

Freie Universität Berlin
Department of Political and Social Sciences
Master of Cultural and Social Anthropology
Summer Semester 2023

Master Thesis

An Abattoir as a Multispecies Dwelling in Central Nigeria

Hellena Debelts

First Examiner:

Dr. Marcos Freire de Andrade Neves (Freie Universität Berlin, Germany)

Second Examiner:

Dr. Almudena Marí Sáez (L'Institut de recherche pour le développement (IRD),
France)

Abstract

This work investigates multispecies dwelling arrangements in an abattoir (slaughterhouse) in central Nigeria. The abattoir space, surrounded by dense settlement, comprises a slaughterhouse, slaughter slap, a lairage for small and big ruminants, markets, a mosque, prayer rooms, and other service points. Humans and their farmed species are not the only ones occupying the space. They are joined by many semi-domestic and wild animal-others – from dogs to rodents, cats and lizards, mosquitoes, flies, and many more. The multispecies inhabitants of the abattoir make different use of what they find in constant dynamic renegotiation with the other co-dwellers, materials and outside influences. Countless microorganisms populate these bodies, fluids, open soil, the concrete of the kill floor, air, and other materials. Thus, pathogenic infection, transmission, disease and health are embedded in this complex web of living arrangements. To shed light on these shifting socialities and their potential consequences, I adopt a comparatively novel analytical framework to investigate an abattoir, adding new perspectives to a large body of literature on the global meat industry. Through the utilisation of the dwelling perspective and by leaning on Tim Ingold's meshwork-thinking, I approach the abattoir in a multispecies way in which no entity is distinct by itself. I show that, even though meshwork-thinking is rather phenomenological and offers little prescribed methodology, it gives tools to investigate open-ended and emergent entanglement in the texture of this lifeworld. In three comprehensive chapters, I address the central research question of what multispecies co-habitation in this abattoir can mean and how people and other species affect and relate to one another along meshwork traces from different angles. As part of that, I explore different temporalities, proximities, and specificities in moving entanglements of species with each other, the dwelt community of the abattoir, and interconnecting forces within shared space. I highlight that all cannot be separated and that action, knowledge, emotion, practice and perception emerge out of entanglement in close co-habitation. Furthermore, this thesis illustrates the dynamic, non-linear and perpetually evolving nature of these processes, which react to social, political, economic, temporal and environmental forces like the daily circle and the seasons.

Table of Contents

Abstract	II
Table of Figures	IV
Abbreviations	V
Acknowledgements	VI
Preface	1
1. Introduction	3
1.1 <i>Research Context</i>	5
1.2 <i>Research Question</i>	10
1.3 <i>Structure</i>	12
2. Study Context and Methodology	15
2.1 <i>Applied Methodology</i>	15
2.2 <i>Positionality</i>	19
3. Topography of a Multispecies Dwelling	21
3.1 <i>An Abattoir as a House of People</i>	21
3.2 <i>Multispecies Dwelling in an Abattoir</i>	30
3.2.1 <i>Meshwork Threads of Soil and Flies</i>	35
3.2.2 <i>Multispecies Agency and Attentiveness</i>	40
4. Temporalities of Attentiveness and Disregard	44
4.1 <i>Co-Habitation of Day Hawkers and Night Owls</i>	44
4.1.1 <i>Multispecies Thread Proximity and Specificity</i>	49
4.1.2 <i>Blurry Co-Domesticity</i>	53
4.2 <i>Intensities in a Multispecies Peri-Domestic Meeting Place</i>	57
4.2.1 <i>A Mosquito Meshwork</i>	59
4.2.2 <i>(In-)Visible Traces along Multispecies Pathways</i>	62
5. A Fluid Niche	68
5.1 <i>Entanglement in an Abattoir Backyard</i>	68
5.1.1 <i>Canine-Abattoir Threads</i>	71
5.1.2 <i>Zoonosis-as-Emergence and Blind Spots in Multispecies Entanglement</i>	74
5.2 <i>A Niche for Multispecies Muddles</i>	77
5.2.1 <i>Sympoiesis in Multispecies Muddles</i>	78
5.2.2 <i>Scalability of Meshwork Traces</i>	82
6. Conclusion	85
6.1 <i>Limitations</i>	89
6.2 <i>Outlook</i>	91
Appendix	94
References	95

Table of Figures

Figure 1: Map of the abattoir (sketch by the author).	22
Figure 2: Evening in the abattoir. Fabrics lie on the floor next to the slaughterhouse, spread there by women to sit on. In the back dinner is cooking on small improvised firepits in front of the slaughter slap, visible through faint rising smoke.	26
Figure 3: Dinner cooking in front of the de-furring, blood boiling and slaughter slap side.	26
Figure 4: Rodent burrows at the blood boiling site towards the streambed. Blood chunks are drying on planes above the burrows and next to it are huts where workers of this site sleep or store work materials.	30
Figure 5: Slaughter slap and de-furring site behind the slaughterhouse. The small ruminants in the front are de-furred already, their fur burned off from the fires in the chimney. The others in the back wait for de-furring... ..	38
Figure 6: The entrance to the slaughterhouse.	39
Figure 7: The kill floor of the slaughterhouse. Fluids and bodies entangling in activities.	39
Figure 8: Ram shed with a bench in the back on which people eat, wait, rest or sleep.	45
Figure 9: A dead rat at the blood boiling side.	48
Figure 10: Process of dissecting a caught shrew in full body PPE (photo by a colleague).	50
Figure 11: Mental map by the market seller I.A.18.	51
Figure 12: Left photo shows the empty market in the evening, after the workday is over. A chicken is roaming down the alley. Right photo shows the inside of the slaughterhouse with remnants of a late slaughter in the evening that will be cleaned the next morning.	52
Figure 13: Semi-domestic chicken roaming in the market around feet or through cattle body parts on display on the market floor. These chickens are owned by people and at one point killed and consumed.	55
Figure 14: Small ruminant lairage during rains. The domestic animals are put under the cover of sheds where people also spend their time.	57
Figure 15: Photo above shows the flooded lairage. The second photos shows a young cattle on a dryer patch. Its body market by the ground.	58
Figure 16: Drainage in the process of being emptied: A cleaner is pushing the water to flow down into the stream. Through the movement a cloud of insects is flying above the water.	62
Figure 17: Condemned body parts from the slaughterhouse after a workday ready to be burned in the streambed.	68
Figure 18: My interlocutor I.A.17 in the daily process of incinerating disposed bodies and body parts of abattoir activities.	69
Figure 19: Photo above, roaming dogs licking up remnants from a late slaughter at the slaughter slap and de-furring site. Lower photo, dog gnawing on left-overs of the incineration site in the streambed.	72
Figure 20: Carcass parts around the streambed.	73
Figure 21: Decomposing fluids and materials with maggots crawling in them.	77
Figure 22: Photo on top: Multispecies mingling of a goat, a dog, and flying birds around the incineration site. Lower photo: The dung pit in the streambed with birds searching for food and rising smoke from the incineration site behind.	79
Figure 23: Main drainage spilling its contents into the streambed, digging a path into the ground until it reaches the stream.	83
Figure 24: The streambed water mixing with abattoir effluents. Over the surface small black birds chase insects.	84

Abbreviations

BTB	Bovine Tuberculosis
FLI	Friedrich Loeffler Institute
HCW	Health Care Workers
NCDC	Nigerian Centre of Disease Control
NVRI	Nigerian National Veterinary Research Institute
PHC	Primary Health Care
RKI	Robert Koch Institute
SSA	Sub-Saharan Africa
VHF	Viral Haemorrhagic Fever

Acknowledgements

All work is collective and it would not have been possible without all the wonderful, open, friendly and patient people that welcomed me into their daily lives in the abattoir. I am deeply thankful and happy to have met so many amazing and welcoming people during this time.

I am also grateful to my supervisors Almudena Marí Sáez and Marcos Freire de Andrade Neves. Your guidance, expertise, and mentorship have been crucial in the direction and quality of this thesis. Your valuable feedback, discussions, and continuous support have been refining my research and strengthened the overall thesis.

To Carlos Rocha, I extend my deepest appreciation for your insights, constructive criticisms and our thought-provoking discussions. It is here that I also want to express my appreciation to the ZIG for making this research possible. To the M4 project team, it has been an exceptional experience that went beyond bounds of colleagues. Together, we explored new interdisciplinary working methods and continuously enriched our scientific expertise. Your open and friendly spirits and dedication have made this project journey special and hard to live up to in future projects. I am lucky I had the chance to enter professional work life with you by my side – with room for errors, doubts, and exploratory first tries.

Preface

Like many days before, I arrive at the abattoir at 7 am in late dry season. I watch exhausted and weak cattle being offloaded from a truck coming from a Northern Nigerian livestock market and then walk through the lairage into the meat market. Small shops for vegetables, dried fish, and other groceries are set up and ready for customers to be sold. Other wooden tables already have a bit of meat on them for display. Butchers are hacking quarters of flayed cattle carcasses, fresh from slaughter, into smaller pieces with axes and machetes on their tables. Bone splinters are flying through the air. Flies are already very active and cover meat, intestines, tables, and other food. I enter the slaughterhouse through one of the open doors. Inside it is full with people and dying or dead cattle. The coarse-pored paved floor is slippery with a brownish mixture of water, blood, dung, soil, and other fluids, in-between are red spots of stomach parasites and undigested corn. It is full in the slaughter room. Cattle are dragged in on their feet, then pushed and tied on the ground to be slaughtered. It is all happening one animal next to the other in different stages of the slaughter process performed by the many butchers. Other people come in and out – chat, eat, drink, wait for their orders. After some time, I walk out of the slaughter room through the open back door to see over the black blood boiling, de-furring and goat slaughter site. Black smoke rises from small chimneys where men de-fur small ruminant carcasses by pushing them in the fires of the chimneys. Goats are slaughtered, blown up through breath into a cut of one hind leg, de-furred, afterwards washed in black water of a washing basin, and then gutted. Two men blow out one white gut after the other with their mouths to wash them in buckets filled with clear water. In-between these activities people come and go. Some toddlers and small kids play around in dry drainages or on the dusty ground. Behind these activities is the streambed, where abattoir workers dispose of the stomach content from slaughter next to where the carcasses and body parts are burned and the drainages spill out their mix of fluids. Birds, goats, and dogs roam there. Time goes by. In the lairage, some customers come to look at domestic animals on display, negotiate prices and time of slaughter. Early afternoon men go to prayer in clean clothes while other workers start to leave. The prayer room at the lairage in-between small and big ruminants is full of worshippers. It is above 35 degrees. The humans and remaining more-than-human animals around me move as little as possible or try to come together in available shade from wooden sheds where workers rest on benches or woven mats on the floor.

In the evening the market is still lively but not busy and people as well as animal-others seem to enjoy the calmer temperatures. I go around different abattoir sections. One Mallam is relaxing on a chair in front of the veterinary office chatting with friends. The rusty metal gates of the slaughterhouse are closed. Drying work clothes and boots lie on the ground and over the outside walls of the abattoir. Black plastic buckets stand filled up with water all around, ready for the next day. Some pigeons drink and bathe in them, some dogs and goats pass by, also drink from them, and then continue roaming around. A toddler is blowing bubbles in the water of one of the buckets. The dusty soil is cleaned of plastic, leaves, and other collectible remnant of daily abattoir business. Some women cook in front of the black slaughtering hills with metal pots on small improvised firepits. Children play around and laugh while some girls still carry buckets on their heads with last deliveries. Women sleep on mats, others chat or braid hair. One animal health inspector sits in front of the office and listens to a small radio. While going down the path to the blood-boiling section I see a big rat in a drainage. A cat walks slowly over a wooden roof further back. In the adjacent shed, two men sit next to a steaming metal pot on a fireplace, smoking and talking, while waiting for their dinner to be ready. Close by, a group of dogs, owned by abattoir butchers, lick up sticky red blood from the black, dusty floor. The blood comes from a late slaughter on the hill where animals are de-furred in the flames of the small mud chimneys. A roaming goat and her kid pass by, also on their search for eatable leftovers. In the market section, most tables are already empty, some are clean or in the process of being scrubbed, while others still have residue on them. Flies cover them all. People come and go and carry food or water with them. Many domestic animals in the lairage lie down and look around while slowly ruminating. I see a worker standing next to a young cow stroking its back. Further back, a young man leans on the sidewall in the dark entrance to an unused brick building with a dog in his lap in warm evening light. The overall atmosphere is a strong contrast to the hot conditions and rough and hectic mood of the day. The speakers of the small mosque between the slaughter hall and the market start to carry evening prayers in every corner of the abattoir grounds. It is getting dark and while I am leaving people are starting to eat in clean gowns. They sit in groups surrounded by resting or roaming more-than-human animals – chatting, drinking, eating. I see some small bats and birds flying through the evening air in little remaining light. The roofed market area is almost empty in dim light, as electricity is off again. And on my last meters, one ankle itches from a new mosquito bite.

Field journal, dry season

1. Introduction

“We come messily from a motley. Indeed, we literally come from messmates and morphed diseases, organisms that ate and did not digest one another, and organisms that infected one another and killed each other and formed biochemical truces and merged.”

Augustin Fuentes (Sagan 2011)

Human life is deeply entangled with other species of different sizes. From microbes in our guts to companion species we keep close, to insects, lizards, and small to bigger mammals in our houses, gardens, cities, plantations, or remaining nature reserves like forests, to farmed species we raise and kill for consumption. Without most of these interconnections, human survival would not be possible. Everything is entangled in a delicate web, constantly re-negotiating symbioses, assimilation, or domination. Multispecies' lifeworld realities are messy and complex, never standing still, but evolving through their entanglement. As Donna Haraway (2008) notes, it is foolish to believe in human exceptionalism, as all life on earth is interdependent. Then becoming human “is a process of becoming with others – indeed, our bodies are to a large extent made up of microorganisms” (Ginn et al. 2014: 114). This means that human health is an interspecies and planetary matter. It is therefore also a complex matter, interconnected with a multitude of factors and multispecies actors. To understand it, we must acknowledge that today, human nature is an interspecies relationship on a damaged planet in the Anthropocene (Tsing 2012: 144) and that humans cannot exclude themselves from the larger ecological community of this world.

Microbes – bacteria, fungi, viruses, parasites – that inhabit and surround ourselves, other species, and the environment are often to our benefit or easily controllable in their effect on bodies or surroundings. However, they can be transmitted between species and sometimes become pathogenic for some species. When an infectious microorganism is transmitted from another vertebrate species to a human or vice versa it is called zoonosis with the transmission process often called a “spillover” (Lynteris and Keck 2018: 21-22). These transmissions can happen in most mundane moments of daily domestic life or in moments of intense entanglements between species in farms, markets, or during slaughter. The impact of zoonotic diseases can be devastating on human and other species' health, livelihoods, and economies, with the COVID-19 pandemic of the past years being only the most prominent recent

example.¹ Thus, multispecies mingling as well as sociality in diverse contexts can be beneficial, fascinating and celebrated but it can also be dangerous (Brown and Nading 2019: 6).

In the midst of human encroachment and a rapidly expanding global transportation network, diverse species increasingly find themselves crossing paths. This creates new arenas of multispecies and microbial entanglement and continuously connects local with global contexts and in reverse (Aronsson and Holm 2022: 25-26). As part of that, pathogenic microbes and zoonotic diseases highlight negative health effects that result from entanglement of different lifeworlds and the extent to which different species come to hang together. However, it is important to recognise that there is not a simple biological continuum from transmission to disease to death, but rather a complex situation that demands precautionary measures (Keck et al. 2021: 7). This means that it is critical to understand mechanisms that facilitate zoonotic pathogen circulation and factors that contribute to new emergence in order to improve prevention, preparedness, and response efforts in public and global health. Bardosh et al. (2016: 93) emphasise that zoonotic diseases require a focus on distinct spatial and temporal relations between humans, animal-others (domestic, wildlife, and micro-organisms), and their ecologies within changing environments. This focus adds complexity to national and global disease surveillance and control efforts, as transmission processes of zoonotic diseases involve diverse routes and interactions between humans and other species. In more detail, from direct or indirect contact with infected species, to exposure to particles in the air or in food and water, transmissions of zoonotic pathogens can be influenced by a myriad of factors (Lainé and Morand 2020: 3).

