ranciere's political theory and these sorts of bio-artistic practices can push us to think more deeply and differently about the politics of living in a more-than-human world. In her words, a world "wherein a species- and bio-based demarcation of difference is queried on a number of levels, not least in terms of the distribution of practice and affect" (p. 414). Parsing out this line, living in a more-than-human world forces us to move past the simple markers of difference we may have leaned on before: species differences, the status of *bios* – living versus non-living. Those classic lines of demarcation: human versus animal; animate versus inanimate must be questioned on many levels, including two that Dixon specifically highlights: how our practices are distributed and how our affects or feelings are distributed. Though it takes some slowing down, I really like Dixon's line because she names two of the sites that interest me most: the details of practices (what is done in daily repeated performances) and the nature of affect (feelings, connections and responsiveness), as high-stakes arenas for political figuring.

Rafferty and Dixon both analyze artistic practices as disruptive to our everyday understanding of the boundaries between human and animal, living and non-living and essential for learning to live ethically in a more-than-human biopolitical reality. I argue that the seemingly mundane everyday social happenings of humans animals and

microbes do the very same work. By listening more carefully to the strange and the perfectly ordinary stories of intersecting social lives of various species and living and non-living entities (humans, animals, microbes, infrastructures) we can open up new possibilities for thinking and for living in more-than-human worlds.

Intimate Politics of Slaughter – CONCLUSION

From practicing the right feelings slaughtering your first animal as a kid in the 4-H club to the right ways to sit and stand receiving a prize in meat competitions, from drinking in the agricultural fraternity to planning the annual banquet, from salting the floors for cows to building a new room in the meat market for the birth of each child – these movements, actions, feelings, interactions generate ways of living and worlds to live in. These stories, experienced firsthand or through the distance of news reporting, offer windows into culture in the making, not culture made.⁷⁷ They take our hands and pull us inside and outside of lives and spaces, through personal, political, intimate happenings.

In these chapters, I have traced the contours of many nodes where people, animals, alcohol, microbes, traditions, feelings, salt, lives and deaths interact. And I've traced a trajectory of inspiration from the material body of a pig to the disassembly conveyor at Swift's Chicago packinghouses to Henry Ford's mechanized assembly line. The animal's body in its twitches and symmetries, its precise nesting of endo and ecto and meso layers, the different materialities of bone, muscle, connective tissue, skin, guides practices of butchering and inspired not only how we disassemble other objects, but how we assemble all sorts of things from sneakers to iPads. Interactions between humans and more-than-humans beget worlds.

Katie Stewart, in her article "Cultural Poesis" (1994), returns to the feminist slogan of the 1960s, pushing social scientists to understand "how the personal is political." What Stewart calls affect – feelings, the intangible senses of things in the

making—is generative, world-making potential. While feeling and the affective realm are a component of my analytic map of socio-cultural world-making, I am particularly attuned, and call for greater attunement, to what is happening: materially, and through action and interaction. Without attributing motives to actors in a scene, I take actions and happenings—comings together, pushes, kicks, presses apart—to be generative, world-making stuff.

In the conclusion of the dissertation that follows, I pull back to a wider shot, tracing this project as a whole, as each analytic mode, each chapter, and the overall process of doing this work has helped make sense of politics at large. I explore this work as a contribution to understanding the politics of food, of race, of bodies and lives, and as a contribution to the several academic disciplines I am grounded in. I articulate some of what I have learned in the process of doing this work, and how the methodological approaches I've taken might offer a model for further work.

[CONCLUSION]

Politics as Usual

A month after Freddie Gray's death and the Baltimore protests that led food safety officials to start their cocktail hour early, rapper and media mogul Jay-Z Carter freestyled the following rhyme at a launch event for his new streaming media platform called "Tidal":

Don't ever go with the flow, be the flow...
You know niggas die for equal pay right?
You know when I work I ain't your slave right?
You know I ain't shucking and jiving and high fiving
You know this ain't back in the days right?
But I can't tell, like the way they killed Freddie Gray right
Shot down Mike Brown how they did Tray right?
Let them continue choking niggas
We gonna turn style, I ain't your token nigga
[I've deleted the portion where the billionaire describes the
hardships he faced in launching his new media venture]
...It's politics as usual (Jay-Z, 2015)

He then launched into the song "Politics as Usual" from his 1996 album *Reasonable Doubt*, nearly twenty years after the album's release. In the original song, Jay-Z describes the local politics of street corners, gangs and drug sales. Now he is firmly a member of the 1% of wealthiest Americans, and freestyles about the challenge of a sort of work only a millionaire could undertake. Across the disparate social class worlds his own life has straddled, Jay-Z's song title and main argument ring true: while circumstances may have changed for Jay-Z, race-based violence and systemic oppression continue; it's politics as usual.

How can we tell stories connecting the deaths of black men at the hands of police officers to the systemic disregard for worker health and safety in food

production and other industries? How does the authority to ‘police’ black bodies connect to the authority to kill and eat non-human animals? Microbes? Human workers? Who is protected and protectable and who is disposable is written and rewritten in each of these ongoing relationships and in the repetitions of each of these interactions between authorized protectors and disposable bodies. Here, I engage some of these questions, focusing on how the world-making in meatworlds can help us to make sense of social and political worlds more broadly.

What does it mean for bodies to matter versus *lives to matter*?

Here I return to my attempts to understand the boundaries between life and death, and the particular ways of knowing *with* that distinguish the worlds of butchers, inspectors, and researchers. Yes, these practitioners are knowledge workers, and yes they are engaged in material-semiotic philosophical work, articulating the contours of life and death and working to separate and cohere life from death. But their work and those sites can also help to make sense of how bodies and lives come to matter politically.

In the performances I’ve recounted, while animals’ lives are made disposable, other lively bodies become the focus of value. For lab researchers, lively *tissues or cells* become the lives worth protecting in place of the animal’s life. I mentioned the cow researchers who record the moment the cow is stunned – from then they have 30 minutes to get the thigh up to their lab, trimmed, ground, and weighed into vials of medium then centrifuged and frozen so that the muscle cells are still alive enough for their research for the next year. Another set of researchers gather pig cervical tissue to

create what they call “ex vivo”, alive but external, models of the human vagina. Those vaginal researchers care less about the precise moment of the animal’s death; they are focused on the tissue’s liveliness and try to get the tissue back to the lab and in preservative medium within three hours of the animal’s death, a window so large that they don’t have to know exactly when the animal died. The most valuable imagined lives for these researchers are the humans and animals who might benefit from the new knowledge they produce. But in their daily work, they focus on caring for lively cells and tissues. For researchers, lively experiments and *models of life* become the lives of greatest value.

For inspectors, concern for animals’ lives is replaced with a concern for animal *welfare*. In order to meet legislated standards of animal welfare protocols, inspectors turn their attention to chronicling exceptions to the protocols. If more than an allowable number of deaths don’t go ‘well’, that can result in a noncompliance report and a demand that the slaughterhouse do a better job of ushering their animals from stunning to death.

For butchers, concern for animals’ lives is replaced with concern for their bodies as meat. Butchers care, above all, about *meat quality*: an animal that bleeds out fully and without much stress will yield better looking, better tasting meats. Some butchers are also, I believe, engaged in caring practices, taking the responsibility of killing to include killing as well as possible, giving the animal as good or easy a death as they can. I have watched butchers salt their floors in a blizzard so cows don’t slip on the way in, shoot a bison in the truck so it won’t panic, usher in two sheep at once

to keep them calmer, struggle to remove a jammed shell and get a new bullet in while a wounded animal crouches, pleading. I've seen many experienced butchers instinctually wait, sometimes stroking the animal's back until the animal becomes suddenly calm and faces the bolt gun, before taking a shot. Separating out concern for the animal from concern for the quality of meat or ease and safety of the process for the butcher is difficult. But I have met butchers who I believe care deeply.

The focus of boundary-making practices isn't just drawing a boundary between larger abstract categories like life and death. Those same practices also carve categories of value for bodies and lives. In the practices of making death happen and making Death, animals' lives are disposable, but their bodies are valuable. The trouble isn't just in devaluing lives, but in how we value bodies. As I've described, animal life is devalued but animal tissue, meat quality, and animal welfare become new, highly valued focuses.

In the slaughterhouse, lives worth protecting and those that are easily replaced are carved out in the daily processes of production. As I describe in the first section "*Boundary Work*," as difference is carved out: separating life from death, clean from dirty, certain bodies and lives are rendered disposable. Animals, workers, and microbes are all replaceable bodies, rendered disposable in the acts of killing and carving boundaries.

So what is the difference between a valuable life and a valuable body? What is the difference between a disposable body and a disposable life? Earlier on in the process of articulating this research, I used bodies and lives interchangeably. But

thinking about the value of animals' bodies alongside the disposability of their lives forces me to tease out the difference. Some bodies are valuable as bodies but not as lives.