Our understanding of factors that lead to infection or transmission of pathogens is still limited, new emergence is mostly unpredictable, and their spread is dependent on complex interspecies mechanisms. To gain better insights of how pathogens are transmitted between different species and to unravel complexities of multispecies coexistence, we require more comprehensive data: veterinary or human medical data of lab results, for example, are not enough to understand processes of transmission outside artificial lab situations.

¹ The most recent globally prominent example of zoonosis is the COVID-19 pandemic caused by the SARS-CoV-2 virus. It is the result of a spillover from a yet-to-be-determined animal reservoir to humans (Lynteris 2023: 1). Zoonotic diseases account for a significant proportion of known infectious diseases, with estimates suggesting more than half of known infectious diseases and even more of new or emerging infectious diseases (EID) are zoonotic in nature (Lynteris and Keck 2018: 20-22).

Anthropological knowledge production and theoretical frameworks can offer valuable insights into lived realities of humans interacting with other species. By examining these complex relationships in detail in different contexts, ethnography can shed light on various lifeworlds. This understanding can contribute to the development of more effective strategies for promoting healthy ecosystems and preventing the impact, spread, or emergence of diseases (e.g., Brown and Nading 2019, Lynterin and Keck 2018). Thus, the focus of this thesis lies at intersections of critical medical anthropology and multispecies ethnography about multispecies co-habitation in an abattoir located in a satellite town of a major city in central Nigeria.

1.1 Research Context

I came to do ethnographic fieldwork in the abattoir and in an adjacent primary health care (PHC) facility for three months as a student assistant in medical anthropology at the Centre for International Health Protection (ZIG). ZIG is part of the German public health institution, the Robert Koch Institut (RKI). Together with the Nigeria Centre for Disease Control (NCDC), the Friedrich-Loeffler-Institut (FLI) in Germany, and the Nigerian National Veterinary Research Institute (NVRI), I was one of two anthropologists doing fieldwork in Nigeria for interdisciplinary research with the aim to strengthen public health systems through a One Health approach.²

Zoonotic diseases are a significant and growing public health concern in Nigeria (Nigeria Ministry of Health 2019).³ As part of that, the focus of the One Health project was the multispecies and environmental dimension of zoonotic pathogens and diseases, especially

² The interconnected triad of human health, other species' health, and environmental health builds the conceptual framework of the One Health agenda (Keck and Lynteris 2021: 5) that is part of the initial project conceptualisation. According to One Health, each of these three dimensions is profoundly affecting the other. They blur into one another and should not be seen as separate entities (Bardosh et al. 2016).

³ The population of Nigeria is rapidly increasing and it is estimated to more than double by the year 2050, which will position Nigeria as the world's third most populous country after China and India (Pona et al. 2021: 2). National public health systems continually expand and grow, however, limited resources for outbreak response and surveillance persist, while frequent disease outbreaks exacerbate the challenge of safeguarding public health in the country (Adesina et al. 2021: 111-112). Factors such as population growth, climate change³, and poverty are expected to further strain the health system (Okolocha et al. 2021: 35). These factors drive, in turn, human encroachment, thereby increasing the burden on dynamic multispecies environments and existing infrastructures. This results in greater exposure to diseases and risks of pathogen circulation between humans, domestic animal-others, wildlife, and the environment in a national health system that struggles with limited means to respond to disease emergences or outbreaks (e.g., Gibb et al. 2014).

SARS-CoV-2 virus and COVID-19 disease. However, the research focus of this thesis is not on the original project scope of COVID-19 and the One Health agenda. I do not focus on one pathogen or embed my research within a global conceptual research and governing agenda. Both are the focus of forthcoming joint project publications. Therefore, I include One Health and respiratory diseases in the conclusion and present ideas of potential use of my research results for these contexts in a final outlook to upcoming work. Further, I focus solely on my research in the abattoir, without elaborating on specific data from the PHC or veterinarians.

Coming to the research place, the abattoir is situated in a satellite town roughly a dozen kilometres east of a big city. It serves as a central abattoir for the city due to its proximity, revenue, and the number of animals slaughtered per day. It is operated by the Ministry for Agriculture and supplies meat as well as live animals not only to the city but also to other customers in the state and neighbouring states. Between 100 and 150 big ruminants (cattle, rarely dromedary) and 300-600 small ruminants (goat, sheep, ram) are slaughtered there daily, varying by season and weekday. All killing is done halal⁴ with a throat cut on the floor by Mallams⁵. Further slaughter is manual work. By the time of research, the abattoir management employed four veterinarians, nine animal health workers, five administration and accounting staff, as well as five Mallams. In the butcher union were 50 registered butchers who each employed up to 10 workers.

The basic abattoir structures were built in the mid 1990s but came into high function when the previous main abattoir of the municipal city moved to its current location in the satellite town in early 2000s. It consists of a slaughterhouse, a slaughter slab, a wide cattle lairage and a smaller lairage for small ruminants with stables. There is also a loosely roofed market area. The abattoir is embedded into an extensive and complex local, national, regional, and even international web of multispecies contacts and supply chains: it supplies private customers as well as supermarkets, restaurants, and farms with products. Domestic ruminants arrive at the abattoir from various states in Nigeria and neighbouring countries such as Niger, Mali, Sudan, and Cameroon. Finally, the abattoir also functions as a transshipment point for livestock

⁴ Halal is a term that applies to the kind of animals and the conditions of how animals are slaughtered as well as how meat is prepared following Islamic Law. Following Mazhary (2021), it “is an Islamic legal concept, in this context referring to what is made permissible to eat in Islamic scripture.”

⁵ In Islamic West Africa a Mallam is a title for a man that is learned in Koranic studies with the word origin from Hausa language (Dictionary 2023).

transported from big Northern markets in, for instance, Kano, Mubi, Sokoto, Kebbi, and Kaduna all the way to southern cities such as Lagos or Port Harcourt.

Abattoirs, as integral components of the meat industry, are designated facilities authorised and registered for the sanitary handling and examination of livestock, their slaughter, and the subsequent processing of meat products (Alaji and Baiwa 2015: 29-30). These measures aim to ensure the preservation of meat products prior to their distribution for human consumption in the public sphere (Timothy et al. 2019: 2, Borkfelt 2022: 1-5). In the realm of live animal holding and slaughter processes, abattoirs serve as sites where humans and farmed species converge. Within this context, the meat industry has been involved in numerous instances of multispecies disease outbreaks, revealing intricate connections and consequences of such interactions. The COVID-19 pandemic has shed light on the significance of these outbreaks (e.g., Segata et al. 2022). Similarly, repeated occurrences of avian influenza outbreaks (e.g., Keck 2020) and the recurring need for mass culling (e.g., Lederman 2022) emphasise the industry's involvement in far-reaching multispecies health crises.

Further scientific research associates abattoir activities with a wide range of diseases, such as pneumonia, diarrhoea, asthma, typhoid, respiratory and chest diseases, and E.coli infections (Bello and Oyedemi 2009: 122-123). These diseases possess the capability to disseminate from diverse organisms present within an abattoir to adjacent neighbourhoods, facilitated by movement of bodies or release of various abattoir residues such as faeces, tissue remnants, blood, fat, intestinal contents, animal trimmings, and urine into surrounding environments (Moreroa-Monyelo and Basitere 2022: 12). These outbreaks and disease occurrences are embedded in characteristics of other known problems in the industry, ranging from precarious work conditions, high numbers of vulnerable groups of ethnic minorities or migrant workers, health risks associated with the handling of raw meat and other (contaminated) body fluids, exposure to chemicals and emission of air and water pollution. As Segata et al. summarise, the meat industry is constantly producing human-made “unhealthy ecologies that contribute to emerging pathogens and constitute a scenario of chronic destruction and exploitation that makes people, animals, and environments sick” (2022: 399).

Functional requirements of these workplaces entail specific spatial provisions – including areas for holding domestic animals, storage spaces for feed, loading and unloading sites for vehicles, a dedicated space for slaughter known as the kill floor, areas for cutting, processing, storage and packaging of meat products, as well as designated sites for waste collection. Notably, the works of Blanchette (2020), Pachirat (2011), Segata et al. (2021), Wentworth (2016), Ribas (2015), and Anderson (2019) offer diverse insights into industrialised dynamics of sites in this agribusiness. They explore themes such as the concept of industrialised animality and the "factory farm"; politics of distance and concealment in industrialised slaughter; unhealthy ecologies in Brazilian frigoríficos⁶ in relation to COVID-19; experiences of slaughterhouse workers and lives of immigrant workers in the slaughterhouse industry; and concentration of power, exploitative labour practices, environmental degradation, and commodification of farmed animals in the American meatpacking industry. These scholarly investigations highlight both commonalities and very different characteristics in the performance and entanglement of the global agribusiness when compared to the specific context of this abattoir. However, none lays a focus on multispecies entanglements beyond humans and farmed species.

In the preface, I introduced this thesis with a vignette of my field journal from the abattoir. This snapshot starts to illuminate intricate interconnections of activities between humans, multiple other species and spatial dynamics of the abattoir. Within the meat industry, relationships involve meticulous control and manipulation of diverse forms of multispecies existence and mortality. However, the preface showed a web of entanglements in multispecies assemblages that go beyond imaginaries of relationships and activities of animal husbandry and slaughter elaborated above. The abattoir serves as a shared space for both humans and a multitude of other species apart from domesticated ruminants in a local context of the global meat industry.

Like this abattoir, there are many more or less similar abattoirs around Nigeria and other African countries (Olawuyi et al. 2020: 108). However, in-depth social science research in these abattoirs is scarce, particularly outside highly mechanised or industrialised contexts. In

⁶ According to Segata et al. (2021: 387), the meat industry in Brazilian Portuguese is commonly known as the "cold storage industry" or "cold storage houses" (frigoríficos), due to the low temperature required for food safety purposes.

contrast to the aforementioned ethnographic accounts, many African countries have abattoir infrastructures that are less centralised, controlled, and mechanised. Consequently, these abattoirs heavily rely on manual labour throughout the production line (Bardosh et al. 2016). Moreover, there is a dearth of in-depth ethnographic insights into these abattoir settings. Existing research primarily focuses on slaughter processes and relationships among human actors within the local industry (Ameso et al. 2017), working conditions, hygiene practices, and interplays between domesticated animals, individuals, and a selected pathogen or host along the supply chain that can spread to the vicinity of abattoirs (Thompson 2018).

A literature review reveals that many scholars in social science research in these settings point out that studies of slaughter facilities in “middle- or low-income countries” are mostly epidemiological and predominantly underline potential of these facilities as disease amplifiers (Bardosh et al. 2016: 95). While this is important it is also simplifying real-life complexities. In this regard, most studies refer to dimensions of interspecies labour and sociality in narratives surrounding “low knowledge”, “low-risk perception and hygiene practices”, “uncooperative behaviour”, or “negative attitude” of butchers, “very poor inspection procedure” of veterinary staff and “inadequate infrastructures” (Odetokun et al. 2018, Olawuyi et al. 2020, Ibrahim et al. 2021, Okpala et al. 2021, Odetokun et al. 2022).

The findings, from ethnographic accounts of the American meat industry to epidemiological foci in African abattoirs, reveal a wide gap in understanding multispecies entanglements in local contexts. This underlines a need for in-depth multispecies ethnography of abattoir interdependency and social lives of multispecies communities. In this way, we may understand the dynamics and complexities of such abattoir lifeworlds better and their potentiality of pathogen circulation. What I mean by multispecies ethnography here is that I am interested not only in one or two species, such as the farmed ruminants, in relation to humans in the abattoir. I reach out to the concept of “critters”, utilized by Kirksey (2014) and Haraway (2016), to refer to a wide range of species – from insects and birds to mammals and beyond. These critters are often overlooked or left out, especially so in conceptualisations of encounters in human-made, defined, and highly organised spaces. Thus, I am interested in the

countless entangled critters, the ecological assemblages and the other kinds of non-human agents that sustain lives and make humans who they are in this world, for better or worse.⁷

1.2 Research Question

Coming back to the preface, species and environment in the abattoir are intimately entangled through many practices. People that engage in abattoir activities or with the spatial setting are joined by domesticated animal-others meant for slaughter but also by countless wild or semi-domestic species – from roaming chickens and dogs to rodents, mosquitoes, flies, and more – and microbes. Due to these characteristics I epistemologically frame the abattoir as a dwelling. This perspective understands dwelling not as constructing something but as a dynamic process of becoming, a constant engagement with a relational surrounding never in a fixed state (Ingold 1996, Ingold 2000, Ingold 2011). By conceptualising the abattoir as a dwelling, a domestic and peri-domestic space where multiple species including humans co-habit, I acknowledge temporalities, materialities, and interdependencies that manifest in such spaces which can contribute to risks of (zoonotic) pathogen circulation or transmission modes.

By acknowledging the presence and importance of critters in this context, I begin to develop a nuanced understanding of complexities in multispecies relations and ways in which different species co-produce themselves as well as their surroundings – the abattoir as a dwelling – through the eyes of a “meshwork” (Ingold 2011). Inspired by Tim Ingold’s phenomenological meshwork idea for analysing the multispecies entanglement⁸ within the abattoir, I do not limit myself to points of time when species meet. I understand bodies as permeable and people and their surrounding enmeshed through space and time in webs of relational pathways, contacts, traces and movements, all influenced by elements such as knowledge and emotions. Through meshwork-thinking, I thus follow “an inquiry into the conditions and possibilities of human life in the world” (Ingold 2011: 242). By linking Ingold to a wide archive of work from anthropologists doing multispecies ethnography in and beyond contexts of health, I make this

⁷ This multispecies focus in anthropology is described as an “ontological turn” that moves away from a focus on the human or anthropos in anthropology (e.g., Fuentes 2019, Parreñas 2018, Odgen 2013, Tsing 2015). Among others, this turn to other species in anthropology has been characterised by a renewed interest in ways in which other-than-human animals are culturally constructed, and the impact of these constructions on human relations to more-than-human others (e.g., Kirksey and Helmreich 2010, van Dooren 2019).

⁸ According to Nading, entangled life is “the unfolding, often incidental attachments and affinities, antagonisms and animosities that bring people, nonhuman animals, and materials into each other’s worlds” (2012: 574).

inquiry one about the possibilities and conditions of multispecies life (e.g., Deleuze and Guattari 1987, Kohn 2007, Haraway 2008, Beisel 2010, Raffles 2010, Nading 2014, Tsing 2015, Haraway 2016, van Dooren, Kirksey et al. 2016, Tsing and Swanson 2017, van Dooren 2019, Nadal 2020, and others).⁹

Therefore, substantiated by close ethnographic analysis, I explore how the abattoir is functioning as a dwelling for different people and other species through meshwork-thinking. Concretely, what does multispecies co-habiting mean or entail in this dwelling, as in how are species relationally entangled in shared space? – How do people and species (inter-)act with and affect each other along their meshwork pathways in the abattoir? As part of that, I explore how species grow in relations and produce affective and practical knowledge that influences how life is lived. How can this affect (zoonotic) pathogen transmission or circulation?

This approach can help to reveal depth and complex socio-economic and ecological entanglements that shape the multispecies abattoir lifeworld and diverse practices, beliefs, and values that emerge in response to them. Moreover, this approach adds to research on multispecies co-habitation that examines how SARS-CoV-2 and COVID-19 disease (Kirksey 2020), avian influenza and its governability (Porter 2013), and Lassa Fever and Ebola virus disease materiality (Brown and Kelly 2014, Kelly and Sáez 2018) manifest as multispecies emergencies. All these studies argue that detailed attention needs to go to social drivers, physical, material, and other immaterial connections and disconnections that hinder as well as facilitate the transmission of pathogens (Dilger and Mattes 2018: 265-267, Aronsson and Holm 2020: 24-25). Moreover, this approach can also challenge public health assumptions of immanent threads of pathogen transmission in multispecies mingling and explore why co-habitation also seems to work – why no disastrous outbreaks happen all the time in all the many spaces of co-habitation similar to the abattoir.