It is significant that the Black Lives Matter campaign claims black LIVES matter. Black bodies have always mattered in America: healthy, laboring bodies were highly valued during slavery, and black bodies matter in sport, labor, and on military front lines today. The Mizzou Football team's effective boycott of racism on campus is but one site where the value of black bodies is being leveraged to demand attention to devalued black lives. As the examples from Missouri, from the kill floor, and in Kalindi Vora's work on surrogacy and human organ selling all remind us (Vora, 2015), we can't just use bodies and lives interchangeably; the difference between who is valued as a body and who as a life is significant.

In the slaughterhouse, I am studying the details of sanctioned killing as the killing is done. And in understanding the details of how fundamental boundaries like life and death are carved out, we also start to understand how categories of difference and of value or disposability are carved for different lives and bodies: animals' muscle and tissue is valuable as their lives are disposed of; microbes and workers are both managed through the daily work of separating clean from dirty and working to make safe foods. Workers' bodies are valued for their labor but consumer health and safety often eclipses worker health and safety.

I'll point again here to Timothy Pachirat's ethnographic study of large industrial slaughterhouses as a counterpoint to my work. As a political theorist,

Pachirat works to make sense of the implications of what happens in a slaughterhouse to make sense of broader political forms. Pachirat's analysis yielded a scopic theory of power built in connected acts of surveillance and sequestration.

In contrast, my approach pays attention to the affective dimensions of work, to touch, care, intimacy, to the human and non-human bodies in interaction in practices of carving out difference. Power, I argue, is diffuse, distributed, and enacted through the daily work of carving out grand abstract sorts of difference through material practices, practices that produce very real material consequences for valuable and disposable bodies and lives.

In the course of doing this research, I have learned a great deal about different worlds, and about the particular world of small slaughterhouses, butchers, cattle farmers, and government regulators. I've come to understand that the same hopes and fears motivate very different people in very different worlds. And that these hopes and fears themselves constitute lived worlds and congeal as political positions.

Toward the end of this project, in the first half of 2016, I sit beside a nation of Americans watching our country divided as we head into a new presidential election. At I write this, in April 2016, two of the frontrunner candidates, one Democrat and one Republican, are running on seemingly opposite platforms but rallying the same set of frustrations, hopes, and fears. One satire piece circulating on the internet is a dichotomous key to help people choose who to vote for. "Is everything ok? Yes. No." It asks. If you answer no, you are asked "who is to blame?" If the answer is "immigrants, #blacklivesmatter, and government spending," you are urged to vote for

Donald Trump. If the answer is “the wealthy,” you are urged to vote for Bernie Sanders. The same hopes and fears are rallying points for seemingly opposite political platforms. In a February 2016 lecture at NYU, Achille Mbembe suggested that South African student activists are tired of waiting. Waiting, as a black cultural mode, is a form of attention and attunement with a long and complex history with religious, cultural and political legacies (Mbembe, 2016). Here in the U.S., I asked, are we witnessing a nation that is tired of waiting? Surely the instability and sweeping reform that either of these controversial candidates propose would have materially real and gravely unequal consequences for the lives and bodies of variously vulnerable white, black, Hispanic, immigrant, queer, transgender, Native American, poor and other marginalized Americans. Though neither Trump nor Sanders may end up occupying the White House, these two candidates preaching sweeping change have become mouthpieces for broad swaths of our country who are tired of politics as usual.

Good Meat?

“The highest order of humaneness produces the best flavor”

– Dan Barber, *Chef’s Table* Season 1, episode 2 *netflix.com*



Figure 8. Photograph of an Austin, TX food truck. Copyright 2016 by Kara

Wentworth.

I’ve described some of the real implications of this work for the capital-P Politics of lives, bodies, race and racism. But the project also offers a chance to engage more explicitly with questions about the politics of food. In this next section, I ask whether there can be such a thing as “good meat” and what that might mean. I include a short thought piece on the ethics of meat consumption, and trace the clarities

and confusions I've encountered about food, politics, meat-making and meat-eating along the way.

My time in slaughterhouses has upended many of my leanings toward certain sorts of meat as better than other sorts. As I've described, I have seen organic pigs come into the slaughterhouse so neglected and diseased that they have been condemned or come close to it. I squeezed their guts like a handlebar and felt the worms move, thicker than a fat, bloated pencil. At another slaughterhouse, a butcher told me he wouldn't ever buy organic meat himself and doesn't much believe in it, but one farmer who brings his organically raised pigs in is producing the most beautiful animals that have ever come through the facility. "Look at that side of pork" he said as we stared at it, pink and white before it was rolled into the cooler, "just gorgeous."

One slaughterhouse I visited very briefly threw more of my preconceptions about what makes good meat up in the air. I only visited once, for twenty minutes or so when I accompanied a farmer who was picking up his butchered meat from the cooler. I was so appalled by what I saw happening on the kill floor – the feel of the small room, what may have been poor light but felt like uncleanness, and most of all the way the young butcher hacked at the hanging carcasses. It was the only time I saw a butcher who seemed untrained and careless, delighting in the hacking rather than taking pride in a series of precise movements to take the animal apart. They were slaughtering goats that day, and perhaps the particular smell of the goats and their piles of heads and horns added to the experience, but this was the first and the only slaughterhouse I have ever been to that felt like a horror film or nightmare. Even

knowing the farmer who brings his animals there and the chef who cooks the meat up at a local restaurant of ours (a pipeline I previously thought of as iron-clad: *the best meat!!*), I haven't been able to bring myself to eat the wonderful burger sourced from that farmer since. I don't have an articulated belief that bad energy enters the meat or a 'horror movie vibe' harms the burger, but my gut has simply turned against it. Like elk, bison, and certain preparations of organ, I have built new associations and suddenly I can't stomach it.

Over and over, the boundaries around what might make some meat good or better blurred, and things that should have stayed put shifted. In Austin, Whole Foods headquarters was forcing small farmers to bypass their local slaughterhouse and ship their animals hundreds of miles in the wrong direction to get to a slaughterhouse Whole Foods partnered with. At the same time, the animal welfare standards Whole Foods spearheaded and prominently display in their meat departments recommend that animals be transported as little as possible or even slaughtered on the farm if they can be. Many meat markets I've visited do the dual work of slaughtering animals for local farmers to eat close by with friends and family or sell in advance of slaughter to neighbors, and also make sausage and cuts of meat for their meat counter using boxes of parts that come in from IBP or another massive meat wholesaler. Animals come in the back and leave in waxed paper packages while boxed beef and pork come in on the loading dock and leave from the front meat counter – the meat slaughtered on site and the meat coming in in boxes and being sold to retail customers will never meet. Several meat market owners have admitted that they lose money keeping the slaughter

part of their business open, but they see it as providing a service to the community. Some have also admitted that keeping the kill floor operating, even just one day a week, may imply to customers that the meat they are buying from the front counter is fresh and good--maybe even raised nearby. Owners would never lie about the origin of what they are selling, but having an active slaughterhouse as part of the plant may give all the meat they sell a sense of freshness and goodness from a customer's perspective. In some cases, a generation ago the meat slaughtered at the back of the building *did* make it to the deli case up front, and a smart owner wouldn't disrupt the nostalgic assumption that this was still true today.

So what do I believe about whether there is such a thing as good meat and what makes it good? I believe that *some* pig farmers who raise pigs on a larger scale and/or using industrial agricultural methods might be better stewards of their herds than *some* newbie organic farmers who don't give their pigs the option of shelter in poor weather and don't listen to the advice of the butchers, inspectors and meat market owners who make recommendations on how to give those pigs better lives. I believe that eating meat is one among many ethical choices we make in how to sustain ourselves alongside animal and human others on a planet that we have seriously fucked up. I didn't eat meat in my teens, not for animal welfare reasons but because I loved the idea that I could get closer to the sun's energy but cutting out one of the middle men. But prior to that freshman biology class-induced period, I have always eaten meat, and I eat meat today, probably more of it than I did before starting this research. And I don't just eat organic or grass-fed or locally raised meat. I eat meat!

And I love it when I get to eat meat that I am closer to, that has been raised or slaughtered or prepared by someone I know and trust. But it is rare for me to know the farmer, butcher *and* cook of a piece of meat – if I know and trust one of them, I have more faith in the whole production line, including the care for the animals during their lives, during their deaths, and the care for the farm and land they were raised on and the people who made it all happen.

If I were to develop a framework for “good meat” around infrastructures of feeling, care would be the word at the center. Meat built around networks of care – for animals, for the people who raise them and kill them, and for the tools, lands, and spaces that together make this all possible. Food is energy, and what we eat and how it gets from seed to table is one of the ways we all invest in and produce the sort of world we live in. Our planet is changing, and *if* we continue to consume resources as we have and as climate change modelers predict, *if* the global population continues to increase as population modelers predict, *if* more people come to eat meat and more of it, as global animal agricultural futures modelers predict, then we have some serious questions to answer.