It is here that I need to clarify that, to a great extent, I do not know specifics about health conditions or laboratory results of people, other species, or the environment in the abattoir. I add insights from existing research conducted in the abattoir or other relevant studies about

⁹ As part of that, I follow geographer Sarah Whatmore (2002) by using the concept of “more-than-human” animals to convey a sense of hybridity of social worlds that are made up by so much more than human relations.

the meat industry. However, in general, the aim of this thesis is not to single out specific health risks, diagnoses, or pathogen findings beyond what people confided in me. I am descriptive in reference to existing literature and research, open to unfinishedness that remains true to the complexities of the world. Further, I do not aim to prove risks, vulnerabilities or disease occurrences. I rather attempt to show insight into what multispecies co-dwelling can consist of in the abattoir. In this understanding my thesis contributes to a large body of work on daily realities in the global meat industry with a focus on multispecies health as a different approach.¹⁰

Finally, throughout this elaboration, I avoid anthropomorphising¹¹ other species and remain human-centric in my analysis. Despite taking note of more-than-human animal behaviours through observations, instances of encounters with many remained few. I took note of physical signs of their presence, such as traces in mud, burrows, excrement, and other cavities they create in habitats. Nevertheless, my examination of other-than-human species behaviour and presence is essentially temporarily limited and second-hand, acquired mainly through observations of others who co-habit with them. Thus, my multispecies elaboration will be in continuous relation to human dwellers and human health, through engagement with records of my many conversations.

1.3 Structure

The purpose of this thesis is to shift the reader's attention toward multiplicities of life forms and more-than-human entanglements that can exist within spaces deeply rendered by human presence. Through a compilation of chapters that gradually introduce my research with interview quotes, field journal vignettes, and photographs in relation to literature from post-

¹⁰ Further, acknowledging the constraints of the epistemological frameworks I use is essential when attempting to understand the emotions, embodied behaviours, and experiences of other species, especially those that are beyond human perception. This is particularly relevant when contemplating lived realities, as their ways of existing and knowing defy human-centric paradigms (van Dooren and Rose 2017: 124-126). Moreover, it is important to underline that this study predominantly relies on examples from Anglophone settings or from scientists trained and publishing in Europe or anglophone countries. I include as many insights from Nigerian and African scholars as possible. Nevertheless, the number of social science and especially anthropological publications to draw from remains limited. This is also reflecting prevailing biases and limitations within the existing body of literature in medical anthropology as well as in multispecies ethnography.

¹¹ Anthropomorphism refers to the tendency to attribute human-like qualities, emotions, and behaviours to non-human entities (Watson 2016: 165).

humanities, multispecies ethnographies, and critical medical anthropology I aim to showcase a diverse range of beings that thrive and inhabit the abattoir in constant engagement.

Before I present my findings, the following chapter lays out the methodological approach of this research. It clarifies how I accessed the research field, the methodology I used and my approach to analyse my findings. I also reflect my positionality as a researcher. Thereafter follows the core of this thesis: the analysis and discussions of my findings. This part is divided into three chapters, from chapter 4 to chapter 6, with sub-chapters that each discuss case studies of some multispecies main characters in co-habitation with humans in the abattoir.

Chapter 3, “Topography of a Multispecies Dwelling”, lays out the research setting in an anthropocentric manner. It starts from the point I entered the abattoir with a focus on labour, to explain in detail why the abattoir can be considered as a house of people and how this situates the abattoir in anthropological literature of domestic and peri-domestic spaces. The second sub-chapter introduces Tim Ingold’s dwelling and meshwork concepts in analysis to build the framework for the remaining chapters. This chapter examines the significance of soil, as the foundation of the dwelling space, and the ubiquitous presence of flies as interconnecting and relational co-habitants. Both aspects – the conceptualisation of the abattoir as a spatial house of people and the focus of analysis on multispecies dwelling through meshwork-thinking – draw a clear line with the body of literature about the global meat industry and therefore add vital insights on more-than-human existence.

“Attentiveness and Disregard in a Multispecies Dwelling” is the title of chapter 4. It is a chapter that unpacks connections of temporalities, abattoir space, and multispecies subjects. It combines the dwelling ontology and meshwork-thinking with anthropological literature on disease transmission modes in domestic and peri-domestic spaces. The analytical focus of the first part is on specific research that explores temporalities of human-rodent entanglements with materials, pathogens, embodied knowledge production, shadows, and luminosity. The second chapter explores seasonal wet and dry intensities and their interrelation within perceptions and practices emerging from the meshwork of human-mosquito co-dwellers in the peri-domestics of the abattoir.

Chapter 5, “A Fluid Niche for Multispecies Dwellers”, explores specific labour activities that expose humans to transmission risks and discusses protection behaviours and the social life of materials in relation to these livelihoods. It also takes a closer look at the entanglement of dogs with abattoir activities and how this can create various challenges for a multispecies dwelt community. The second part of this chapter explores how co-habitation can also be beneficial and why the abattoir lifeworld can be understood as a mutually becoming niche for the various multispecies dwellers.

In the concluding chapter, I present a summary of main findings and arguments. Moreover, the chapter emphasises the significance of acknowledging other limitations of my research and chosen theory, underscoring their importance in the overall analysis. Finally, I identify areas that require further exploration by gathering open questions and establishing connections between the thesis and other relevant fields, such as the One Health agenda, labour of care and killing and biopolitics.

2. Study Context and Methodology

The following chapter presents my research methodology and lays out my analytical endeavour. In the subsequent chapter, I reflect on my role as a researcher. These considerations are crucial before delving into the analytical chapters as they have far-reaching implications for the process of data interpretation.

2.1 Applied Methodology

In 2022, I spent a total of three months, divided into two six-week periods, conducting fieldwork at the abattoir site. The first fieldwork took place during dry season, from March to April, while the second occurred during rainy season, from September to October. The purpose of conducting research in both seasons was to investigate potential variations in interactions between humans and other species as well as their surrounding environment within the research setting. To gain access to the research field, representatives from NCDC, NVRI, and myself from RKI presented the research outline, involved partners, and consent regulations to the abattoir management.¹² All participation in the research was voluntary. Participants were required to sign a consent form, which was provided and explained individually prior to their involvement in the study.

Over the course of fieldwork, I utilised various methodologies. Where quantitative research follows a logic of testing, qualitative research follows a logic of discovery (Rosenthal 2018: 14). As an anthropologist with training in ethnography, my goal was to immerse myself in the research setting.¹³ As part of that, I aimed at co-producing knowledge in a collective and relational act together with my interlocutors. My methods included a continuous literature review, during and after fieldwork, daily participant observations with informal conversations and discussions which I noted down as fieldnotes, semi-structured interviews, mental mapping, photography, and an emotion diary. Before I go into more detail about these methods I emphasise that I followed Tim Ingold's (2008) understanding of ethnographic research as continued entangled relationships among all species as well as the natural and

¹² The consent form includes a brief description of the project and research interest, use of data and protection statements and also contact information of the involved partner institutions. It also includes a section where the participant can agree or decline to have photos taken as part of the research.

¹³ By systematically assembling the perspectives of research participants and creatively combining different data dimensions ethnography offers a scientifically robust approach to research (Stodulka 2021: 100).

social environments, where the environment of multispecies organisms are a zone of entanglement (Ingold 2011: 231-233).¹⁴ Following this assumption of ethnography, I actively included into this zone of entanglement the scientific inquiry of bodily attention of my own senses – sight, sound, touch, smell, taste, and movement. I actively tried to account my body, and by that also other bodies in extension, as a scientific instrument, a place of experience and resource for complex and synesthetic learning. I captured insides from that approach as data – either as part of thinking processes in written daily observations or the emotion diary, by talking about them with interlocutors and team members and by taking photos.

Field research was based on approaches from grounded theory to identify relevant topics and interconnections in the findings emerging from the different methods and steps (e.g., Cutcliffe 2000, Charmaz 2006). Data analysis involved the coding of findings in text format – by also creating text or assigning codes to maps, and photos – and through that creating classifying categorisations and key conceptual labels. This, in turn, allowed exploration of interconnections among topics and sub-topics (Breidenstein 2020: 125-127). For coding of text, I used the NVIVO software. To anonymise my interlocutors in any text I developed an ID for each person. This ID was built upon general information of “Informant” connected to the research setting “Abattoir” and the number of the informant: I.A.1 as the ID for “Informant Abattoir No. 1”.¹⁵ In total, I analysed transcripts of 16 interviews between 40 minutes and 1,5 hours long and entries of my fieldwork journal and the additional emotion diary (see annex for a list of interviewees).

The following main codes evolved from the data that led to the final formulation of the research question and focus: multispecies knowledge, relating, dwelling activity (sleeping, cooking, eating together, sharing food, raising offspring, birth, growing up, resting, socialising, worshipping, meeting, home, and more), in-habiting, co-habiting, public and private, community and immunity, care, killing, physical touch, biopolitics, sickness, disease, health, wellbeing, dirty and clean, (un-)acceptable ecologies, health seeking, treating, medication, medical pluralism, labour, positive or negative emotions, One Health perception,

¹⁴ This understanding assumes that ethnographic knowledge is generated by many kinds of interactions instead of detached observations and is therefore a co-creative knowledge-making (Elliot and Culhane 2016: 3).

¹⁵ Full or identifiable names were noted down, only first names, in a private separate notebook of mine that was not linked to the generated ID's.

(dis-)connection, ontology, narrative building. To structure information and to find patterns or further fields of interest, these codes generated key conceptual labels and were developed, used and extended for all data sources during, in-between and after fieldwork.

Thinking, acting and understanding with my senses was manifested and materialised through the method of daily participant observations with many informal, open-ended conversations and discussions with different interlocutors at various places of the abattoir.¹⁶ I wrote notes in private as soon as possible. My field journal helped to shape iterative lines of inquiry and analysis as well as to develop new research questions. These participant observations with their informal conversations and discussions are not merely the “anecdotal” (Okely 2020: 82) of research but the very basis of conceptual understanding, developing and proving interpretation and understanding.

Additionally to these daily notes, I kept a personal emotion diary for a more detailed self-observation. This method was used to reflect on a personal level on my daily emotional state because my field journal entries were uploaded to a server for all project team members of 15 people to read. The emotion diary originated from the idea that generally “emotions are inherent to knowledge production during the research process” (Allan and Arber 2018: 2). In a place where I was continuously confronted with intense impressions, my positionality had to be accounted for on an in-depth and personally transparent level in relation to empirical information that emerged through applied methods.

During the end of fieldwork, in both dry and rainy season, I conducted interviews with adapted semi-structured questionnaires to compare, highlight and follow up on specific findings from other applied methods with key interlocutors. I transcribed interviews with the NVIVO software to subsequently analyse and organise the text along the developed codes and with writings generated through the other methodologies. The transcripts are verbatim, keeping individual errors in tense or grammar as part of the interview content. Afterwards, I followed a content analysis of the texts following Phillip Mayring (2022).¹⁷ Interviews at the end of dry

¹⁶ This “deep hanging out” (Geertz 1998) for observations, conversations, and discussions is needed to understand the life worlds of interlocutors and their entanglement with other species.

¹⁷ This means that I do not take possible latent meanings of my interviewees into account but concentrate only on the verbatim contents of their statements. By doing so, I searched whether and which (social) phenomena occur in combination (Davenport 2008, Kiefer 2007: 264).

season were focused on a broader questionnaire to gain or prove basic understanding. In contrast, the questionnaires at the end of rainy season set a focus on people's specific activities and (emotional as well as physical) entanglement inside the abattoir as a place of dwelling. Additionally, these second questionnaires included questions about seasonal influences of dry and rainy season on the daily life of my interlocutors. I developed intersecting but varying questionnaires for butchers, veterinarians, animal dealers and market sellers. I built the interviews on three parts equal for all interviewees but with altered questions depending on professions: 1) biographic background – e.g., profession, how they came to work in the abattoir, since when, how they feel about it; 2) abattoir as a multispecies dwelling – e.g., where they (like to) spend time, when and how they have contact to animal-others, how they feel about it; 3) multispecies health – e.g., known multispecies health challenges, health seeking behaviour for themselves and their animals, if they had any.¹⁸ The interview participants were included due to various factors – from type of occupation to being specifically knowledgeable on a subject or being able to speak English or soft Pidgin English, the creole langue spoken in many part of Nigeria as lingua franca.

For this thesis I also used audio-visual media.¹⁹ I enhanced informal conversations and discussions and ultimately the final interviews with the tool of mental mapping. I asked four interlocutors – two animal dealers and two market sellers – to draw simple maps of places they accounted for as most important emotionally and in regard to the time they spent there. This approach can be used as a survey instrument expanding conversations as well as analytical material because it can give insights into culture-bound perception, classification systems and subjectively experienced (spatial) lifeworlds of people (Helfferich 2014: 242-243).

²⁰ Through this, I tried to get a better understanding of my interlocutor's spatial knowledge,

¹⁸ These three parts focus on the research question of the abattoir as a multispecies dwelling while still allowing broader insights into individual emotions, behaviours, and interspecies perspectives.

¹⁹ (Im-)material audio-visual media, such as recordings, mental maps, sketches, diagrams, photography and film represent both materials to be analysed and survey instruments for generating empirical material (Bischoff et al. 2014: 2-4, Banks 2007: 55-56). In the process of evaluating, the collected visual material has to be triangulated with other data from different sources. These sources can be interviews that are analysed according to the criteria of requirements of inclusion, such as stand-alone importance of insights the material offer or supportive visualisation of findings, and theorised so that they enter into a dialogue with the concepts of relevant theory for the research context (Bischoff et al. 2014: 3-5). Generally speaking, audio-visuals in research can be part of the research process to document as well as subsequently analyse aspects of the research context without the research being specifically audio-visual (Banks 2007: 3-7).

²⁰ Following Helfferich (2014: 242) on mental maps, space is not reduced to its materiality but constituted through experienced arrangements and relations and is therefore regarded as relational. This means that such spaces are spaces of interaction with varying boundaries and multispecies socio-cultural networks of

perceptions, and preferences of places (Kaisto and Wells 2020: 2-3). Because the research focus is on multispecies encounters, I asked my interlocutors to include in their maps the associated species they share these spaces with. Subsequently, the maps became part of informal conversations.

To create further insights and contributions to thinking processes I used photography. I did not use photos as survey tools, i.e., included them directly in discussions or interviews with participants as I did with mental maps. Rather, I support my analysis and description process with them as data of the research narrative in their own right (Banks 2007: 4, Bischoff et al. 2014: 210). The visuals were taken cautiously, always with sensitivity to not show identifiable faces to respect personal privacy and especially if consent of everyone could not be ensured. This is in accordance with the consent form, stated above, that the management and participants signed before I interacted with them. While taking photos, I continuously re-insured that my interlocutors in the situations felt comfortable while I avoided taking photos of people altogether without explicit consent.

2.2 Positionality

Central in anthropological discussions is the researchers' positionality in the field, in "terms of personality, power asymmetries, professional and personal experience, ethics, training, and motivation" (Stodulka et al. 2018: 519). Therefore, I continuously reflected on how my presence at the fieldwork site impacted my findings and their interpretation.

I acknowledge that my position as a white female European researcher impacted my research outcome in any way. In a context of colonial history, my whiteness and European origin had to be always kept in mind which lead me to be very sensitive and cautious with any kind of requests and personal statements, especially in conversations about politics, inequality and aspirations. Moreover, because I was new to Nigeria, not only as a research context but in general, I did not understand many situations and connections and thus must disclose that I probably interpreted situations differently. However, it also appeared to me that my position

relationships (Helfferich 2014: 242-244, Götz and Holmén 2018: 157-158). The interest is not in physical space as such, but rather how the human being appropriates spaces and settle into spatial conditions. The use of subjective maps is based on an understanding of space in which space is created through experience, including reference to a real environment or world (Helfferich 2014: 242-243).

as an “outsider” who was collaborating with national institutions but without being directly involved in national politics, corruption and insecurities gave people room and curiosity to engage in more open discussions to explain individual life challenges to me.