On a fundamental level, I feel that our systems of meat production are oppressive and flawed. But so are our systems of employment and chemical and water use in agricultural production, our border protection and military actions, our division of wealth in America. Eating lettuce in America is no innocent affair (even if you grow it in your own backyard). What happens on the kill floor of a slaughterhouse, large or small, is among many unsavory goings-on that allow me to sit as I do today,

in the middle of the USA, looking out at a green lawn and hammock, drinking free trade decaf coffee, writing a dissertation funded by the US government's National Science Foundation ("This material is based upon work supported by the National Science Foundation Graduate Research Fellowship under Grant No. (NSF 11-582).") and the state of California's public university system.

Rather than demonizing slaughter – just one of the many unsavory doings being done in my name – I try to sit close to the trouble and stay close to the feeling of being troubled. I try to ask: How is this all connected? And how can we do this better? Where are there opportunities to make a significant shift in the well-worn pathways of overlapping inequalities and oppressions? Is there good meat, and what does that look like? Good for whom? I believe that meat-raising, killing and eating is a robust place to think about how we live alongside animals, microbes, and other people. It is a rich site for thinking about how things are done and how they might be otherwise.

Unlike the mainstream rhetorics around animal agriculture, I do not accept that massive population growth, increasing meat consumption, and increasing animal agricultural production are the only options for the coming decades. I don't accept the definition of "sustainable agriculture" as that which will sustain the inevitably growing population of wealthier humans wanting more meat. And what is taken to logically follow: that the only way to sustain this is through constantly increasing output and efficiency. I don't think that constantly increasing production in an open marketplace is the only way forward. I am inspired by the many people I have met in doing this

research who are working to do *better*, not necessarily bigger. Most of these butchers and owners are not niche meat activists: they are not, for the most part, advocates for organic or local or grass-finished meat. But they are advocates for good, modest lives, and for the importance of human relationships in the networks that bring food to our mouths.

This dissertation does not set out to solve the problems of climate change, population growth, and the future of animal agriculture. I aim here to document what is happening, to be present with the people and animals whose labor and bodies we are eating, to try to understand what else we are making when we're making meat. And in the process, I have begun to lean toward a new way of evaluating food systems, a holistic approach that asks questions about care for humans and non-humans, from workers to cattle to microbes. Here I excerpt my "ethics of eating meat," a short piece I submitted to The New York Times in response to their call for "argument for the ethics of eating meat." Needless to say, the panel of male meat and ethics experts evaluating the piece did not send me any reply (this panel included philosopher of animals and ethics Peter Singer and food journalist Michael Pollan).

How to Choose a Meal in a Complex World

Arguments for and against meat-eating tend to be equally obsessed with the superiority of humans. Meat eaters often focus on human nature or freedom and animal rights advocates merely expand the circle of superior beings worthy of protection. This belief in the self-importance of man (or man and animal) is a

misguided relic of Western thought blamed on the Greeks, and there are many alternate ways of imagining the world.

Here is one possibility: if we let go of our self-centrism, we can see that any act of consumption is morally fraught, whether we are considering a pig, a walnut, a piece of an airplane or even another human. Each decision to put something in our mouths should be made using the same ethical framework of care for the entire network of people, animals, plants and things.

Consider the entire network of production of a single-serving meat substitute made to look (and taste!) like chicken nuggets: the employment practices, land, energy and water use, packaging, harvesting machinery, the middle men and grocery purveyors you are buying from and where the money from that transaction goes. Compare that to a deer that lives without much human contact until the moment it is shot by a hunter, who carries it onto her truck, brings it to a local custom slaughter facility, and shares venison with her family and neighbors. Whatever system we might agree on for calculating care, the second scenario will likely involve a great deal more of it.

Whether or not it is humanly possible to make such calculations is irrelevant. The principle remains: Eating meat is inherently as ethical as eating anything else; it all depends on context. Choosing not to eat meat does not absolve a person of the responsibility to carefully consider each object she puts in her mouth. Vegetarianism might be an effective shorthand for estimating which acts of consumption are going to involve the most care, but it is not inherently more *ethical* than care-conscious meat-

eating. Rather than cutting corners or continuing to believe in the myth of our own superiority, meat-eaters and vegetable-killers alike should consider care for the entire network of things before every act of consumption.

Kara Wentworth, San Diego, CA

Final Offerings

In addition to reflecting on the politics of race and politics of food, this work offers contributions to understanding contemporary socio-political worlds and to understanding the *nature* of socio-political worlds more broadly. I offer a theory of how difference of all sorts (including the dichotomies like inside and outside life and death as well as social difference like race, class, culture and gender) is *made* in daily practice. Following Charles Pierce's work on "offensive mechanisms" or "micro-aggressions," (1970) I theorize durable inequalities like racism as well-worn groove lines made deeper and enacted with each action, repetition, cut that we make each day. In theorizing difference and inequality, I emphasize the responsibility of daily action and interaction for producing inequality and as a site of liberatory potential. It is through daily action and interaction that we can also enact disruptions and make change.

This work is also an intervention in feminist theory of knowledge and bodies. While scholars like Judith Butler have deeply theorized how repeating action constitutes a self and a seemingly coherent identity, this work takes another approach to the question of how bodies come to matter. I focus on more-than-human bodies in material detail to understand how all sorts of meanings—useful vaginal models, legible cuts, valuable and disposable lives—get made. I also make sense of knowledge and meaning as performative material practice. While Barad draws on Nils Bohr and experiments in quantum physics to understand performativity, I look instead to the slaughterhouse kill floor. In the daily interactions between butchers,

knives, animals and microbes, actors emerge from the tangle variously victorious. I locate knowledge not in the observer, but instead throughout the scene: there is no cut that cleaves butchers from the cow's body, making the carcass knowable. I articulate knowledge as forever-diffuse and distributed: it is only in interaction with the animal's body that a butcher 'knows' how to butcher. Tacit knowledge is spread across the bodies and tools that interact in each scene. And non-human bodies can act as material scripts for their own disassembly, and in turn for disassembling and then assembling many bodies of all sorts.

This work brings together trajectories of thought in anthropology, feminist theory, science studies, and communication to articulate a theory of how meaning is made in practice. For fields of Communication, I have offered another set of theories and tools for making sense of meaning and interaction. To interdisciplinary studies of distributed cognition, spanning through and across Communication as a discipline, I offer a focus on animals' bodies and microbes (in life and in death) as actors in sense-making scenes. While work in distributed cognition regularly incorporates all sorts of objects in the scene of knowledge, my focus on animals is an addition to the existing literature.

I offer a contribution as well to semiotic theory, articulating material-semiotics in the flesh of animal bodies and the dulling and sharpening of blades. I have described cutting as a semiotic process. Here, I want to turn to the potential of this approach to semiosis for research methods and ethics. If knives can teach us about material-semiotic processes and about knowledge practices, other questions arise:

What is the nature of an analytic tool kit? What might it mean to have tools for knowing-making that are sharp? Dull? Multiple?

As one butcher described, a dulled knife can be a better tool for following the contours of the animal's hide, fat, and muscle; if you wedge it in just so, apply some body weight or knife weight or gravity, the knife traces a line that is already there: a difference between body and skin. Sharp knives, in contrast, can leave accidental and intentional nicks, nicks that can be used as handholds to maneuver and make further sense of the body at hand.

Perhaps there is an argument to be made for dulled analytic tools, dulled knives that trace out contours, that do less cutting of the fabric of the world at hand. Surely any world, scene, culture, person "at hand" to the researcher is altered and made through the research encounter. But it seems equally naïve to claim that there is no *there* there prior to our arrival on the scene. I am quite certain that the lives, workplaces and worlds I've participated in as a researcher are going on perfectly alright without me there. So how can a research ethics and also a research method hold the weight of observer effects and reflexivity alongside undying reverence for research subjects? Dull blades might help us get there.

Ultimately, I offer not only a way to theorize methods, but also a methodological model. I have carved out three ways of working through a study of material practices: as an ethnographer of categories-in-the-making, a theorist of material meaning and knowledge-making, and an analyst of human practices of making lives, livelihoods, and cultural worlds. All three of these modes attend to

interactions between humans, non-human beings, and things. But each analytic cut brings another aspect of the scene into focus. I hope that this model of multiple ‘cuts’ can be an opening for other projects searching for methods that fit the problems of making sense of complex more-than-human worlds, and for carving out futures and interactions *otherwise*.