Nevertheless, me being part of a health project and being from Germany lead to certain expectations and interests as well. It was neither the purpose of my stay nor was I in any way equipped to educate people. However, questions were asked on health protection measures, risk potentials or my perception of hygiene.²¹ I tried to be open about my own perceptions while at the same time avoid pushing the focus of conversations into health risk awareness topics, as this would have had a strong impact on the course of exchanges. Generally, I aimed to underline that they were experts in their day-to-day reality and I was there to learn from them. The latter was especially important because I was not familiar with Nigeria, slaughterhouse contexts and new to One Health research. Being open about these personal facts was essential to create an exploratory and truthful atmosphere in shared time and conversations.

As part of this, the interviews were conducted at the end of each of my two fieldwork stays. This gave time to create a trustworthy atmosphere and to build an understanding of each other to ultimately limit possibilities for unvoiced reservations or misunderstandings. Considering financial disparity between me and most of my interlocutors, I closely consulted my Nigerian colleagues in the project to know what would be appropriate for me to bring or give as a sign of appreciation for their time.²²

²¹ Questions such as “How can we protect ourselves better?”, “What do you see that is dangerous here for our health?”, “How do you do it better in Germany?”

²² I, for example, occasionally brought something to eat or drink while spending time together in the abattoir. Sometimes I bought a small product from the market shops of my interlocutors or I brought sweets from Germany. And when two of my interlocutors came down with a fever I gave them vitamin supplements for a quicker recovery.

3. Topography of a Multispecies Dwelling

For the orientation of the reader, the following two sub-chapters are sketching out more detail about the abattoir topography. The first chapter starts with information on why and how people engage in house-ing activities within the abattoir. It briefly drafts out multiplicity and complexity of human activities within the abattoir which are important to understand the concepts introduced in the subsequent chapter: dwelling and meshwork. This section then introduces the analytical concepts of the dwelling and the meshwork that guide the analysis of the remaining chapters.

3.1 An Abattoir as a House of People

“Okay, the abattoir is within the four corners of the fence – the lairage, the market inside the abattoir, the slaughter room. You know, just within the four walls. You know that there is the fence that goes all around. So anything within that is the abattoir. “

Interview I.A.6, abattoir veterinarian

Driving from the city into the satellite settlement via the highway, one has to take the road off a bridge down south before the highway enters the neighbouring state further east. When on top of the bridge in the morning one can already locate the abattoir through distant black clouds, while it is still several kilometres to drive. It is a view over a mixture of small brown and beige houses, churches, mosques, petrol stations, schools, and other buildings for various purposes. Everything is smaller in size and appears less structured as in the municipal city but still very organised until one drives down into the old village structures of the settlement. There the shops, lined by self-built house extensions along the road, appear more rudimentary and many are marked by red crosses and governmental graffiti saying that they have to be removed to avoid demolition by government officials. Buildings are small one-story maximum two-story at most, with basic amendments and small pathways that go further inside the settlement that are at best wide enough for a motorbike. The streets are permeated by potholes and lined with shops, bustling with people carrying out their individual business. Amidst this lively scene, one can spot dogs, chickens and sometimes goats meandering here and there. Within all this, the abattoir is adjacent to a PHC facility, a small military base, a primary school and nursery, places of worship, general settlement, shops and the chief's palace of the settlement.

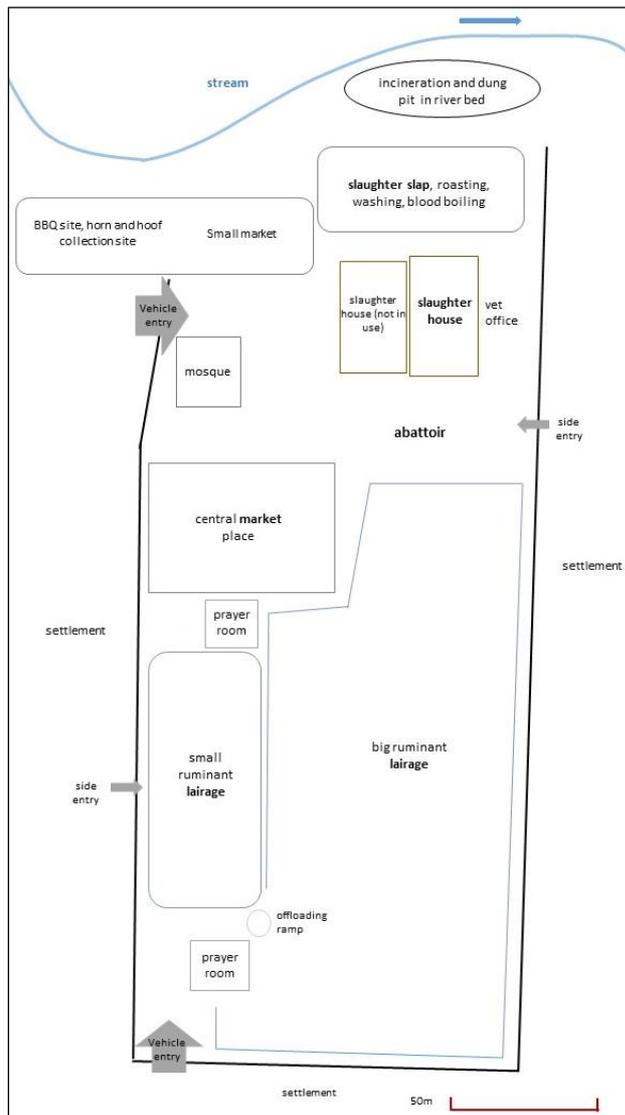


Figure 1: Map of the abattoir (sketch by the author).

As Figure 1 and the introducing quote depict, the abattoir itself is enclosed by an approximately two-meter-high brick wall on three sides, with two main gated entries for vehicles and two small side doors. The northern side, however, remains open along a stream, which functions as a natural perimeter. Originating from North-West and extending all the way down into the neighbouring state, the stream adds another layer to the tapestry of this settlement. Within the fenced abattoir area are two slaughterhouses, which are the only tall brick buildings with corrugated metal roofs. However, only one slaughterhouse is in use. Along the slaughterhouse side are several rooms for the management, veterinarians, animal health inspectors and cleaners. Behind the slaughterhouses towards the stream is

another small slaughter slab, mainly for small ruminants, a section where slaughtered animals are de-furred over fires places, washed afterwards, further processed, and also the blood boiling area. In the streambed is the burning area for hazardous waste – disposed organs with disease lesions, dead animals from transport and other disposed body parts. A small, loosely roofed market area is at the centre of the premises bordered by the small ruminant lairage with stables at the side and the big ruminant lairage lined by storage and cover sheds. There is also a mosque and two additional Muslim prayer rooms, as well as service shops, small kiosks, and unregistered medicine shops inside the abattoir walls. Trucks filled with livestock cargo enter or leave through the south entry that opens up into the lairages. Finally, a “BBQ area”, where meat parts are further prepared for customer preferences, the collection side for horns and hooves, and a parking area for supply and customer vehicles stretch into the outside settlement area around the abattoir at the northern entry. The dark clouds that can

be seen from afar originate at the de-furring, burning, blood boiling and BBQ sections, through burning of fur, tyres, wood, and coal.

In addition to its role in animal husbandry, slaughter and meat processing, the abattoir serves as an open marketplace where individuals from diverse backgrounds can purchase various food products and access a range of services.²³ This multifunctional space offers economic opportunities for individuals to generate income by selling their own goods, including domestic animals, vegetables, groceries, meat, medicinal items, cooked meals, clothing, and more. It also provides a platform for providing services such as supplying goods, cleaning services (for clothes, animals, cars, dishes) and various forms of general assistance such as vehicle (off-)loading, goods transportation, and a multitude of other tasks. However, the premises is not limited to economic activities alone. It is also utilised for multiple purposes beyond commerce that I elaborate more closely in the following section.

I start my analysis with activities of people that are engaged with the abattoir and how their activities spark the interest and need to analyse the abattoir more thoroughly through dwelling as a lens of multispecies engagement and entanglement. At first sight, structures and spaces of the abattoir are not built comfortably to stay in for social activities, or to sleep, cook or raise children in. The space is mostly designed with few concrete buildings and the majority of the area without permanent structures and open soil. However, to quote my interlocutors:

“I feel very comfortable. Like nothing to bother about because I take it like my home. You understand? So I spend most of my time here, about 6 to 6, that’s almost how many hours?”

Interview I.A.8, market seller

“Ah. The thing where you now say, you say the place where we chop (eat) is your barrack. The place where they come, they come and do work, get something, go and feed your family is your barrack.”

Interview I.A.10, butcher

Many abattoir workers spend the majority of their time in the abattoir, working for more than 10 hours often for seven days a week. While feelings of my interlocutors about this are mixed, most of them react positively because it provides them with income. Moreover, as animal dealer I.A.5 notes in an interview: “Some people take it as a home. They bath in the public

²³ Products from the abattoir vary from live domestic animals to their parts of intestines, meat, bone matter, heads, hooves, hides, skin (leather), dried blood for animal feed, dung from the lairage as fertiliser for farms, dead foetuses from slaughter for dog breeders, cattle bile for medicine.

toilet, they cook here or eat from here at the normal thing, evening, night, do breakfast here. They stay here.” This is further elaborated by another animal dealer, I.A.7: “So, 2009 that I came [...] here I slept here three years before I left, so that I experienced business very well. [...] Even after rent my house I still sleeping here.” And another interlocutor tells me:

“Why no go like it? [...] I don't have any office way past this one. It's like home. I rest there where you see me before [offices], do abolition in front, pray in mosque there [abattoir mosque]. So that is why I stay 6 to 6 every day. [...] Every end of month I dey go see my family and come back. [...] I think, I myself, you dey see me in the evening with my friends there [next to offices]. So, if you bath you come and rest here. So, people do come to you [...]. Talk, talk, anything what you want to talk, listen radio. You are with your friends.

Interview I.A.13, Mallam

These interview quotes illustrate how specific activities through which people within the abattoir make use of the structures and open space for needs beyond abattoir labour activities but also how they understand the abattoir within their work time. The examples reveal multiple reasons for this house-ing (house-making): What I.A.5 and I.A.7 say underlines that people stay within the abattoir because of financial reasons, sometimes only come at night in need of a place to sleep, while others do it to understand the business better. Another one also is a mindset, as I.A.8 and I.A.13 tell me, for taking the place of business as one's home, when most of the waken time is spent there and many social contacts are tied to this workplace. This process involves the interplay between physical and social elements that generate a sense of comfort and belonging, irrespective of actual physical structures (Sigmon et al. 2002: 25).²⁴

Then the abattoir not only presents the workplace that becomes a second house through long working hours. Its conditions of shelter and confined open space render it into a spatial environment where people perform house-ing activities in and beyond labour and work time. These close and long-lasting relations that many people have to the abattoir are also deeply affected by the state of Nigeria's economy, high unemployment and poverty rates, illiteracy, inconsistency of the informal sector, national insecurity and internal migration through

²⁴ I do not go further into the concept of home and its psychological and culturally specific implication, as the notion of home and “home creation” can be highly subjective (Sigmon et al. 2002: 25). I focus on the activities that are at play in the spatial setting of the abattoir and how these can be understood as domestic, dwelling, or house-ing activities. Therefore, I do not say that the abattoir is a home for people but that the abattoir is functioning as a spatial house for people in which they find shelter, perform house-ing activities and make various use of what they need and find.

(forced) displacement or urbanisation movements (Abdullhi et al. 2022: 96-99, Allah and Ugbomah 2022: 17, IOM 2014). Generating income for many Nigerians is a constant struggle which is one reason why an established employment or work relation somewhere is not given up easily, even if it is far away from the place of residence (Abrams 1966, John 2019: 116-117, Rufai et al. 2019). Additionally, living costs and accommodation in and around the city are high in comparison to other cities or villages. All these are reasons why people engage in “spatial housing” or squatter settlement activities (Bello 2009, Obiadi and Osita 2018: 26).²⁵ To quote Blanchette, these circumstances indicate how most people “can only live where there are things that put us to work” (2021: 6).

Therefore, like I.A.13, many people that work in the abattoir are from other states. They stay to work every day for long shifts to then visit kin and friends for a longer period of time every other month. As my interlocutors tell me, some rent an apartment to sleep in close by for that time while others save money and stay in their market shops or places they find inside the abattoir. As I.A.9 adds:

“It is not that they cannot afford to pay for accommodation but most of them they don't come [here] with their wife and their wife is maybe in Kano, Kaduna. So, they like, you know, managing to gather money and sent to their wife or do other things with it. And most of them they built these *batchas*. They use planks to build like kiosk. Most of them they built behind this [abattoir] fence and sleep there.”

Interview I.A.9, butcher

These apartments or *batchas* (small self-made huts), so I am told, are simple and meant for a bit of privacy and a place to rest or sleep but not to receive guests, to cook, or spent time in with family or others. Of course, many people also live with their families and commute every day between their houses or apartment and the abattoir and working hours also vary greatly. However, as I.A.15 underlined, “most of them don't even have houses. So they stay here almost any time. They sleep in the market. All those Northerners [...] most of them here are Northerners”. As Obiadi and Osita (2018: 26) explain, spatial house-ing is a phenomenon in big cities in Nigeria where public or open spaces are utilised to meet basic spatial, socioeconomic, psychological, and shelter needs of “the urban poor” people. Thus, spatial house-ing addresses diverse needs of people. As Figure 2 and 3 show, spaces like the abattoir and its immediate surrounding, while not originally intended for housing purposes, become

²⁵ There are of course many other reasons why people migrate for employment temporarily. I do not aim to give further reasons or elaborate on theories of migration and labour, as this is not the focus of this thesis.

sites where individuals establish spatial house-ing and engage in various activities to sustain their daily lives.²⁶ Accordingly, for many of my interlocutors the abattoir occupies a central space in their life regarding time spent, spatial house-ing activities, and emotional ties.



Figure 2: Evening in the abattoir. Fabrics lie on the floor next to the slaughterhouse, spread there by women to sit on. In the back, dinner is cooking on small improvised firepits in front of the slaughter slap, visible through faint rising smoke.



Figure 3: Dinner cooking in front of the de-furring, blood boiling and slaughter slap side.

Against this backdrop, I am drawing on Biehl and Neiburg (2021: 543) to challenge stagnant assumptions ingrained within anthropological discourse surrounding viable forms of dwelling, habitation and belonging. By reconceptualising the abattoir as a multispecies house, a space of spatial house-ing, a domestic to peri-domestic dwelling site, I broaden the notion of “houses”

²⁶ According to Obiadi and Onochie (2019: 25-27), it is important to distinguish spatial housing from the situations faced by destitute or homeless individuals in the city. They argue that unlike destitute, those living in spatial housing tend to have relatively fixed locations, albeit often in inappropriate areas, and rely on certain socioeconomic activities in the city’s economy for their livelihoods.

as complex and multi-dimensional concepts that encompass a range of entangled and interrelated factors. As Biehl and Neiburg (2021: 544-545) suggest in their “Oikography” of house-ing in critical times, houses function not only as physical structures providing shelter and security but also as a collection of relations, affects, and moralities that are intimately intertwined with wider social and cultural contexts in which they exist. Moreover, houses are not isolated entities but rather nodes within broader webs of (multispecies) neighbourhoods and communities. Socio-economic and environmental systems both shape and are shaped by practices and dynamics of (provisional) dwelling and house-building.²⁷

Further, Neiburg argues that houses are inhabited by people in motions and that mobile people often inhabit many houses. For him, house-ing “happens in and through multiple houses across scales” (2021: 546). I understand the abattoir as a multispecies spatial house, where people and other species dwell and engage with given qualities for domestic activities because of various reasons.²⁸ Even if people live in batchas, apartments, and houses outside they can simultaneously perform domestic activities in the abattoir and dwell in it in varying amounts of time with a sense of belonging and meaning for their personhood (Biehl and Neiburg 2021: 544). The abattoir becomes a sort of landscape where a sense of personhood and a kind of house is built in motion. As one of my interlocutors, a slaughterhouse butcher, explains to me:

“I like abattoir more than everything. Because I like abattoir more than my house. Because na here na get to go and feed my family, my wife, and my children, and my parents. That is the thing. [...] I like abattoir more than my house. I also have friends here now, brothers o. That abi.”