Endnotes

1. As Massumi asks, "What would it mean to give a logical consistency to the in-between? It would mean realigning with a logic of relation. For the in-between, as such, is not a middling being but rather the being of the middle-the being of a relation. A positioned being, central, middling, or marginal, is a term of a relation. It may seem odd to insist that a relation has an ontological status separate from the terms of the relation. But, as the work of Gilles Deleuze repeatedly emphasizes, it is in fact an indispensable step toward conceptualizing change as anything more or other than a negation, deviation, rupture, or subversion. The terms of a relation are normally assumed to precede their interrelating, to be already-constituted. This begs the question of change, because everything is given in advance. The interrelating simply realizes external configurations already implicit as possibilities in the form of the preexisting terms. You can rearrange the furniture, even move it to a new location, but you still have the same old furniture. Assuming the precedence of terms in the relation is common to approaches characterized as empirical. Taking pre-given terms, extracting a permutational system of implicit positionings from their form, projecting that system to metaphysical point before the givenness of the terms, and developing the projection as a generative a priori mapping-these moves are common, in varying ways, to phenomenological, structuralist, and many poststructuralist approaches. They back-project a stencil of the already-constituted to explain its constitution, thus setting up a logical time-slip, a vicious hermeneutic circle. What is given the slip, once again, is change. (Massumi, 2002, p. 70)

2. This term was coined by Renato Rosaldo in a 1994 conference presentation, cited by James Clifford in his *Routes: Travels and Translations in the Twentieth Century* (Clifford, 1997, p. 56), and made more famous by Clifford Geertz citing James Clifford.

3. The 'ontological turn' in Anthropology

As a discipline, cultural anthropology is shaped by its history of imperialist practices. For centuries, anthropologists analyzed Other cultures as inferior to those of the conquerors and researchers. The West was taken for granted as a superior and normal world, a site of High Culture, while non-Western people had cultures. Since the mid-20th Century, the superiority of the West has been questioned and inverted, early on by scholars like Mary Douglas (2005), who insisted we must study Western ritual practices like keeping kosher and cleaning homes. The West was unseated as an unquestioned superior norm, and our own cultures became subject to anthropological analysis (Miner, 1956; Moffatt, 1989). Feminist anthropologists demanded an awareness of the role of the researcher in the focus and content of ethnographic research (including Ruth Behar, Laura Ahearn and others). Reflexivity, the

acknowledgement of one's own position as researcher in the site, became an ethical expectation for cultural anthropologists.

Even though anthropologists were working more self-reflexively, studying their own cultures and working to study others' cultures as equally valid ways of knowing, Other ways of knowing still remained precisely that: ways of knowing. The categories of the ethnographer, kinship, ritual, clean and dirty, still tended to go unquestioned while the categories of other cultures were dissected and analyzed. Western categories and ways of knowing were taken to be real while other cultures' ways of knowing are *real for those people*. In the 2000s-2010s, another anti-imperialist shift took place, what scholars describe as "the ontological turn." Rather than taking our own categories as real and others' as 'ways of knowing,' scholars take these other ways of knowing as more than epistemes, but as ontologies: real categories in real worlds. Helen Verran, in her work on Nigerian youth counting, does not say that they have a different way of understanding numbers, but that they have very real numbers that are different from our own. In his work on people of the Amazon, Eduardo Kohn does not say that the Amazon believe that dogs' dreams can predict if someone will die, but instead that dogs' dreams DO predict if someone will die.

I understand the ontological turn as a sort of varsity reflexivity. This move acknowledges that there can be a power differential at play between ontology and epistemology. Epistemology can be derided as 'merely' a way of knowing or understanding the world, while ontology is how the world in fact is. Somehow even with the cumulative layers of reflexivity, anthropology's dirty past as Imperialist project still shone through. Our view IS; theirs are ways of knowing. We have the world; they have a perspective on it. The ontological turn is a giving up of the goat. It gives other cultures a world, not just a culture.

The ontological turn in anthropology is an ethical-philosophical shift. In her work on atherosclerosis, Annemarie Mol (2002) argues that there aren't multiple perspectives on atherosclerosis, but that atherosclerosis itself is enacted in practice. It is quite literally made through daily practices, and it is made differently, so there are not multiple perspectives but multiple atheroscleroses, and ultimately, a 'body multiple'. This radical attendance to and acceptance of actors' categories is a mode of ethical engagement with other people, cultures, and worlds.

Following Verran, Kohn, and Mol, I argue that the interactions on a slaughterhouse kill floor quite literally make cultural worlds. As I will explore in detail, life and death are made and re-made, categories of difference are carved, bodies are rendered meaningful, and visions of futures, good meat, and a good life are enacted through daily repeating practices.

4. Multispecies Ethnography

I am not making this shift from human to more-than-human anthropology alone. I am in the company of and inspired by numerous others, among them Hugh Raffles, Heather Paxson, Eva Hayward, Eben Kirksey, Anna Tsing, Eduardo Kohn and his dogs. Alongside the ontological turn I've described, a posthumanist or more-than-human 'turn' is also widely acknowledged in anthropology of the early 21st

century. Rather than focusing just on human cultures and human worlds, scholars are looking increasingly to multispecies engagements in complex more-than-human worlds as the stuff that makes culture. In the (2014) Multispecies Salon, Eben Kirksey edited a series of in-person engagements and a resulting compiled book featuring work on mushrooms (Tsing), cheese (Paxson), and brittlestars (Barad). In the introduction, Kirksey connects the multispecies turn in anthropology to the ontological turn. "Moving past questions about representation, Donna Haraway has argued that animals are not just "good to think" or "good to eat" but are also beings that are good "to live with." Other species are being regarded by anthropologists "as parts of human society," in the words of John Knight, "rather than just symbols of it." Many anthropologists have begun to chart an "ontological turn" in the discipline, focusing not just on how humans and their worlds are portrayed but on how they are thought to be. Ontology traditionally refers to a branch of philosophy that examines modes and structures of being, such as essence and existence. Matei Candea, a British social anthropologist, associates the ontological turn with a move away from foundational distinctions in European thought between nature and culture, humans and nonhumans. Recent provocations within anthropology suggest that human beings, seen ontologically, are multispecies beings." (Kirksey, 2014, pp. 2-3)

Surely, as Kirksey describes, the ontological turn and more-than-human turn arise out of the same move against humanism and its durable dualisms: mind vs body, knowing vs being, thinking vs. doing, nature vs. culture, animal vs. human. But there is a closer connection between these 'turns' than Kirksey offers. The reflexive turn in anthropology de-centers the human researcher as an unquestioned superior knower. In the shift toward reflexivity, anthropologists could no longer be floating knowers, translating other worlds smoothly through eyes, to brains, to fingers to paper. Reflexivity in anthropology makes the move feminist science studies scholar Donna Haraway insists science must make: disallowing the 'god trick' of knowing from nowhere and everywhere at once. In reflexive ethnography, the researcher must claim a body and must know from somewhere.

The turn to ontology pushes this anti-humanism further, taking others' worlds seriously, and giving power to material and immaterial things. Concurrent with work in science studies and philosophy that insists on including non-human objects in descriptions of how facts and worlds come to be made, anthropologists navigating the ontological turn also de-center the human, giving agency to powerful objects in the world: numbers, dogs, dreams, mushrooms, rainforests. From the reflexive turn to the ontological turn and through the turn to analyzing more-than-human cultural worlds, anthropology and social studies of science across disciplines (what I'll call STS) follow a similar trajectory of epistemic decolonization. Certainly a great deal of cross-pollination across STS scholars and anthropologists (including many anthropologists who are themselves STS scholars) have married the trending paths of these disciplines. For a recent discussion of the intersections of anthropology and STS, see de la Cadena et. al.'s collaborative article based on an American Anthropological Association panel (de la Cadena & Lien, 2015). The history of STS as a discipline, expanding from the

classic history and philosophy of science to encompass social and ethnographic studies of science and of knowledge in the making, is founded largely in the turn to anthropological methods in the 1970s and the birth of “laboratory studies” (Knorr-Cetina, 1983; Latour & Woolgar, 1979). The trend toward multispecies engagement is not isolated to these interdisciplines or even to the social sciences; understanding the human as more-than-human has become a hallmark of contemporary work in the sciences and humanities as well. The 2015 launch of a new UC San Diego institute for studying microbiomes is an exemplar of multispecies, system-focused shifts in the sciences.

5. Feminist STS – materiality, bodies, messiness

This work builds on a longstanding tradition in feminist science studies of focusing in on material practices and everyday technologies to make sense of politics and power. Ruth Cowan’s *More Work for Mother* (1983) looks at the home as a site of industrialization, exploring how technologies from milled flour to microwaves produced more, not less work for women. Susan Leigh Star’s article “On Being Allergic to Onions” (1991), discusses McDonalds as a standardized technology, a fact we live with whether or not we eat there, and a site for understanding identity, marginality, and power. In Chandra Mukerji’s *Territorial Ambitions and the Gardens of Versailles*, garden-building is articulated as a technology of territorial or “land politics” (1997, p. 147), in parallel and representative of the seizure, charting, and transformation of a whole kingdom of land beyond. Each of these accounts details the practices of bodies and everyday technologies in material worlds as productive of politics and power. Adding to these ongoing conversations, I focus on bodies in messy interaction to make sense of how worlds are made through everyday (technological) practice.

One critique lodged by science studies scholars is that science is messy work made to seem neat. Karin Knorr-Cetina points to the messiness of practice in laboratories and the situatedness of choices made as “perhaps the single most consistent result of laboratory studies.” (Knorr-Cetina, 1983, p. 123) Speaking to the trouble of material messes, Leigh Star describes an ape brain-stained lab notebook delivered to her on a silver platter in a sterile archive. Needless to say, the material mess of the lab work figured nowhere in that lab’s final scientific publications. Doing knowledge work is messy, and a great deal of effort goes into corralling these practical and material messes into more sterile, seemingly stable “knowledge.” Feminist theorizations of knowledge tend to work against sterile, inanimate, disembodied knowing ‘from nowhere, by no one’ (D. Haraway, 1988; Harding, 2004). Instead, knowledge is always located in bodies, and knowing is always done from some body, some where.

The scholars I have described are largely focused on the messiness of scientific practices, but there is an equally rich body of literature engaging the material messiness of practice and of bodies themselves. The connection, I dare to suggest, is somewhat determined by the nature of socio-material female bodies. Female bodies are always messy: like animals in the slaughterhouse, they are unruly, untamed,

bleeding all over the place, producing an overflow of both matter and meaning. Feminist science studies scholars have worked for decades with the messiness of bodies, including Rayna Rapp's writing on childbirth and amniocentesis (2000), Emily Martin's work on female bodies from menstruation to vaginal exams in *The Woman in the Body* (1987), Monica Casper's ethnography of fetal surgery in *The Making of the Unborn Patient* (1998), Nelly Oudshoorn's *Beyond the Natural Body* (1994), Anne Balsamo's *Technologies of the Gendered Body* (1996), Anne Fausto-Sterling's *Sexing the Body* (2000), and Donna Haraway's work on primates (1989), fetuses (1997) and premarin (2012). I'll focus in on the last two scholars, AFS and Donna, whom I think of as primary foremothers for this work.

Anne Fausto-Sterling and Donna Haraway both engage with material messiness and messy knowledge practices, and both unseat Cartesian dichotomy as a fundamental starting point for feminist theorizing. In her 2000 book *Sexing the Body*, Fausto-Sterling focuses on how bodies come to be sexed, disrupting the boundaries between nature v. culture, material v. knowledge, real v. constructed, interior v. exterior, by focusing in on the details of historical and contemporary practices. For Fausto-Sterling, as for Grosz and Wilson whose work she points to, these pairs aren't actually 'dueling dualisms', but they "come into being together" (p. 24). Haraway offers a similar construct, describing various beings and things as "becoming with" one another (2008, p. 3). This notion of co-construction or co-constitution (Barad, 2007; S. Jasanoff, 2004) is a hallmark of STS scholarship and of posthumanist work more broadly. Rather than accepting the old humanist insistence on dichotomies between nature and nurture, nature and culture, human and animal, man and woman, sex and gender, observer and observed, being and knowing, we can think instead about seemingly distinct entities creating one another and coming into being together. Fausto-Sterling analyzes this 'coming into being together' through a detailed exploration of the material practices of making sexed bodies. Anne Fausto-Sterling was my usher into feminist science studies from 16-22, as my brain was still materially developing, and my ways of thinking bear her imprint strongly. While the scope of her project in *Sexing the Body* is very different from my own (her work spans many decades of research and scientific-cultural work on hormones, genitalia, brains and sexual identity while this project is based in ethnographic work in one sort of site), my work is inspired by her attention to detail, her insistence on the complex, constructed nature of inscribed boundaries, and her focus on material practices of doing.

I have mentioned already two core notions of Haraway's that guide my work: the insistence that knowing is always situated and embodied (D. Haraway, 1988) and the insistence that beings and entities don't exist alone but are instead "becoming with." These are just two of the underpinnings of patriarchal humanism that Haraway unseats. Abstract "knowledge" and individual powerful human beings are no longer enough, and are no longer apolitical assumptions about the world and its making. There are three additional hallmarks of Haraway's work that push my own thinking. First, Haraway models a way of taking animals and artists seriously not just as "good

to think” (Lévi-Strauss, 1963, p. 89) with but to live with, as partners in making sense of the world. Second, she urges us to “stay with the trouble”: to avoid reductive or easy answers, and to linger with and engage complexity and uncertainty (D. Haraway, 2010). Ethically, this means that justifying our actions and our killings is never enough; remaining engaged, staying open, knowing that no calculation or abstraction is ever enough but that we must stay attuned to the breakdowns of our systems of sense-making and always in a mode that is open and speculative, creating more openings and imagining better otherwise. Third, and in connection with the urge to stay with the trouble, Haraway coheres a notion of “worlding,” building on Heidegger, Spivak and others. The notion of worlding, while mentioned here because it builds from Haraway, is a foundation to the third section of the project, in which I explore how socio-cultural worlds are made or ‘*worlded*’.

Spivak, in her 1985 essay “Three Women’s Texts and a Critique of Imperialism” (1997, p. 147) describes “the worlding of the Third World.” In the first footnote, she offers “1. My notion of the “worlding of a world” upon what must be assumed to be uninscribed earth is a vulgarization of Martin Heidegger’s idea; see “The Origin of the Work of Art,” Poetry, Language, Thought, trans. Albert Hofstadter (New York, 1977), pp. 17-87.” Haraway builds on this same idea of Heidegger’s, but is more explicit in rejecting Heidegger’s humanist limitations. Heidegger, she writes, due to his human exceptionalism, was “poor in world.” In Haraway’s words, “His human exceptionalist preoccupations made him poor in world” (Spivak, 1985).

6. The “San Diego School of Semiotics”

In a 2013 speech, Gina Neff articulated what she calls the “La Jolla School” of Communication:

The “La Jolla School” is the most identifiable department-centered school of thought in contemporary communication research in the United States...Membership in the La Jolla School is defined through a way of knowing that produces richly textured, deeply analytical work on the cultures, infrastructures, and social implications of media and communication across behavioral, social scientific and humanistic approaches. Neff traces the basic contours of this school of thought: First, La Jolla School scholarship directly engages culture, and “marries symbolic and structural approaches to understanding communication as meaning, process, and artifact.” Second, scholars are committed to analyzing communication on multiple levels: “society, culture, economy, group, and individual” are equally engaged, though not necessarily all at the same time or all by the same scholar. And finally, Neff describes “deep dives” as a hallmark of research undertaken by graduate students in the department. It is my hope that this work can sit among the many dozens of projects in the department’s history that, in Neff’s assessment, “delve deep into a particular topic, even by scholarly standards.”

Having spent six years learning from and alongside scholars in UCSD Communication, my work is deeply inflected with the core assumption that knowledge and meaning are not just abstractions located in human minds but are made through

interaction between people, objects, and environments. This particular strand of work within the “La Jolla School” is what I am calling instead the “San Diego School of Semiotics.” This coherent trajectory of scholarship engages, as Neff describes, deeply with culture, and analyzes communication on multiple levels: the individual, group, culture, society. But most significantly, it focuses on interactions between individuals, artifacts and environments as the focal point of theorizing.

To articulate the contours of this approach, I’ll begin with the work of Lev Vygotsky, a Soviet psychologist whose work was popularized in America in large part through the work of UCSD Communication Department co-founder Mike Cole. I then move to work of Ed Hutchins, a professor in UCSD’s Cognitive Science Department whose work has heavily influenced scholars of communication. Next I move again to department co-founder Chandra Mukerji’s work, which intervenes in our understandings of power and knowledge, and finally I point to later arrivals in the department, Carol Padden and then Morana Alaç, whose work extends and expands the sorts of analyses that are possible from this focus on (multimodal) interactions in the world.

Vygotsky’s research is legibly socialist: rather than locating knowledge and meaning in the mind of a lone individual, he articulates an understanding of how meaning and identity are formed through interaction: both social interaction between people and material interactions between people and things. While I discuss Vygotsky’s empirical work on the “zone of proximal development” and Wood et. al.’s extension of “scaffolding” in a later chapter, here I am primarily interested in the legacy of what Michael Cole and others emphasized from Vygotsky as “cultural-historical activity theory” or CHAT. The approach emphasizes that learning and cognition are not accomplished by lone individuals but are instead always locally and historically contingent, achieved through social interaction and in concert with objects and artifacts. These soviet psychologists, at least in these readings, are focused on mediation: artifacts and other people serve as mediators for cognition. Rather than locating cognition in the mind, and considering development to be the accomplishment of a lone individual, cognition and development are achieved through interactions.