Interview I.A.12, butcher

For I.A.12 the abattoir livelihood holds a special position as a means of income and financial security over a long period of time and also due to contacts he has in this spatial setting. Further, many people work in the abattoir together with kin for a long time, some in third generation, as the case of some women from Nasarawa state show.²⁹ This highlights close

²⁷ *Oikos* means “a physical container for people, animals, and possessions—a private, domestic space” (Nading 2014: 103). Oikography (2021: 545) argues that processes of house-ing understand houses as unpredictable and provisional human-non-human entities, formed by frictions of (in-)stability, fluid borders and variations of (im-)mobility.

²⁸ I do not go into more detail why people stay in the abattoir over night or perform certain activities regarded as domestic activities inside the spatial structures. This would go beyond the intended scope of this thesis.

²⁹ They are hired by the butchers to supply them with necessary water for the slaughter process, for carrying the meat products to the customers and the stomach content into the streambed for disposing it there. Many of them raise their children in the abattoir until they reach a certain age. Then the boys go back to the village to

intergenerational or biographical entanglements that shaped the abattoir as part of monetary and emotional labour and dwelling activities, such as raising and caring for offspring and growing up (discussed in e.g., Carter 2013, Carsten 2018).

Thus, for my interlocutors the abattoir is an important component of their life in regards of time spent, emotions, social and domestic activities and for financial security, where work and leisure can become blurry. All are part of a reciprocal process of making the abattoir while the abattoir also makes them, in understanding of Biel and Neiburg (2021: 543).³⁰ The house as an entangled and dynamic entity underscores the need for anthropologists to engage more with diverse human living arrangements. It underlines the need to attend to the complex interplay between material and social processes in shaping the environment and multiple species in it.

The insights outlined in this first section underline the need to understand the abattoir as an entangled, spatial house of people. Through the multitude of domestic activities – eating, cooking, washing, sleeping, resting, worshipping, socialising, raising offspring, care work, monetary labour, and more – as well as close ties – temporal, social, biographical – this conceptualisation becomes clear. It is a space where critical anthropological literature of domestic life and multispecies ecologies can be situated in relation to health and disease. This then relates to the argument of Anna Tsing (2012: 141), stating that “[d]omination, domestication, and love are deeply entangled. Home is where dependencies within and among species reach their most stifling.”

To think that inhabiting a place is also changing it and that places are always inhabited in hybrid multispecies ways resonates with the dwelling ontology of Tim Ingold (2011). For him, a purity of living in an exclusive place does no longer apply, as humans share the world and

become farmers or go to school while many of the girls stay to be raised as carriers and washer to take over their mother’s jobs one day and support them in the meantime. I am told that most of them rent a house together next to the abattoir, where they sleep altogether with their children in little space.

³⁰ They argue, drawing on diverse lineages of anthropological thought in decolonial engagement, while stability, safety, domesticity, and autonomy have long been idealised as normative characteristics of the (bourgeois) house ethnographic research has repeatedly shown that these ideals are not only facile, but also analytically restrictive (e.g., Carter 2013). Living arrangements are shaped by their environments, and that material forms in turn shape collective activity, memory and are key to the politics of infrastructures (see e.g., Larkin 2013, Douglas 1991: 288-290, Carsten and Hugh-Jone 1995). Rather than being static or isolated structures in physical space, houses are partible and "live forms" that are malleable and in movement (e.g., Pina-Cabral 2019).

their dwellings with more-than-human species and plants. This is particularly the case in an abattoir for purposely farmed species and the many other species that join this conglomerate. To have the means of analysing these multispecies entanglements of abattoir dwellers and material structures I combine Ingold's understanding of dwelling with his meshwork concept, a web of relational multispecies pathways. Both concepts are introduced in the following chapter, building the epistemological foundation of the remaining analysis.

3.2 Multispecies Dwelling in an Abattoir

I walk along the de-furring and blood boiling site, black smoke and biting smell from firepits in my eyes and nose. My interlocutor, covered in blood and black residue from his work at the goat de-furring chimneys, tells me in strong Pidgin how some workers of this slaughter slap site sleep in the huts at the edge to the streambed. The huts look very small, barely enough space to lie down and store work materials. While we go towards them we pass plastic sheets of drying blood chunks, crawling maggots and swirling flies in-between. A bit further down, I see holes of different sizes in black, steep sloping soil towards the stream. He follows my curious look and says “rats”, while pointing at the holes.

Field journal, rainy season



Figure 4: Rodent burrows at the blood boiling site towards the streambed. Blood chunks are drying on planes above the burrows and next to it are huts where workers of this site sleep or store work materials.

Humans utilise abattoir space for small huts to occasionally sleep in as part of spatial housing. As Figure 4 shows in a collection of photos, right next to their material hut constructions are rat³¹ burrows and potentially countless underground tunnel systems under the slaughter slap and de-furring hills and beyond (Sodikoff 2019: 103). Above ground, human activities of

³¹ Throughout this thesis I use the terminology “rats” to talk about the various types of mice or rats that dwell in the abattoir. I was told about different types and the NVRI veterinarians caught 17 savannah shrews (*Crocidura fulvastra*) and 16 brown rats (*Rattus norvegicus*). However, I cannot estimate the number or variety of species that are among the small rodent dwellers thus, I chose to use the term my local interlocutors used.

de-furring and blood boiling and drying, to process the nutritiously rich by-product of slaughter into chicken and fish feed for surrounding farms, creates a vibrating habitat for flies and their maggots. In the space of the abattoir, livelihood and house-ing activities of humans are entangled with each other, lively materials, and dwelling activities of countless other species. These critters have many sizes, habits, modes of movement, needs and agendas. They are regular or occasional visitors, constant co-dwellers or temporal guests in purposeful finality of slaughter. Eventually, all of them are joined and populated by countless micro-organisms that variate and shift in effects on bodies depending on the biology of species (Aronsson and Holm 2022: 26).

Situating these engagements, I lean on Tim Ingold's (2000: 5) "dwelling perspective". To dwell, for Ingold, is not the act of constructing a house, as the construction of the house itself does not guarantee that dwelling is happening in it (Ingold 2011: 27).³² In his view, all living beings and things dwell within a web of relational contexts and constant engagements with their surroundings (Ingold in Jones 2009: 266-267). This dwelling perspective emphasises the importance of understanding human interactions as a continuous and ongoing process of dwelling with a more-than-human and material world or the reciprocal relationship between humans and their surroundings (Haraway 2016: 1-2, Tsing et al. 2019: 186-187). Thus, in the introducing vignette each species (humans, ruminants, flies and maggots, rats, micro-organisms) and various forms of materials (huts, open soil, plastic sheets, blood chunks, de-furring residue) are entangled in activities in a dynamic process. This perspective rejects the idea that human surroundings are static and passive backdrops to human actions, and instead sees the environment as an active and dynamic entity that shapes and is shaped by human and more-than-human activity (Aronsson and Holm 2021: 31-32).

These examples of engagements by humans, rats, flies and maggots show that a dwelling is (re-)designed according to articulated needs and preferences of all its inhabitants while new incoming multispecies inhabitants find shelter in it and make use of material construction and

³² Thinking with the dwelt ontology of Heidegger (1971), that is taken as Tim Ingold's foregrounding statement for his dwelling perspective: "We do not dwell because we have built, but we build and have built because we dwell, that is because we are dwellers... To build is in itself already to dwell... Only if we are capable of dwelling, only then can we build" (Ingold 2000: 186).

what domestic qualities offer for their own preference (Ingold 2000: 172-175). A dwelling, then, is never a final spatial form but a process that is immersed in activities, where (re-)building is continuously going on (Ingold 2000: 43). Following this dwelling ontology, the abattoir as a multispecies dwelling with its material environment, qualifies as a veritable being. It is in a constant process of entangled becoming over its multispecies history through relations and entanglements of all humans, animal-others and spatial material qualities – natural and human-made – and is therein continuously rebuilt. Thus, abattoir structures are a result of particular demands for abattoirs by national and state laws and regulations³³, experiences, needs and creative adaptations of people engaging in labour and spatial housing activities and multiple other influences of multispecies inhabitants that variously transform and make use of what they find. Even though they are subject to constant rebuilding or abrasion, these structures are differently fixed – from cemented floor, the slaughterhouse to wooden huts. These materials are the built infrastructure of the abattoir that aim to structure and also separate space into different parts for different activities. I am interested in multispecies frictions and fringes that happen along these human-made ordering processes and structuring measures.

When all species, activities, infrastructure and other materials are interconnected, how to analyse these complex engagements? And what do they mean for the dwelt community? Take the flies, a type of blowfly³⁴, for example. In the abattoir, these insect critters are omnipresent, covering exposed meat on market tables or in supply vehicles waiting for departure as well as fluids and body parts in the slaughterhouse. They can be found on various infrastructures, species, faeces, slaughter remnants, and frequently land on human skin. Their sheer number makes it impossible to exclude them from the slaughter processes in the abattoir while they also infiltrate the fabric of the settlement. As they undergo distinct morphological stages, from larvae to pupae to fully formed flies, their significance within the ecosystem becomes evident through numerous functions and requirements. As Raffles (2010: 125-127) notes, “[f]lies taking over, moving in, preparing the generations, the eggs, the larvae, the feast”. They serve as indispensable agents of decomposition, facilitating vital processes of breaking down

³³ The Nigerian Meat Hygiene Act, Nigerian Meat Inspection Laws, and the recently promulgated Animal Diseases (Control) Act are regulating abattoir labour, procedures and hygiene (Njoga et al. 2023: 2-3).

³⁴ There are many blowfly species but I will remain generic for the sake of this example here. All are found to breed profoundly in slaughterhouse-refuse but congregate in nearby vegetation (Green 2008: 474)

organic matter. Simultaneously, they are acting as a source of sustenance for other organisms, while their presence also carries the potential to transmit diseases.³⁵ Not hindered by many barriers, these creatures weave intricate connections that transcend boundaries, interlinking aspects of existence. In this display of omnipresence, they underscore an absence of any sealed-off spaces within the abattoir, effectively dissolving illusions of separating “insides” and “outsides”.³⁶ As Raffles (2010: 126) writes, flies “were invented by God to punish man for his arrogance.” In this view, the presence of flies in the abattoir presents an intriguing phenomenon. Along their pathways their imprints forge interconnections to many things humans try to keep their distance to – from faeces to decomposing organic matter – and link them to other inhabitants and materials in shared space. They do not necessarily always take traces in but take them along, nevertheless. Along these pathways they change their composition and eventually the one of others. They might get devoured in their various stages by co-dwellers, from chicken, to rats, to lizards or other. As Bertoni (2013: 62) notes, ecologists “tell us that life on this planet is enmeshed in intricate food webs through which everything, living and non-living alike, circulates.” How, then, start to analyse flies and their complex and intense entanglement with the abattoir dwelt community in their multiplicity of function and meaning, attentiveness and reactivity in perceived omnipresence?

Drawing on the example of flies, the lives of these critters extend along pathways or traces of multiple lines, “knotted together at the centre (of their body) but trailing innumerable ‘loose ends’ at the periphery”, meaning that they are enmeshed in multiple continuous entanglements with their surrounding (Ingold 2011: 85). In this understanding, species and materials are not distinct beings that only engage with each other when they come into direct

³⁵ Even though flies are not the common species associated with zoonotic disease transmission and emergence I start with them as important critters in relation to interspecies health in the abattoir. In a recent study the role of flies as mechanical vectors for infectious agents re-emerged as a crucial aspect that warrants deeper exploration, particularly in the context of interactions between human settlements, their domestic animal-others and wildlife populations (e.g., Jahan et al. 2023). Flies in relation with human settlement and livestock populations can transmit a great variety of pathogens as vectors, including Salmonella, Escherichia coli (E.coli), Typhoid fever, Cholera, numerous parasites, and antimicrobial resistance (e.g., Greenberg 1973, Ying et al. 2022). They can transmit infectious excreta until 3 weeks they came in contact with contaminated matter (Green 2018: 476). High fly density is associated with an increased risk of disease transmissions (Graczyk et al. 2001).

³⁶ This aligns with findings from Daramola and Olowoporodu (2017), who studied the surrounding residences of 15 abattoirs in two categories: 1-250 meters and 251-500 meters radius. The results indicate that slaughterhouse activities contribute to environmental pollution, which negatively affects the health of nearby residents. The study found a higher prevalence of flies in the surrounding residences as the distance to the slaughterhouses decreased. Furthermore, the study revealed that a significant proportion of residents in the study area regularly had to treat diarrhoea (70.4%).

contact. Here, Ingold' (2011) meshwork concept suggests that (social) life is not accurately described by the "network" metaphor, which implies connections between points of contact. Instead, he proposes "lines of becoming" (Ingold 2008: 210-212, Rock and Degeling 2016: 78). The distinction between flows of lines (meshwork) and lines of connection (network) is critical. Network theories, particularly actor-network theory (ANT), a theoretical model in social sciences, are often used by medical anthropologists who focus on tracking the flow of power through different objects and actors in a network. In ANT, actors can be human or non-human entities, while these entities possess agency that can shape and cut networks through their (inter-)actions or presence (e.g., Latour 1996, Strathern 1996).³⁷ In contrast, meshwork-thinking is less concerned with the role of individual actors and more focused on collective and distributed agency that emerges from interrelationships between all entities in their web of entanglements. In this understanding, life is lived along lines that open and get entangled with those of others. These lines of becoming cross other lines, but do not necessarily connect points. As Rock and Degeling (2016: 5) summarise, "meshwork denotes 'being alive' as a process of 'continuous birth'". Meshwork, in fact, entails incessant exchange between bodies (human and non-human) with their surroundings as basis for sentience, perception, knowledge and behaviour. A line of becoming passes through or runs transversally to localisable relation of distant or contiguous points. It has neither a clear beginning nor end and cannot be defined solely by points it connects to or composes of other lines (Klenk 2018: 316).

The meshwork concept depicts emergent, relational and earthy engagements that form entanglements of pathways along which life is lived and experienced in permeable and leaking bodies and materials. It encompasses personal trajectories – from, e.g., more-than-human ecologies, infections, living arrangements, used materials, types of knowledge, practices and skills, emotions, socialisation, and more. Within this meshwork, each line establishes its own

³⁷ Ingold (2011: 76-88) challenges the notion that describing social worlds as point-to-point lines provides a comprehensive understanding of what it means to be alive in the world. This conceptual shift draws inspiration from Annemarie Mol and John Law's influential essay from 1994, where they propose a "fluid" approach to understanding social worlds and social difference. According the authors, the notion of fluidity suggests that social spaces are not delineated by rigid boundaries or interconnected through stable relations. Instead, entities within this fluid space can exhibit both similarities and dissimilarities at different locations. They have the capacity to transform themselves without necessarily creating fundamental differences. Thus, boundaries between materials or species appear and disappear, allow for leakage, or even vanish entirely, while relations undergo transformations without breaking apart (Wentworth 2016: 291).

course from within interstices of its connections with other lines. As lives come together, pathways also constantly diverge interactively and responsive, resulting in knots that are situated in the midst of things. Yet, with their ends loose, they interweave with other threads of “things”³⁸ like species and other elements (Miller 2019: 16). In this view, as can be seen in the example of flies, the abattoir is not simply a place of relationships between humans, animal domestication and slaughter work. Rather, it is the sum of multispecies entanglements with various meanings, intended or unintended orchestrations and outcomes as well as constant multispecies knowledge production. Accordingly, the objective of this research is to provide a more comprehensive understanding of this process of becoming a never-ending multispecies dwelling.