This focus on cognition as made through interaction is taken up in the ethnographic work of Ed Hutchins. Hutchins focuses on how cognition happens “in the wild,” not in confined laboratory spaces or inside individual human brains, but in the happenings of the world. He looks at the cockpit of an airplane, naval ships, and other sites as manifestations of what he calls “distributed cognition.” Cognition as Hutchins understands it is not located in an individual human brain but instead it is distributed across multiple people and objects in the world. Prior to automated landing equipment, pilots, dials, printed tables and little ‘slugs’ that are moved along the edge of the speed and altitude meters together remembered a plane’s current speed and worked in concert to safely land (Hutchins, 1995).

Mukerji extends this notion of distributed cognition to articulate a theory of materially distributed power. Rather than taking cognition as the start and end of the

analysis, Mukerji, like Foucault, is primarily interested in understanding the workings of power. In her work on the gardens of Versailles (1997), the birth of bureaucracy through surveying (2011), the tacit, inarticulate knowledge of stone masonry (2006), shifting knowledge practices (1989), she focuses on how power emerges and is enacted through material practices and work with land and objects. Across these sites, Mukerji performs empirical analyses of practices between people, objects, and environments, rethinking knowledge/power as distributed.

Morana Alaç, who entered UCSD as a PhD student in Hutchins' Cognitive Science Department, extends the notion of distributed cognition differently, with the methods of ethnomethodology and the theories of semioticians including Peirce, Eco, and others. Alaç focuses on multi-modal interactions: the gestures of hands and bodies in interaction with screens, robots, pencils, paper and other entities, as practices that constitute knowledge. Alaç emphasizes the local, situated nature of meaning and artifacts, explaining that a map or drawing may not be able to travel from one context to another without losing its meaning. Alaç's work (as well as Greiffenhagen and Sharrock 2011; Suchman, Trigg, and Blomberg 2002) is an inspiration for paying careful attention to gesture, language, and hands and to understanding meaning as performed in a local context.

Carol Padden was also a UCSD graduate student, but in Linguistics, in the milieu of Cole's CHAT, Mukerji's territorial power, and Hutchins' distributed cognition. In her work, Padden disrupts the founding assumptions of Noam Chomsky and all of linguistics, claiming instead that language is not innate, universal, embedded in all human brains but instead constructed in interaction with others and in and with the world. Much of Padden's research is located in Al-Sayyid, a Bedouin village that has existed in relative isolation in the Negev dessert in Israel, even as powerlines rose above them, passing the village by, and a McDonalds was erected not far from the village's entrance. Without contact with other deaf communities, the growing community of deaf residents of Al-Sayyid developed their own sign language. Padden's work, in collaboration with scholars in Haifa and New York, has thus been able to do the methodologically unthinkable: to document the evolution of a new language. Among their many findings, Padden et. al.'s work concludes that meaning-making is done in collaboration with others and with the environment. In its infancy, the Al-Sayyid Bedouin Sign Language includes pointing—to the sky, to the ground—but over several generations of signers the language has become more complex with smaller, faster more abstracted gestures. Over time, meaning is built through agreement and interaction within a particular community.

Across these US San Diego scholars, a coherent theory of semiotics is articulated: Meaning (Vygotsky, Cole, Alaç), knowledge (Hutchins, Alaç), language (Padden) and power (Mukerji) are situated in space and time, and are enacted through interaction between humans, environments, and things. I enter the scene as a student of this work as part of a litter of Communication and Science Studies doctoral students at UC San Diego in the twenty-teens. The work of Monica Hoffman, Anna Starshinina, Sarah Klein and others likely sports an overlapping stamp, though our

claimed disciplines and primary sites are very distinct. Rather than a stamp, perhaps a die is a more apt material analogue, melting us down and pouring us in, all the while telling us we are special, unique, radicals, and this then is the result. I am deeply grateful for their camaraderie, support, encouragement, editing, conversations, and for all the learning together that we at times happily and at times painfully undertook in these years.

7. I use interaction rather than Barad's neologism, though I try to embed within it the assumption that entities are made through encounter.

8. In a prior footnote I trace the origins of this phrase to Renato Rosaldo.

9. Another equally true saying is that there are only two seasons in Minnesota: winter and construction.

10. "small" plants employ between 10 and 499 employees (unless their annual sales are less than \$2.5 million, in which case they are considered "very small" regardless of number of employees up to 499. Large plants have 500 or more employees.

11. Based on an April 7, 2016 analysis of MDA and USDA published lists of custom and inspected slaughterhouses. As of that date, 233 slaughterhouses out of 283 are custom slaughterhouses. Of the 50 inspected slaughterhouses (26 federally inspected and 24 inspected by the state), the majority are also what the USDA would classify as "very small."

12. There is, of course, more to this story, and a complex racial history in telling it. Oftentimes, both Hispanic tejano ways of preparing barbecued meat – *barbacoa* and open-fire cooking of less desirable cuts by African slaves are left out of the tale of barbecue's history. The frequently uttered phrase "real barbecue is just salt and smoke" or "real barbecue doesn't have sauce" is an affirmation of the superiority of white Texas barbecue history and an erasure of black and Hispanic barbecue origins and modern day legacies in Texas and throughout the American South. Food historian Robb Walsh addresses some of this history in his *Legends of Texas Barbecue* (D. Haraway, 2010).

13. A March, 2016 search of the custom exempt (slaughtering for farmers and non-paying guests but not inspected by the state or federal inspectors) slaughterhouses in Minnesota yielded 33 plants that still have "locker" in their name. *Custom Exempt Slaughtering Plants*. Minnesota Department of Agriculture. Another 4 state-inspected plants also are called "Locker."

<http://www.mda.state.mn.us/licensing/inspections/meatpoultryegg/custom-meat-processing/customplants.aspx> Accessed March 30, 2016. In 2015-2016, rentable meat lockers are making another appearance in upstate NY as a way for consumers to purchase quarters or halves of animals from local farmers and store the meat inexpensively (for \$5-8 per month). <http://civileats.com/2016/03/01/communal-meat-lockers-could-help-scale-up-sustainable-meat/> Accessed April 7, 2016.

14. "Boundary work" should not be confused with "boundary objects" – Leigh Star and Jim Griesemer's term that has gained great traction in the interdiscipline of STS. While boundary work is focused on the making of boundaries themselves, "boundary objects" focuses on communicatory objects that can travel *across* boundaries, allowing

disparate communities of practice to interact and get work done, often in the absence of shared understandings of what that object is (Walsh, 2002). While much of Leigh Star's other work--on making categories, categorical outliers, power, and messy practices--is directly relevant to this chapter and to my work more broadly, boundary objects are not a concept I will engage here.

15. I am indebted to Chandra Mukerji (in personal conversation April 2013) for this word play.

16. My understanding of lines as traces comes from Tim Ingold's work, which I will describe in more detail shortly.

17. For Barad, space and time also emerge out of these tangles.

18. Dawne McCance, interviewed by University of Manitoba online describes the process of translating Derrida's "life/death" lectures.

"I'm currently translating a seminar of Derrida's, *La vie la mort* [life/death], from 1974-5, and in it, he says he's going to think about life in relation to the history of biology, but according to a non-oppositional logic," she explains. "So of course I had this in mind, but I became increasingly aware of the pervasiveness of this problem, of trying to escape this oppositional thinking. For example ... the difference between human and animal, and this whole Cartesian heritage of "mind-body" -- or pinpointing a moment of death. I mean, what did they used to do -- they'd hold up a feather [in front of the person's mouth or nose] to see if the person's dead? And now that's become much more complicated, with the technologies we have, to sustain breath, respirators, and to harvest organs - - so there are all these other dimensions." (Susan Leigh Star, 2010; S. L. Star & Griesemer, 1989)

While this translation is not yet published at the time of dissertation submission, I was able to engage with Dr. McCance as conference organizer and as editor of my essay in the *Mosaic* special issue on lifedeath in 2014-2015 (Wiebe, 2014).

19. This is an excellent example of where Lefebvre loses me--descriptions of nature using the language and concepts of inside/outside are not, in my estimation, a particularly good justification for the existence of those concepts in the first place--Lefebvre's circular logic does not work for me, and this sort of appeal to nature is the sort of boundary-making project I detest most. For a counter to this approach, see Haraway's 'nature-cultures' and the work of Anne Fausto-Sterling, discussed in footnotes on Feminist STS.

20. For more on disgust and civilizing, see Elias' *The Civilizing Process* (Wentworth, 2015).

21. As opposed to Barad's onto-epistemology that requires a moment of in-place-ness for entities to come to be, Ingold's cares for where they've all come from and where they're all going: not just a fixed point while in intra-action with other proto-entities (my summary term; not Barad's), but a line-in-the-making along which being happens. As Ingold describes, "every thing is a parliament of lines."

22. A word that Barad, Haraway and others pick up as well.

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23. This notion of openness and “the open” resonates with Haraway’s work on Heidegger’s open as a multispecies affair, and on a tradition of feminism’s imagined alternate possible futures (D. J. Haraway, 2008, p. 78)
24. This shift from treating the outside of the animal as dirty and inside as clean to treating the entire carcass as clean, as FOOD, traces another boundary as well: the transition from animal to edible. While it is alright for animals to have dirty hides and dirty digestive tracts and organs, once all that remains intact is the ‘clean’, ‘edible’ ‘meat’, the animal has transitioned to a new mode of cleanness and the animal has become edible.
25. If you read this and think “gross,” congratulations. You are partially enrolled in the world of the kill floor, where killing dirty animals is clean but nicking a stomach is ghastly. You are learning to discern boundaries like a butcher.
26. This sort of occurrence may require corrective action and a written report describing what happened outside of the HACCP protocol and what corrective action was taken to remedy the wrong and “regain control.”
27. Custom product is considered a service to the owner of the animal, not an act of making food for commerce and therefore not inspected by the USDA nor a state department of agriculture. For further discussion of custom slaughtering, see the discussion of the day I purchased a cow in chapter four on cow muscle cell research.
28. I will discuss these federally mandated control points, part of an oversight program known as Hazard Analysis and Critical Control Points of HACCP (“ha-sip”) in considerable detail later on.
29. Peroxyacetic acid wash is considered to be a ‘natural’ acid to spray on the carcasses. Slaughter plants may use this acid, another acid or a simple hot water wash as the final spray before each carcass enters the cooler.
30. But we know that skin is a selectively porous barrier, allowing hormone-mimicking toxins and known carcinogens in our face creams to enter the bloodstream. And though inside is clean, there are insides within insides that are themselves, again, dirty: here I mean *insides*, the sort you’d have to hold tightly and press back in if someone’s body were sliced down the middle.
31. He defines colonialism as “converting the paths along which life is lived into boundaries in which it is contained,” and making of the world a series of joined-up closed communities. Lines are nothing new to STS or social theory. The spatial metaphor of ‘networks’--actors and entities connected through lines of relationality--is a persistent trope in STS. These lines, in Latour’s analysis, form a tangled web of inter-connection and association. Bowker and Star in *Sorting Things Out* refer to the usually invisible lines or “Lilliputian threads” that connect actors and objects in a social field, made visible through “infrastructural inversion” (Bowker & Star, 1999, p. 34). But Ingold sees these point-to-point line descriptions of social worlds as impoverished understandings of what it means to be living in the world. In Ingold’s work, *meshwork* replaces network to describe sets of interwoven lines, rather than fixed entities with relational threads between them. This ontological framing pulls from Annemarie Mol and John Law’s 1994 essay, which proposes

“fluids” rather than regions or networks as a topology for understanding social worlds and social difference. As they describe, “places are neither delineated by boundaries nor linked through stable relations: instead, entities may be similar and dissimilar at different locations within fluid space... [and] may transform themselves without creating difference” (Mol & Law, 1994, p. 641). Mol and Law describe their ‘fluid’ model as an alternative approach to boundary: “Sometimes, we suggest, neither boundaries nor relations mark the difference between one place and another. Instead, sometimes boundaries come and go, allow leakage or disappear altogether, while relations transform themselves without fracture. Sometimes, then, social space behaves like a *fluid*” (p. 643).

32. “Yet even here, at the one point in the long chain of industrialized killing where the animals are at once sensible and insensible, conscious and unconscious, it was impossible to state categorically that there was a moment when they were dead.” (Pachirat, 238)

33. At least in the plant Pachirat worked in, the first line workers to begin cutting the animal are on an elevated platform and can’t tell whether the animal’s tongue and eyes look dead. They begin cutting whenever the animal arrives without knowing if it is sentient or not (Pachirat, 60).

34. Here I attempt to read Haraway as Haraway often reads artworks: as offering strands for woven storytelling that gets us somewhere. In *The Companion Species Manifesto*, the idea of fleshy meaning making bubbles up out of the practices of intimacy and mis/understanding between a human and a dog. The phrase is, to be precise, “fleshy, meaning-making” (D. J. Haraway, 2003, p. 35). Taking some liberties with punctuation, my colleagues in UCSD’s Science Studies Program used ‘fleshy meaning making’ as an organizing theme for our panel session in conversation with Professor Haraway at UCSD in April 2013.

35. See Helen Macdonald’s essay “Considering Death,” which considers the question of what is considered ‘brain dead’ in humans in the context of the history of heart transplants in the UK in the 1960s (Macdonald, 2014).

36. Many food production companies outside of these categories have also implemented HACCP plans. HACCP is part of the Codex Alimentarius, a set of international benchmarks for food and drug safety, and has been adopted by food companies globally.

37. In early 2010, United States public school teachers became subject to a new sort of competency exam designed to measure not only skills or aptitude but “performance.” This new “performance-based assessment” codified new modes of watching and managing teachers and created new barriers to becoming a certified teacher (Wentworth, 2013).

38. The text of this phenomenal exchange:

Interviewer: Surely not all aspects of socio-cultural life are “incommensurable” or “emergent.” Indeed, some social forms are not precarious at all, but are extremely durable and remarkably hard to change (heteronormativity, race, sexual difference, one’s habitus, one’s habits of desire, for example). Yes, all

of those “things” are constantly in-motion, too, and hence are subject to (potential) change (failure). But it’s not very often that one encounters “radical change” around core aspects of identity and desire. How do you account for the persistent durability of certain social formations like sexual difference and race in your work? I ask becomes sometimes, after reading your work, I come away with the sense that the social world is far more fluid (and, hence, easy to transform) than it may be. Perhaps I should rephrase: Sometimes I wonder if talk about “emergent forms” overplays the “agency” card and elides the very real, violent power of normative regulations that do a wonderful job of quashing emergent forms as soon as they pop up. Does your analysis/writing account for the durability of regulatory norms?

Stewart: Seriously? Foucault and Nietzsche gave us strong conceptualizations of the intimate relations between knowledge and power. In doing so, they focused intellectual projects on the conditions of emergence of new forms that have been built into the conduct of life. The coming into being of forms in the details of daily life moves beyond the tired, grinding oppositions of fabulated/real, structure/agency. Structure is prismatic. It takes place as singular events saturated with everyday violence. It is not just violence, in other words, that is the event of power but much less dramatic, equally devastating forms. Politics is not reducible to a communal consciousness or a neatly conceptualized ideology but takes place as intensities of all kinds and in various registers. Agency is not the clear and intentional act of a subject but an energetics. Instead of attending to the opposition of categories, ethnographers might try to hold attention to the pressure points of the compositionality of life in situations of all kinds. This is where new structures of attention already being laid down in microbiopolitics, new sensory registers, and the systematic engineering of affect are begging new political question. Anthropologists could help us attune to what’s happening in the lived frictions of knowledge and power. But that means giving up a flat world seemingly somehow simply imprinted with concepts, categories, and normative orders. (Stewart, 2012)

39. “If risk and taboo turn out to be equally engaged in protecting a vision of the good community, whether it is a vision of stable continuity or of sustained radical challenge, I will have achieved my original intention.” (Douglas, 2005, p. xx)

40. The notion that the contemporary “anthropocene” era is marked by a politics of competing visions of the future and perhaps a rethinking of the relationship between past present and future is raised in both the sciences and social sciences in 2015 publications. In the introduction to the annual *Annals of the Association of American Geographers*, Bruce Braun (2015) invokes Benjamin’s angel alongside Latour’s notion of the future as that which is approaching us (2015) to mark a shifting relationship with time and the future in the anthropocene. Today, writes Braun, “we increasingly experience time coming toward us, from the future to the present.” We are living, as Latour claims, in “apocalyptic times.” Meanwhile, scientists recognize competing

visions of the future as the stuff upon which research agendas will be and must be built (Bai et al., 2015).

41. From e-mail communication with Donna Haraway (D. Haraway, 2014)

42. Aristotle, in the first pages of *Categories* writes, “knowledge is present in the human mind” (Aristotle, Ross, & Smith, 1908). Philosopher Clinton Tolley has guided me to the right conversations in Aristotle’s oeuvre and to contemporary philosophical works on meaning.