3.2.1 Meshwork Threads of Soil and Flies

The following vignette starts meshwork-thinking through the dwelling perspective in analysis of multispecies abattoir dwellers before it comes back to include flies again:

We sit on his bench surrounded by cattle. Some of his workers sleep on mats on dusty soil in the shadow of his shed behind us. It is hot and the air is dry. His animal-others eat their feed out of their wooden troughs or ruminate slowly. The open soil under the troughs is wet from water they just got from a vendor. My view stops on a number of small green sprouts that grow in darker wet patches in the soil under these troughs. They appear to be corn seedlings from animal feed. A small bird flies on the back of a ruminating cow in front of us and picks the fur. After some picking it leaves again while the cow had not reacted to the light-weight visitor at any time. A bull further back has thick saliva slobbering in threads out of its mouth, dripping continuously on the dusty soil. Flies are again intrinsically present – on faeces, wet soil patches, around eyes of ruminants and on skin and clothes of us humans. Meanwhile, my interlocutor explains his business model to me. After a while he concludes: “We stay where the animals stay, we eat where the animals eat, we drink the same water. We are always very close.”

Field journal, dry season

What my interlocutor says to me that day, about the farmed species and people in the abattoir, echoes on for the remaining time of fieldwork. The vignette extends his statement and shows ongoing intimate enmeshment of many species and materials in the abattoir not only when they meet physically but along constant co-construction of each other. My interlocutor dwells in the abattoir in engagement with his material and multispecies environment. His skilled

³⁸ Following Deleuze and Guattari (2004), Ingold understands species and beings (like trees, the soil, etc.) or materials (e.g., a house) as “things” that are never final (Ingold 2007). Things are always “going on” and comprised of many things. The tree is comprised of its bark and insect and microorganisms in it, birds in its crown, fungi in and along its roots and more – were does the tree end?

actions establish conditions for other humans, non-humans, and vice versa that originate out of knowledge grown along his enmeshment in the first place. His livestock keeping forces him or some of his workers to stay in the lairage at all time. They tend to the needs of the farmed animals – to feed them, look after them, or to sell them. Because of this they need to rest, eat and sleep close to the animal-others. At the same time, his cattle are confined in one place, surrendering to decisions on where and how much they are meant to move, eat, or drink. They stay in the lairage for days up to weeks, months or even a couple of years. They are embedded in weather conditions, actively engage with their feed, their human caretakers, other species that come into their range, and each other as a fluctuating herd composed of individuals from various regions of Nigeria and West-Africa. Meanwhile, birds take up the chance the big ruminants provide them with – fur for nest building or to feed on the insects that live in it. These behaviours are skills they acquired through their entanglement with the animal-others. Moreover, the crop feeding, drinking and shadows of the trough create unlikely opportunities for young plant life to grow in the heat of dry season below the troughs. Simultaneously, other organisms cherish or live in the ruminant faeces covering the lairage ground. And flies, again, travers between it all. These are processes of formations, never final through their continuous entanglement with other beings and forces. Humans and other species are constantly leaking and are permeable to a multitude of influences – from diets, fluid intakes, weather conditions, micro-organisms and generally the conditions of their dwelling space.

Let me examine the soil more closely, as it forms the floor of the majority of the large abattoir dwelling space and when analysing a dwelling one has to include the matters it is made of. Only the slaughterhouse and its courtyard, the market place, the offices and places of worship have a cemented ground. The rest of the big abattoir space is characterised by open soil. Thus, soil serves as a shared ground for humans, their domesticated species and the semi-domestic ones, like the many dogs and chickens. Additionally, it accommodates rats, insects, and countless micro-organism and provides space and nutrients for the growth of seedlings and other plant life.

The soil absorbs the remnants of the multispecies community that lives in the abattoir space. It takes in body fluids and left behind traces by various species that have come from different

locations, such as the ruminants that come back from daily grazing in the bush or the places where they were bought from in Nigeria and neighbouring countries. The soil becomes a repository for these diverse elements and so much more. It embodies a complex tapestry of entanglements and consists of countless particles and organisms. The soil is a basic force in a permeable and leaking lifeworld in constant dynamic exchange (Puig de la Bellacasa 2019: 392). It is a whole ecosystem (Bertoni 2013: 33). Thus, it makes a great difference for dwelt life if the ground of a dwelling is cemented or open soil, as life for many co-dwelling species and micro-organisms would be differently possible or otherwise entangled in and through textures, space and nutrients. What this can mean is further elaborated in my emotion diary vignette and subsequently extended through an interview excerpt:

I wash my body and my hair as soon as I come home every day. My clothes, now not black anymore but faintly brown, smell distinctly like the abattoir – a mixture of blood boiling, burned fur, animal dung, fireplace and sweat – slightly upsetting. I keep them in a corner. The bare skin of my face and upon my arms is covered by a layer of dust. And after I snort my nose the paper tissue is marked by the same brown remnants.

Emotion diary, dry season

“When I will reach my house I will remove it, soak it, wash it, take another one. I already separated the clothes that I will bring to this abattoir. They are different, different. You understand? Like many they don't wash their clothes. They wear it, hang it, tomorrow they pick it and wear again. You see them dirty. Even the shoes they are wearing, the boots, they don't wash it and keep in house. So defiantly they get some kind of diseases”

Interview I.A.10, supplier and former butcher

With a breeze of wind dry soil blows up and sets on materials and bodies or is breathed in by species. This loose earth, imbued with its own multispecies vitality, becomes variously entwined with the activities and movement of other beings. In this regard, the brown soil of the lairages in dry season is visibly a harsh contrast to the black soil at the slaughter slap, blood boiling and de-furring site. The latter is marked by dried blood, carbon black of the fires, and other remnants of slaughter, showing impressively how it is a constituent for a composition of multispecies activities and intense relational enmeshment with activities of the other species that engage with it, in it, on it or through it.

As Figure 5 shows in a photo collection, soil is hard to clean and thus mostly left as it is, building up its layers of remnants and microscopic life. Then, regularly in the lairage (weekly) and occasionally at the slaughter slap and de-furring site (every few months), the dung or the top layer of the soil are collected or taken off and sold to farmers as fertilisers for their fields. This shows, again, the ability of the soil to take in remnants of activities of the dwelt community

and how these are in this case intentionally carried along to entangle anew somewhere else with other meshwork threads.



Figure 5: Slaughter slap and de-furring site behind the slaughterhouse. The small ruminants in the front are de-furred already, their fur burned off from the fires in the chimney. The others in the back wait for de-furring.

For I.A.10 and myself, the visible evidence of soil and other remnants on us has a different meaning and washing is the only way to separate our entanglement with the abattoir when we leave. Without this washing, as I.A.10 continues, we would risk infections through entanglement of our presence and activities in the abattoir. But having been part of the abattoir we know that we cannot wash everything off, as something of it became a part of us while we imprinted on it as well.

Soil, as the relational constituent to harbour and exchange remnants of activities by species and materials, is an example for a force in which continuously mutual becoming of particles, textures, species, experiences and knowledge are immersed in and through which life is lived in the abattoir. In other words, soil is part of the meshwork, where it serves as a foundation for the entire open-ended system. It contains a diverse community of micro-organisms, fungi, and insects, that can entangle with other threads of the meshwork and thus be shared along paths of other dwellers. Through that, soil becomes alive as well (Bellacasa 2019: 394).³⁹

³⁹ Bellacasa calls it “soil aliveness”, elaborating on “soil’s microscopic life in movement. Beautiful creeping drawings of nematodes, bacteria and arthropods furtively pass through” (2019: 394).

Hence, the composition and texture of soil – including dry and wet – directly impacts its multispecies vitality and thus threads of the meshwork. It is therefore part of life-making. This includes pathogenic potential because soil can harbour and transmit a multitude of micro-organisms that can lead to infectious diseases among species (Steffan et al. 2022: 35-37). It is constituting a basis for activities through which it is carried along by entangled webs of active agents (humans, flies, or other species). These agents defy separating ideas of “insides” and “outsides” of infrastructures as well as distinct separations of entities in and beyond the abattoir – through permeable and leaking bodies and porous materials with many openings and lively comings and goings of species and micro-organisms.

Exemplary here, Figure 6 and 7 show busy slaughterhouse activities. All work is performed on the cemented ground of the kill floor. As abattoir veterinarian I.A.15 notes: “if you look at the environment, the whole place is so porous. Like people just come in, in and out all the time”. This coming and going continues also after slaughter is over and cleaning is completed, by humans and countless other species. This is only one other example of how soil becomes part of activities, here labour on the kill floor, mixing there with



Figure 6: The entrance to the slaughterhouse.

other fluids and materials and leaving in new composition with meat products, bodies or down drainages to become part of a shaping texture of other pathways again. It is a basic force on, in, and through which many activities are entangled.



Figure 7: The kill floor of the slaughterhouse. Fluids and bodies entangling in activities.

3.2.2 Multispecies Agency and Attentiveness

Between the example of soil and flies is an important insight to be drawn, in the understanding of Ingold's (2011: 93) meshwork. Soil is not able to act by itself. It gives room for others to act with it or through it or gets distributed through them (and other forces like wind or rain). Flies, on the other hand, are able to move on their own. Every move they make is also a move of their attention, entangled in a web of threads of which soil is one constituent part for their abilities to act or react. "It is the attentiveness of this movement that qualifies it as an instance of action and, by the same token, qualifies [it] as an agent" (Ingold 2011: 93). Action, then, is driven by close integration of bodily movement and perception through entanglement in forces, from soil to wind. Thus, it is important to recognise that actions of flies involve varying degrees of skills, such as to find sustenance, places to lay eggs in decomposing matter, to avoid predators.⁴⁰ However, such skills are not all innate or predetermined; they are cultivated through the fly's own growth and development within the abattoir environment or beyond. In contrast, soil classifies as a force or "the ground upon which the possibility of (inter-)action is based" (Ingold 2011: 93). Nevertheless, in this chapter I start to show intimate multispecies vitality that is dwelling in and with soil or "soil life" (Bellacasa 2019). Because of that it is almost impossible to draw a line where soil ends and species begin. Thus, in accordance with Ingold's meshwork-thinking, I consider soil to have fluid agency – it is a force of the meshwork and also an agent with its own aliveness or attentiveness that grows, reacts, and changes along its path. In our time in the abattoir, the flies, my interlocutors, soil and the many other species and I exchanged something (e.g., microorganisms, body fluids on our soles, attention), reacted variously to it (e.g., developing skills like washing and perceptions of infection risk) and through it all became something slightly new along our engaging pathways as part of the abattoir dwelt community.

This means that, when species come into contact, it is never just about distinct beings that meet in single moments. Rather, entangled lines develop that are build-up of processes

⁴⁰ For Ingold (2011: 93), agency necessitates skill, and skill arises through developmental processes. Thus, it becomes evident that the process of development is essential for the exercise of agency in a moment. Attributing agency to objects that do not undergo growth or development, that lack skill, and whose movement is not intricately connected to their perception (as is done in ANT) does not make sense in meshwork-thinking. Thus, the interplay between movement, perception, skill development, and agency underscores the inseparable relationship between factors in understanding action in a moment. I do not go further into the depths of his discourses in social theory on (in-)animate objects, knowledge and agency.

influenced by many forces, skills, perceptions and interconnections. Therefore, the sociality and relationships of flies to other species in the abattoir emerged from ongoing re-interactions. It, for example, led to my interlocutors, other species and me giving up to keep these omnipresent insects away from products or our skin. We adapted to accommodate them as part of multispecies dwelling experiences in the abattoir. This, on the other hand, formed other intensities of entanglement, as they were left to walk skin or furs, leaving traces, taking new ones with them, feeding on slaughter remnants and meat products for sale alike.

This elaboration has shown so far that meshwork-thinking is a practice to follow continuous weaving lines that predate inclinations to separate and confine. It is a way to understand complexity of entanglement among species, through exploring pathways of becoming – of flies, humans and other species as line-making bodies in motion. They are constantly evolving through the processes of movement and interweaving of tracing lines, immersed in engagement with forces like wind, rain, sun, or constructions. I argue that this is the prerequisite to shed light on what makes this abattoir lifeworld, as the “thread-lines of the web lay down the conditions of possibility” (Wentworth 2016: 63), for both social and pathogenic entanglement.⁴¹

This meshwork concept is not all-encompassing and does not in itself include considerations of power or domination, rather it characterises open-endedness and constant movement. These can be (dis-)connected to other influencing mechanisms (Giddens 2015: 6). By daring to remain open ended and unfinished (Biehl and Locke 2017), it can be applied to investigate real life complexity along pathways of species and forces, to include various pathogens and disease transmissions. This acknowledges that humans are part of – not separate from – their environment and that a thing is never alone in the world. Using this meshwork idea is underlining that humans are intimately entangled in embodied movements of self and others, knowledge, meaning and emotions in multispecies life (Klenk 2018: 316, Miller 2019: 16). Then thinking within meshworks is changing how to think about places: from spatial locations to complex co-developing formations of pathways that are as much the sum of events and temporal processes that emerge from practices of intimate, rich and creative togetherness of

⁴¹ However, it is important to highlight that the meshwork itself is not understood as an agent or capable of agency (Ingold 2011: 93). It is the foundation in which agency emergences.

beings and things as coordinates on maps (Jones 2009: 266-268, Rock and Degeling 2016: 78). Thus, the multitude of entangled practices among multispecies dwellers in the abattoir are of critical importance. The abattoir is a certain gathering together, a knot of many threads of lives. It is entangled in a relational process of “mutual becoming”, where many lives entwine or engage in their pathways (Deleuze and Guattari 1987, Mol 2002, Haraway 2008, Ingold 2011). I follow this meshwork-thinking to combine it with medical anthropological literature that also includes flows of power, inequalities and domination in extended queries on how social and ecological factors emerge and interact to shape diseases, transmission, knowledge and perceptions.

Thinking with dwelling and meshworks adds to what Hannah Brown and Anne Kelly (2014: 280-2181) argue, that while human social and cultural factors such as beliefs, practices and values play an important role in shaping human behaviour and influencing the spread of diseases, they are not sufficient to explain the complexity of pathogen emergence, spread, or outbreaks. Therefore, they advocate for an approach of “extending the social”, that considers physical and ecological factors that enable and sustain transmissions of certain pathogens, including the environment, more-than-human populations and biophysical processes involved in disease transmission (Brown et al. 2015: 5). As Hannah Brown (2019: 123) adds on this matter, ethnographic writing can provide “attention to the complexities that take place beyond our descriptions of the concrete, and thereby troubles existing conceptualisations of the world around us”. Against this backdrop, research through meshwork-thinking can engage and capture nuances in interspecies health complexity and interdependencies and make them visible by daring to remain unfinished and open ended. In this view, ethnographic depth of the dwelling perspective in combination with meshwork-thinking can add insights to a dialogue of dissonances between real life complexities of how species are enmeshed in ongoing co-habitation and efforts of disease control. Therefore, the meshwork concept gains increasing attention in post-humanistic research that is concerned with an integrated and interconnected approach to health, which is ultimately needed for multispecies well-being (in e.g., Degeling and Kerridge 2013, Leach and Scoones 2013, Hinchliffe 2015, Singer 2015, Rock and Degeling 2016).

To conclude this chapter, it is evident that disease control policies and efforts that narrowly perceive the abattoir as a meat processing facility for specific domestic species overlook the intricate web of multispecies activities and interactions that unfold within this spatial dwelling. By solely focusing on labour aspects and overlooking effects of the abattoir as a shared habitat, such approaches can too easily fall short of comprehending the holistic nature of its multispecies functioning. This very part of the abattoir must not be neglected, as it is a big part of what makes this lifeworld.

In the abattoir, lives intertwine and contribute to the formation of a mutually transformative and open-ended meshwork as a complex lifeworld that needs in-depth analysis to avoid oversimplification. The human-made infrastructures, spaces and multispecies dwellers are intimately entangled and defy ideas of “insides” and “outsides”. These circumstances create a harsh contrast to structured assembly line movements, sealed access restrictions and strict disinfection barriers present in many abattoirs in accounts of highly mechanised places in the meat industry (in e.g., Pachirat 2011, Blanchette 2020, Segata et al. 2022). Thus, domestication, slaughter, meat processing and the multi-scale supply chain of products are only few factors embedded in health relevant entanglements in this abattoir among many other. The subsequent chapters delve deeper into this argument. They explore explicit proximities, specificities and temporalities of the abattoir dwelt community in relation to health through meshwork-thinking.

4. Temporalities of Attentiveness and Disregard

The idea of this chapter is to direct my attention to specific more-than-human life forms, their sociality, behaviors, movements, and traces in the abattoir multispecies meshwork in relation to humans and interspecies health. As has been shown, meshwork-thinking does not offer a prescribed methodology, as it is purely descriptive, urging researchers to trace intricate pathways that link various actors embedded in continuous relational interactions. The goal is not to establish linear causation, but to depict complex entanglements inherent in constitutions of multispecies social landscapes. By doing so, this chapter also highlights challenges of multispecies dwelling together in the sense of pathogen circulations among species. Hence, for meshwork-thinking about abattoir dwellers in relation to health, I trace paths of moving bodies in this spatial setting. For that I lean on the argument of multispecies anthropologist Thom van Doreen's (2014), who notes that "[w]hile we may all ultimately be connected to one another, the specificity and proximity of connections matters – who we are bound up with and in what ways. Life and Death happen inside these relationships".

4.1 Co-Habitation of Day Hawkers and Night Owls

He points at the wooden bench in the ram shed next to us. On it, a young worker currently eats his lunch, in-between ruminating and eating rams. He says that during nights this would be a place where people would sleep. He points at the bench I am sitting on and continues that it would be the same on this bench. People would sleep on benches to be away from the ground and through that further away from "bugs" there. But many, like rats and mosquitoes, would still come and bother them. Therefore, most would prefer benches around light bulbs as the light would keep rats away during the night. They would otherwise jump at sleeping people occasionally. Mosquitoes would be there anyway, he replies to my question of them being attracted to light.

Observation 13.09.22, rainy season

Engaging in daily routines of my interlocutors in the abattoir's lairage and market involves spending extended periods seated on wooden benches under shelter of sheds (see Figure 8). In the realm of my sensory experience, the other-than-human beings that inhabit my immediate surroundings during these times include ruminants, birds (also chickens), flies, other insects, lizards and dogs. However, numerous species remain concealed, in corners or burrows, evading casual observation. Nevertheless, the brief vignette underscores the significance of certain co-habiting creatures in the abattoir, particularly rats and mosquitoes, whose presence intensifies when night comes. So, let me start with rats, as these are the species expressed as most annoying co-dwellers by my interlocutors, due to multiple reasons.

What does it mean to have them as co-dwellers that entangle traces along paths in the abattoir?



Figure 8: Ram shed with a bench in the back on which people eat, wait, rest or sleep.

According to the introducing vignette, the direct entanglement with rats has a temporal dimension, as they would emerge from their burrows and hideouts in the night. Other interlocutors further underline this through accounts of their experiences:

“Usually in the morning the atmosphere and condition is that it is busy. [...] as I said, many people from all [around] come buy, buy, but within short time you see reducing small, small. The population of people are reducing because they buy and are going.”

Interview I.A.16, delivery driver

“It is many where these people are sleeping. It is many [rats]. They are right there. Sometime they bother people when sleeping but we don’t have any option. [...] They use to disturb them.”

Interview I.A.7, animal dealer

“In a week sometimes three times maybe more I sleep here in abattoir. [...] many [rats]. They bother me at night in the quarter here. Because I experience it in the quarter. Normally I see it entering the room at night, there is a hole.”

Interview I.A.16, cleaner

Extending the introducing vignette, these interview excerpts highlight that interspecies relations and entanglements variate depending on the time of day and night. During mornings human-to-human and human-to-domesticated-animal encounters seem to dominate⁴², based on labour purposes of the abattoir. However, this changes when the sun sets and the human

⁴² Importantly, non-human-animal to non-human-animal encounters are constantly happening – from domestic to wild, to semi-domestic, but I need to create a focus of analysis for this elaboration.

population reduces and varies in composition and activity to sit together, to cook, eat and talk, or go to sleep. Then, during twilight and night, the nocturnal rats become more active and roam freely through their habitats.

These small rodents are omnivorous beings, able to nourish themselves with a wide diversity of sustenance – from grains, fruits, vegetables, seeds, insects, decaying matter and even small vertebrates (Wundram and Ruback 1986: 212-213). Guided by their keen olfactory senses, rats navigate their environment, tracing scents of foods, easily scale walls, trees, and any vertical surface in their way (Sodikoff 2019: 102-103). Their agile bodies and powerful limbs allow them to squeeze through narrow crevices, finding their way into quarters, storage sheds, and communal spaces, seeking shelter and sustenance. These highly social creatures build vast burrow systems that can link human infrastructure underground through their long tunnels (Sodikoff 2019: 103-104). However, their adaptability also allows them to build their nests in untouched materials in dark corners or in cavities of building material (Bonwitt et al. 2016: 242). They are masters of making use of what material structures and activities of other dwellers, especially humans, present them with (Yu et al. 2022: 2). The abattoir, through human livelihood and dwelling activities with domesticated species, offers an abundance of space for burrows or nests and also a wide range of sustenance sources around feeding troughs, storage sheds, market areas, slaughtering sites.

At night, humans arrange their presence, the space they occupy in the abattoir, in habitual relation to rodent co-dwellers in attempts of avoidance. Whereas during day time, rats try to keep out of sight and range of their human co-inhabitants. Particularly at night, when humans and their domestic animal-others retreat to sleep and nocturnal animals emerge from their nests, these modes of evasion and inattention are amplified (Schnepel and Ben-Ari 2005). Through use of benches or illuminated range of light bulbs people then try to avoid unwanted contact with rodents, underlining intimate proximity and specificity of their co-inhabitation of shared space. Then electric light that is used during nights to oversee domestic animal-others is a way to gain desired separation, as rodents try to avoid natural or artificial light and keep moving within shadows and therefore do not like to come to sleeping humans in illuminated range (Kelly and Sáez 2018: 32). In Ingold's (2000) understanding, things that are within or part of a dwelling are critical as they have the ability to gather or unite, as well as separate

and exclude – which is visible with the example of benches or artificial light. As these examples show, the need or desire for shadows by rats and the separating material to the floor for “bugs”, is used to curate or redirect contact and delimit unwanted tactility by humans, by navigating material proximities through the creation of knowledge about the other (Godsil and Fanselow 2004, Brown and Kelly 2014: 293-294). Here, multispecies entanglement is connected to darkness and luminosity in the “peri-domestics” of the abattoir as a fluid home (Biehl and Neiburg 2021: 544).

Bodies of multispecies dwellers are interdependent with the specific time of day, light or darkness, the house-ing environment, their material underpinnings, and the intentions and sociability of the multispecies dwellers. This entanglement is in constant renegotiation by the co-dwellers, materials and outside influences, such as regular electricity cut offs that leave the light bulbs dark. Then, when new configurations of darkness come, new spaces are created to explore for rats that eventually stumble upon sleeping humans with salty skin or residue of dinner on their hands to lick up as a delightful treat (Schnepel and Ben-Ari 2005: 134-136, Bonwitt et al. 2017: 940).⁴³ Therefore, knowing one’s co-inhabitants and their temporal preferred patterns, acting and reacting is a necessary developed skill to create desired separation, intimacy, or comfort in associated core activities of multispecies dwelling to orchestrate outcomes of actions (Kelly and Marí Sáez 2018: 22-23, Aronsson and Holm 2022: 24). To stay with Kelly’s and Marí Sáez’s (2018: 32) understanding of multispecies domestic places, time-space configurations of practices of avoidance, intimacy and compromise become central in shaping co-existence of species through attentiveness to entanglements in the realm of a dwelling space (also Brown et al. 2015: 2). In light of Ingold (2011: 92), these skilled practices form a web of reciprocal and recurrent lines with the perceived environment and behavioural patterns of self and other species that unite and divide co-inhabitants along a series of adjustments, anticipations and evasions that simultaneously entangle them in processes of becoming knowledgeable together. This highlights how different species in the abattoir are, to a certain extend, only able to negotiate desired closeness and separation through their close physical contact in the first place, as prerequisite to understand one another.

⁴³ As Bonwitt et al. (2016, 2017) elaborate, rodents in domestic spaces come in intimate contact with sleeping human inhabitants, nibbling feet, licking fingers, biting flesh.

These choreographic practices of avoidance and moments of intimacy at day and night of both species are joint by moments of extreme intentionality by humans when they catch their co-dwellers. As I.A.7 tells me:

“They can jump on you sleeping, or bite. [...] Sometime they use to put all this local trap and catch them. So, when the trap catches the rat they use to throw it away. Sometimes people catch big rats here, bush rats, and dry it to chop [eat]. That is sometime.”

Interview I.A.7, small ruminant dealer

As he explains, people do not only orchestrate their co-habitation to the overwhelming presence of their co-dwellers in acts of avoidance but occasionally start to catch these unwelcomed co-inhabitants. They either throw them away, in acts of pest control or, when some people catch big “bush rats”, they prepare and eat them. The perceived pest or parasite then becomes something to eat, a source of nutrition. Simultaneously though, this forms other proximities of contact of intense physical entanglement that can have health consequences through pathogen transmission (Bonwitt et al. 2016: 235). The latter is underlined by the following vignette:

The NVRI veterinarians are sampling ruminants at the slaughter slap and de-furring site, taking blood and nasal swab samples at time of slaughter. I am of no more help to them so I walk around the hill. Close to the streambed border and adjacent to the small huts I find a dead rat. I cannot determine any apparent cause of death, no injuries or deformation. Going back, I tell my colleagues and suggest that it could be collected for sampling. After all, they try to trap rodents for testing with medium success every night. But my colleague resolutely shakes his head and says: “Who knows what it has. Better to stay away from it.” We leave it untouched. [...] In the evening we come back to set rodent traps. I walk to the hill to check for the rat while the others walk around the abattoir to set traps in corners, huts, the slaughterhouse, and drainages. The rat is gone. I wonder who or what species took it and for what and where to?

Field journal, rainy season

Following the reaction of my veterinary colleague, rats have long been associated with transmissions of various (zoonotic) diseases, making them significant in the realm of public health (Lynteris 2019: 3). As part of that the primary concern regarding rats is their ability to harbour and transmit bacteria, viruses, and parasites which frames them as “reservoirs” or



Figure 9: A dead rat at the blood boiling side.

“carriers” of diseases in health discourses.⁴⁴ The pathogens can be present in their urine, faeces, saliva, or on their fur, leaking with the potential to infect other species, among them humans, through direct contact or through contaminated materials, food and water sources (Brown and Kelly 2018: 283-284, Wood et al. 2021: 1). Through this, these species are framed as “epidemic villains”, non-human disease vectors, in the understanding of Lynteris (2019). However, this is not a one-sided transmission, as human remnants can also be the cause for permeable rat bodies to take in pathogens to carry them along. Therefore, for both species in the abattoir their co-dwelling is not only annoying or threatening because they can be caught, but it can also endanger their health resulting their intense entanglement. This creates another meaning of the multispecies abattoir meshwork for health investigations, when including pathogenic viruses and bacteria in permeable and constantly leaking pathways of bodies and things.

4.1.1 Multispecies Thread Proximity and Specificity

In this understanding, it is not only about moments when these species come into physical contact but also about their threads and pathways, physical remnants of body fluids on materials and also aerosols in the air, that get entangled with one another and acted upon in spatial, material, and temporal co-presence (Wood et al. 2021: 3).⁴⁵ Especially in domestic settings, which I understand the abattoir to be one, risks of transmission between rats and other inhabitants are high through close proximity and intense sharing of space. Then, the question of why the rat died and who picked it up is interesting to follow. If a human picked it up in a moment of cleaning, how was it done? What about the permeable soil beneath the carcass that can harbour bacteria, viruses and parasites to entangle with other species again? Before it died, where was it wayfaring and leaving traces behind? Where and how was it disposed? Considering the many other abattoir co-dwellers, it could also have been a dog or

⁴⁴ Rat species can carry pathogens such as *Leptospira*, *Salmonella*, *Yersinia pestis* (the bacterium responsible for causing bubonic and pneumonic plague), various hantaviruses, Lassa fever, and more (Evans 2018, Wood et al. 2021, Besong et al 2022).

⁴⁵ Wood et al. (2021) note successful virus detection in faeces samples for various viruses such as coronavirus RNA, rodent parvoviruses, and Morogoro arenavirus (MORV) in laboratory rodents. Viruses in rodent samples can be detected within 3 to 29 days post-infection. Moreover, many viruses, in this case Lassa fever virus, have been found to survive outside rodent hosts for several days. Wood et al. (2021: 3) found in their study that in co-habitation to virus host species, infection risk extends not only while the rodents are physically present in shared spaces but also after they have left, through contact with the faeces.

a cat that examined and picked it up to carry it off or to eat it. How would their permeable bodies have entangled then with microbes of the rat and how would their bodies leak and entangle with other bodies and materials in sociality again? If it was thrown away somewhere, other species like flies and their larvae would devour and decompose it, taking up traces with them or be eaten themselves again. What emerges of this enmeshment with pathogens that get transmitted along paths of bodies, species, materials? These questions aim to highlight Evans (2018) argument of how fragmented and isolated narratives surrounding rat and human agency, that limit their focus on narrow moments of physical contact, can result in disparate levels of explanation, often leading to a disconnection between questions of “what happened, how it happened, and why it happened” (ibid: 3). This ultimately creates a situation where the actions of rats are peculiarly detached from the broader ontological inquiry of human-rat co-habitation and how certain diseases emerge and persist.

Looking at Figure 10, the potential threat to human health expected to come from certain rodent species could not be more drastically exemplified by the full body personal protective equipment (PPE) of veterinarians in the process of dissecting a caught rodent from the abattoir. This is a harsh contrast to the close entangled co-habitation that many human dwellers have with these small mammals in their daily life. Thinking through meshwork threads here underlines complexity that can arise along a context of multispecies assemblages of not-distinct beings or entities, permeable and leaking, when they are operated under a zoonotic framework which expects potential of cross-species infection and circulation of infection through the presence of a certain species (Lynteris and Keck 2018: 23-24).



Figure 10: Process of dissecting a caught shrew in full body PPE (photo by a colleague).

It is important to underline that framing these species in simplistic narratives as pests or epidemic vilians is highly anthropocentric, reductionistic, and sientifically flawed through

neglect of complex socio-cultural, ecological and political factors that contribute to disease transmission (Lynteris 2019). Especially in the abattoir these species also work tediously as waste collectors, eating many left-overs of market and slaughter activities or other unwanted co-dwellers like maggots and small insect. This very circumstance, on the other hand, puts them at risk of coming in contact with pathogens from human livelihoods again. As I.A.8, a market seller, explains to me in that regard:

“Most of the animals are cows, like bulls, and goats. Most of the animals I am used to associate with. Because I am used to where they kill cow and goat. But we also have a cat in our shop. You have seen it before. It used to come early in the morning before customer come. We feed it with like meat, it will eat, it will leave. Then it will come back in the evening. It will come and eat again and in night keep rats away. [...] They [rat] use to come in the nights and eat what they get by themselves. You understand? And we also have lizards. At time we have bats. Because, you know, it is an environment comprised with many things. Animals, dogs, bats, insects, anything. That’s how it is. But most of the animals that we use to mingle with is cows and goats. At times with chicken because we have chickens inside the market, like local chicken. They are running around.”

Interview I.A.8, intestine seller

Rats, as well as the local chicken, insects, lizards and dogs he talks about would feed on what meat and other leftovers they find, which, according to I.A.8, would be plenty in the market. Similarly to I.A.8’s observations, the mental map of I.A.18 (Figure 11) shows places he spends most time and animals he associates with these places. For both, I.A.8 and I.8.18, rats are present as part of the market because it would present them with a lot of food, as they would feast on the many leftovers of daily activities.