43. Heidegger describes the concept of standing forth in Introduction to Metaphysics (2000): “This emerging and standing-out-in-itself-from-itself may not be taken as just one process among others that we observe in beings. *Phusis* is Being itself, by virtue of which beings first become and remain observable. ... *Phusis* is the event of *standing forth*, arising from the concealed and thus enabling the concealed to take its stand for the first time.” (11-12)

44. In most plants I’ve visited, even those with very small staffs, sausage-making and cured cuts (bacon, hams, etc.) was the domain of another worker or several. Often, the owner is the one supervising this work or doing it himself, experimenting with new seasoning combinations and manning the smokehouses. In one plant, a female manager was the head of sausage, and in another, the workers all traveled from the kill floor to whatever the day demanded – cutting, grinding, curing –together. In the upper Midwest, pride in sausage and cured products was not unlike the cult of BBQ in Texas. This simple combination – time, heat, salt and meat – carries a smoking allure, connecting masculinity to a sense of past, pride, and the good life. Smoking meats is seen as noble work, work that men stay away from their families to keep watch over, driving in the middle of the night or early morning hours to check on the bacons (in Minnesota) or briskets (in Texas).

I wonder what makes these hearths still masculine today, places men can get away to undisturbed and without criticism. What, similarly, makes taking care of animals a masculine project, while taking care of one’s own children could never be. One young inspector-turned-butcher described his father as a workaholic: a cattle farmer who was more likely out in the barns than home with the family morning, noon, or night. In another plant, the owner and patriarch of the family would come into work even on his one day off each week. Go home! His wife and kids would shout from the cutting room, but he would stay, getting extra work done in the office, doing the microbial sampling he needed to finish, or catching up with customer orders.

45. The Pipestone Meat Cutting Program operated in Pipestone, MN as part of the Minnesota West Community and Technical College. After several decades, the program closed in May of 2006 due to declining enrollment. The meat processing instructional spaces were designated in 2010 to be converted from tiled butchering rooms into “instructional television” (ITV) and computer lab spaces (Kuphal, 2010).

46. Or more precisely the conjoining of butcher-knife *knows*, as I’ll describe in the final section of this chapter.

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47. The scholars I cite in the “San Diego school of semiotics” footnote are credited for this mode of analysis, particularly Cristina Grasseni’s “*Learning to See Like a Cattle Breeder*” (Grasseni, 2009a).
48. See section on boundary work between life and death.
49. They actually are not useless at all in many countries and markets, but in the slaughterhouses I’ve spent time in, federal regulations (lungs are never approved for human consumption in the USA) and local eating preferences (tripe and brain are delicacies in French, Mexican, and some Asian cuisines, but less popular at these white-owned Minnesota meat markets) make these parts meaningful as “offal” – passed to the inspector then dumped into the offal bin for a rendering company to come pick up and render/process into byproducts.
50. See Anna Starshinina’s doctoral work in progress (UC San Diego 2016) on stabilizing objects of study; see also our collaborative work in progress on the nature of animal models.
51. What about meat facilities- is that an establishment number and grant of inspection too? I think so – so is it approval to engage in commerce?
52. Any time an elk over 12 months of age dies, its body must be tested for Chronic Wasting Disease, a prion-caused illness (like BSE) commonly found in *Cervidae* animals including elk. Inspectors in Minnesota send tissue samples to the Minnesota Veterinary Diagnostic Laboratory at the University of Minnesota so that the state Board of Animal Health can continually monitor incidents of the disease within the state. According to the submission form that accompanies these tissue samples, there is an option of sending lymph node, brain stem, or whole head in to the lab for testing. (<https://www.bah.state.mn.us/deer-elk>)
53. I engage some of the complexities of the question of good meat in the conclusion.
54. Estimated at \$100 million annually or nearly a dollar for each pig (according to the national pork checkoff’s summary of research findings) See <http://porkcdn.s3.amazonaws.com/sites/all/files/documents/Factsheets/PorkScience/Q-UTILIZATION%20OF%20PSE04671.pdf>
55. This experiment was being set up on the day I visited one small meat processor. The owner and I sat next to each other in butchering night class so I got to hear a bit more about the study as it unfolded.
56. As I’ll describe later, these cow thigh muscle cells are frozen then defrosted to become in vitro models of cows-on-growth-hormones.
57. Thanks to Martha Lampland for introducing me to the less Jewish form of this expression, claimed by Americans and Eastern Europeans as their own.
58. I have made the slightly odd choice here to introduce Butler through her early essay on gender performativity (Butler, 1988) with later reference to the two books that are better-known articulations of the argument. I do this partly for ease of analysis, but also because I find the early article to be an ideal description of how she gets where she is going, analytically/philosophically speaking. The essay, as opposed to both books, has more of its bones showing, and is a condensed articulation of some of the key ideas she presents in more detail later on.

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59. “We might want to claim that what persists within these contested domains is the “materiality” of the body. But perhaps we will have fulfilled the same function, and opened up some others, if we claim that what persists here is *a demand in and for language*, a “that which” which prompts and occasions, say, within the domain of science, calls to be explained, described, diagnosed, altered, or within the cultural fabric of lived experience, fed, exercised, mobilized, put to sleep, a site of enactments and passions of various kinds.” (1993, p. 67)
60. Geoffrey Hughes described this scene to me in person and later shared his field notes from that day.
61. These dates are derived from the time of the first major slaughterhouse opening (1818) in Cincinnati to 1861-62, when Chicago overtook Cincinnati in hog production (Cronon, 1991).
62. Today, simple machines like pulleys and hooks that attach to wheels on overhead rails are necessities even on small kill floors like the ones I’ve visited. A non-mechanized but permanent infrastructure creates a fixed line (the rail) along which an animal’s body moves. The technologies for efficient production developed in mass slaughter are employed even for slaughter on a small scale.
63. Barrett, in his history of Chicago packinghouse workers cites 1908 as the year that Armour introduced the moving conveyor regulating the pace of slaughter and disassembly (Barrett, 1990, p. 26).
64. Olds of Oldsmobile may have developed an assembly line in 1901-1902, quadrupling his production numbers. Other industries also worked in distributed space-skill structures, including some shipbuilders who followed a model where the ship moved down a canal, stationing at each artisan shop where teams could work on it in progression.
65. Though we do have a good sense of Ford’s disregard for women and for most men as incompetents incapable of working enough to feed their own families while a skilled intelligent elite class of worker could do higher-level engineering and structural work, enough to support exponentially more.
66. Ford famously eschewed hierarchical working structures and titles, and instead employed a system that he believed made every man personally responsible for work results. He claimed that his approach to mass production did not deskill the labor force but instead added skilled jobs: the higher-level work done by engineers, machine builders and systems planners. Ford believed that most workers were not skilled and never could be as skilled as the machines that a few good men could build. Ford was beneficent in some respects – increasing workers’ wages, hiring blind and deaf workers. But he was far from egalitarian – he believed most men are incapable of making enough to trade to meet their basic needs while a select few others can do far more. He hired women during WWII but fired them all after they went on strike demanding equal wages to men.
67. I describe 4-H a bit more in the following section.
68. “They said I’d feel a lot of emotions when you raise a steer for six seven months for slaughter because you get so close to it, that’s the only steer you have it’s not like a

farm where you have hundreds... so I guess I just went in with the mentality I'm raising this for meat. It's not a pet it's not a dog for me; they're for food. So that's just the mentality that I have...it's hard to grasp that if you don't already set your mind to it...it's just the mentality that I think you have to switch on in your brain." (from anonymous audio interview 4/28, file 15).

69. the first paragraph continues, "The challenges to be met go beyond research into enhanced animal agricultural productivity. Research will be required into how to anticipate and meet significant changes in the global environment impacting on animal agriculture, how to improve equitable distribution of animal agricultural products today and in the future, and how best to improve engagement and respectful bidirectional communication between those engaged in animal agriculture and the public. Ensuring sustainable agricultural growth will be critical to addressing this global challenge to food security."

70. See also the public website for the Sustainable Beef Roundtable <http://www.usrsb.org> and reporting on their activities (Cronon, 1991, p. 230).

71. From personal communication (Scott, 2015)

72. I see it when she takes off her apron and lab coat to go to her car to retrieve a worksheet and sample collection materials for reporting on slaughtered elk to the Minnesota Board of Animal Health.

73. See my discussion of campylobacter 'the wimp' and other caricatures of microbes in the section on managing lives and HACCP training.

74. Anna Starshinina pointed me to the issue of the distribution of risk in her comments on an earlier draft of this work.

75. <http://igrow.org/livestock/pork/the-impact-of-pedv-continues-to-grow/#sthash.M26KMHSd.dpuf> Bob Thaler, PAS December 26, 2013. Accessed August 11, 2015.

76. 4-H is a national organization with agricultural education roots, committed to fostering positive youth development. The 4 Hs in 4-H are head, heart, hands and health. As 4-H members pledge, "I pledge my head to clearer thinking, My heart to greater loyalty, My hands to larger service, and my health to better living, for my club, my community, my country, and my world."

77. I take liberties here with Haraway's push to examine "bodies in the making, not bodies made" (D. Haraway, 1994) as a grammatical figure for thinking about culture as emergent through interaction and practices: culture as enacted through performance, what Katie Stewart calls "cultural poesis" – perhaps not coincidentally in an article published the same year (D. Haraway, 2014).

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