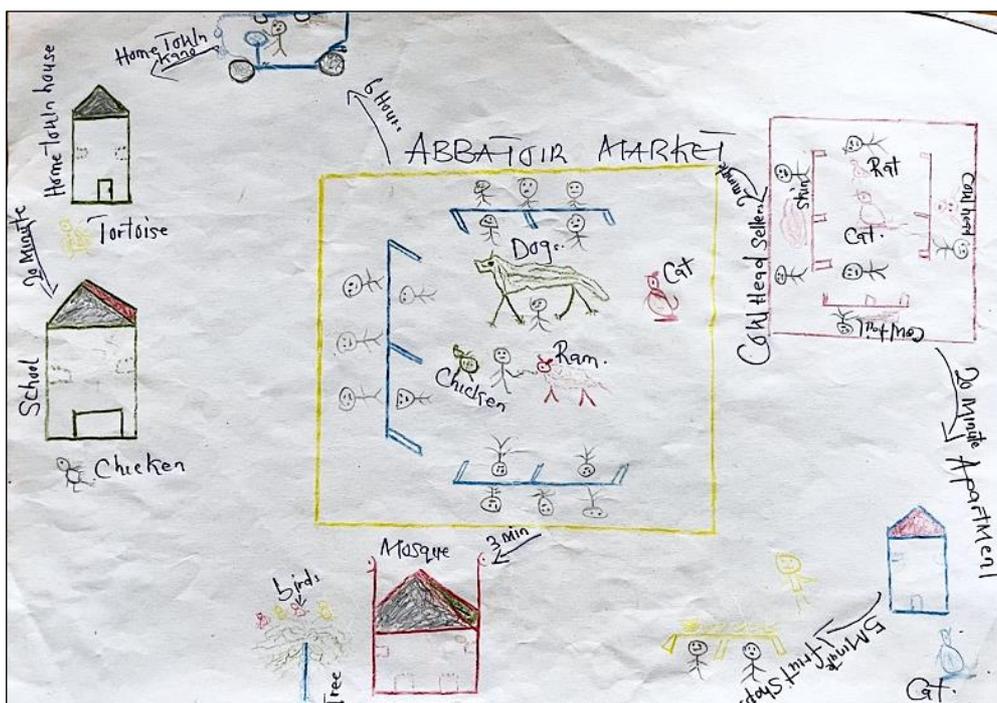


Figure 11: Mental map by the market seller I.A.18.

This entanglement is also facilitated by a scarcity of water. While a borehole situated adjacent to the slaughterhouse is available to clean the slaughter room at end of workday through a connected tube, the remaining area has no to little access to tap or free water.⁴⁶ This means that everyone has to buy water from suppliers which makes water a costly and limited resource. Hence, cleaning oneself, tables, dishes, animal-others, and utensils is done with as little water as possible, leaving out floors and other areas from extensive cleaning processes in the market, lairage, and other places. The rats are eating up the plenty abattoir leftovers and become part of these livelihoods and other multispecies activities, while their leaking bodies leave threads behind. Therefore, as Figure 12 underlines, their presence is deeply connected with ruminant slaughter, its products and domestic human activities of cooking and eating.



Figure 12: Left photo shows the empty market in the evening, after the workday is over. A chicken is roaming down the alley. Right photo shows the inside of the slaughterhouse with remnants of a late slaughter in the evening that will be cleaned the next morning.

In other words, rats carry picked up traces around the abattoir and beyond, take them in and leave threads behind through urine, faeces, or saliva. They create a complex web of pathways that entangle with other pathways or permeable bodies of other species and materials (e.g.,

⁴⁶ Further, Makwe and Chup (2013: 685) found out that the borehole water in the abattoir and its close proximity is not fit for drinking without proper treatment. They found that it is partially polluted by the effects of percolation of the abattoir effluents into the soil.

wooden benches, open soil). While these circumstances also put them at higher risk of contracting pathogenic traces from abattoir activities. Taking this into consideration, it highlights how rats and other multispecies dwellers become together with the abattoir activities and their threads, nutritious or pathogenic, in direct or indirect entanglement with body fluids of slaughtered ruminants and human workers from slaughterhouse and market activities. Then, rat movements and resulting traces around the market and other places relationally produce social as well as pathogenic qualities of materials and bodies and vice versa.

As part of this, Kelly and Marí Sáez (2018: 22) argue that shadows or lack of light, as well as structure and quality of materials play a crucial role for multispecies-microbial entanglement. The survival time of bacteria and viruses depend on surface, temperature, and exposure to light.⁴⁷ This opens up not only another potential pathogenic notion for the many times human and rodent pathways get entangled in moments of contact. The preference of shadows by rats and an extended lifespan of pathogens in the absence of UV-light creates a different meaning of relieving shadows of sheds or the market area. It creates other multispecies thread proximities and specificities in the dark corners, where people and other species wait and sleep, rest, eat or drink, socialise, and engage with material qualities of wooden benches or mats on the floor among differently fading microbial threads of countless other species on and in lively surfaces.

4.1.2 Blurry Co-Domesticity

So far, this analysis shows again how microbes and multispecies lives are entangled with the various human livelihoods of slaughter and domestication within the abattoir, making a separation between what a human or what a more-than-human dwelling or place of labour is hard to distinguish. What is a non-human-animal and what is human cannot be sharply differentiated. This creates continuous multispecies co-domesticity, of domestication, as part of abattoir livelihoods, as a mutual process that involves unintentional and unforeseen transformations in all involved species (Tsing 2012: 144, Huttunen et al. 2021: 123).⁴⁸ Then, in

⁴⁷ According to Kelly and Marí Sáez (2018), direct sunlight or ultraviolet (UV) kills viruses in varying speed, they are photosensitive, meaning their prolonged survival in the darkness of shadows outside their infested hosts.

⁴⁸ As Tsing (2012: 144) notes, most species along the imaginary line of wild to domestic, including humans, “live in complex relations of dependency and interdependence.”

accordance with arguments from Swanson et al. (2018: 2-3), what is “domestic” and what is “wild” are blurry and messy categories in human practice, closely intertwined and embedded in dynamic and ongoing negotiations that shape human and more-than-human co-existence within the abattoir.

This takes us back to Lynteris (2019) argument on how categorisations can shape problematic understandings of precarious or unproblematic interspecies connections. These framings too easily disregard intense entanglement in more-than-human sociality, where all species are entangled in processes of becoming along their pathways (see also Nading 2013: 64). It is important to draw attention to these marginalised multispecies assemblages in domestication for dominant narratives. They too often become obscured and relegated to the periphery, their significance overlooked and undervalued when, after all, emergence of zoonoses are deeply associated with the complexity of multispecies conditions in contemporary agro-industrial sites (Swanson et al. 2018: 3-18). With this in mind, this chapter underlines how, by attending to skilled practices of awareness, intimacy, avoidance, surprise and disregard that shape multispecies entanglement, we can develop a more nuanced understanding of intimate performances that are part of processes of mutual becoming that deeply render competencies required for disease control (Kelly and Marí Sáez 2018: 24).

I like to extend this argument, before I conclude this chapter. For that I come back to the mental map of I.A.18 and the account of I.A.8. As they tell me, both have intimate contact with cattle and small ruminants because they sell meat parts at their market table. This is part of their profession and they do not mind this close contact. However, as part of spatial qualities of the abattoir, they have many more direct or indirect contacts with other species. For both, dogs are intrinsic part of the abattoir. They function as watchdogs in the night and search the market when it is getting empty. Chickens are similarly given co-dwellers. As photos in Figure 13 show, they are feeding themselves in the midst of market activities, eating up the pieces that drop from tables that are disregarded by sellers or customers in-between human feet or pick flies from body parts on display. Flies, again, are annoying but a hardly manageable part of handling meat in open spaces.



Figure 13: Semi-domestic chicken roaming in the market around feet or through cattle body parts on display on the market floor. These chickens are owned by people and at one point killed and consumed.

While accepting this co-habitation amongst many of the other species, they create more intimate ties to a cat, by feeding and occasionally petting it. The cat creates desired separation to rats by hunting them. Even though they do not stay at night when rodents emerge from their nests and engage in more intense sociality with their co-dwellers, they do not want them near their shop, perceiving them in similar narratives to what was discussed in the example of the dead rat and my veterinary colleagues.

In the realm of multispecies domesticity within the abattoir, feeding a cat, being fed by humans, hunting, eating or avoiding species or certain illuminated or dark ranges, and accommodating the presence and movements of chicken, lizards, dogs, birds, insects, and other signify pluralities of distinct moments of perceptions, practices, and skills. These moments are defined by unique intentions, aims, and habits that emerge from entanglement. They influence how species navigate conditions and interactions with other species. In other words, in accordance with meshwork-thinking, these are not linear processes but practices, perceptions, and knowledge of species that emerge out of constant entanglement and engagement in the first place. Along these continuities, pathogenic potential is influenced not only by their temporal and spatial location but also by the character and tempo of encounters.

These processes of commensality can shed light on occasions of pathogenic exchanges between species (Brown et al. 2015: 22). However, I have shown that in the abattoir these occasions are enmeshed in ongoing processes that make it impossible to detangle bodies and

materials into distinct beings that only come into contact in single moments. This adds to literature by challenging spatial assumptions inherent in anthropocentric health research, including ideas of “disease reservoirs” and “spillovers”. These concepts focus on simplistic notions of certain species as villains and on singular moments of viral transfer. Both clash with continual and multidirectional modes of encounters that make it nearly impossible to examine a species in isolation or to pinpoint exact moments of pathogen exchange (Brown and Nading 2019: 12).

Finally, the analysed paths along processes of co-habitation in this chapter also showcase how quickly other species can transition from being considered “unruly bodies” (Zhan 2005), pests, objects of disgust or disregard to becoming pets, allies, or sources of sustenance (Kelly and Sáez 2018: 22-24). These cases exemplify the adaptable nature of cross-species interactions and the dynamic quality of attitudes towards other creatures which can fluctuate through entanglement, stretching in or beyond comfort zones of shared vulnerability, entangled empathy or sociality.

Thus far, this chapter has shown that by approaching the abattoir as a domestic space, where day and night and light and darkness are animating forces in a complex meshwork of interspecies negotiations of intention, attention, neglect and vigilance in multispecies intimacy of permeable bodies that share space with pathogenic potential, we can nuance understandings of socio-cultural and environmental contexts within which people, rodents and other species interact with potentials of infection and contagion. As Guattari (2015) notes, meshwork-thinking reminds us here that species and materials are always participating in the creation of knowledge and meaning. Further, following Appadurai’s (2015: 221) argument, this analysis thus far has underlined that humans are joint in “agency, intentionality, vitality and purposiveness” by other species through engaged multispecies assemblages in continuous arrangements “of many kinds of monads, actants, molecules”. As a bridge to the next chapter, processes of multispecies enmeshment are not only negotiated, influenced or developed along the daily circle but also other temporalities.

4.2 Intensities in a Multispecies Peri-Domestic Meeting Place

“They always be in abattoir but they built, this place where we always standing, they built it because of the animals during the rain. So, whenever rain fall we use to draw it [goats] and put inside until rain stop and then carry it outside again. [...] Many people are sleeping where we are keeping our animals. They sleep in sheds where we keep animals when there is rain.”

Interview I.A.7, animal dealer



Figure 14: Small ruminant lairage during rains. The domestic animals are put under the cover of sheds where people also spend their time.

As I.A.7 explains and Figure 14 shows, during rains and rainy season people and animal-others share smaller spaces that remain dry. This is reducing separation and creates more intimacy among different species, desired or undesired. Thus, another shaping factor of paths in the abattoir meshwork is seasonality. In Ingold's (2000) understanding, material structures of sheds, benches and dry corners gather multispecies bodies in their need or desire to find shelter from heavy rains. This results in closer physical proximities. In regards to the previous chapter, this can influence intensity of entanglement along meshwork threads with potentiality of certain pathogen circulations. Not only is the shared space in the shadow of sheds smaller but research also shows that, e.g., viruses that circulate between rodent and human bodies survive longer in milder temperatures and humid conditions (Casanova et al. 2010: 2712). This means that the darkness of sheds and additionally also humid weather conditions prolong life spans of certain viruses that can affect multispecies bodies in these times.⁴⁹ Further, research shows that many zoonotic and vector borne diseases experience

⁴⁹ Moreover, Davis and Calvet (2005: 305) have linked high rainfall to high case-rates of rodent-borne zoonoses, as the abundance of rodents would increase in these times. However, this is not the case for, e.g., Lassa fever,

seasonal variations (Dzingirai et al. 2016: 2). This resonates with my findings, which is why the following vignette starts to explore effects of seasonal variations in more detail:

I walk through the lairage with my rubber boots, choosing each step carefully to not sink too deep into the mud. The cattle that remain here are standing together on dryer patches, their legs and lower bodies marked by the mud. As I go along I see various insects swirling over the mud, which is a colour pallet of black, brown and green. A completely different sight to the brown dusty soil in dry season that got set on my skin, clothes and in my nostrils.

Field journal, rainy season



Figure 15: Photo above shows the flooded lairage. The second photo shows young cattle on a dryer patch. Its body marked by the ground.

which has its peaks in dry season with one reason being that the rodent reservoir species for Lassa fever is coming more frequently to domestic setting in their search for food and then dwell together with human inhabitants in shared space (discussed in e.g., Kelly and Marí Sáez 2018).

Following the vignette and Figure 15, conditions of open and lively soil, discussed in chapter 4.2, combined with ubiquity of water in rainy season create standing puddles and deep mud. It is a force that gives room to other or more of known co-inhabiting species to dwell and flourish, such as mosquitoes, flies or parasitic worms (Ukwubile and Bingari 2018, Anunobi et al. 2019, Viña et al. 2020). These conditions again bring other dwellers, such as people, cattle or goats closer together on dryer patches in attempts of avoidance. What constitutes flourishing of some species creates conditions that negatively affect others in processes of constant mutual engagement with muddy soil. This creates knowledge, skills and practices. As I.A.5 explains:

“Because some of them now for this rainy season, when they go to bush we cross check how they look, how they came back. We give them food in the night before we go. Early in the morning when I come I see them, I observe them. If there is something I can give them [medicine] before they go out to bush for grazing. They can eat, drink water from there and come back.”

Interview I.A.5, animal dealer

Human dwellers and their farmed species of small and big ruminants fall sick more easily or get infested by parasites that flourish and dwell in the mud and puddles. All are in need to medicate themselves or receive medication more frequently than in dry season. My interlocutors tell me that they suffer from diseases such as pneumonia, typhoid, and especially from malaria transmitted by co-dwelling mosquitoes.⁵⁰ As my interlocutor in the introducing vignette of the previous chapter states, mosquitoes are numerous and hard to avoid when night comes. Therefore, the focus of this chapter will be on malaria and entanglements of mosquitoes and humans in the abattoir. I acknowledge that malaria is epistemologically often not considered a zoonosis (Lynteris and Keck 2018: 22). However, meshwork-thinking in this context allows to cross these boundaries – in understanding of multispecies entanglements in fluid space – to explore how symptoms related to malaria and the disease profile are essential part of pathways within the dwelt world and becomes relevant for considerations about zoonotic diseases.

4.2.1 A Mosquito Meshwork

The abattoir presents good conditions for the uncharismatic creatures, “that tend to populate accounts of multispecies conviviality” (Kelly and Lezaun 2017: 368), to dwell and thrive. In the

⁵⁰ This statement is a collection of accounts from my interlocutors. As the animal dealer I.A.5 explains, “my sickness is Typhoid and Malaria, except something wounds me.”

abattoir, slaughter starts as early as 4:30 or 5 o'clock in the morning while, as shown in the previous chapters, many people stay until the sun sets or even later and through the night. They do it without the protection of a mosquito net or inside a fumigated room. This links many abattoir activities (labour and house-ing) of human dwellers with the peak times that mosquitoes emerge for blood meals. In Harley's (2011: 63) notion, in a metaphorical sense, humans can be seen as impromptu wombs or placentas for anthropophilic mosquitoes. They offer necessary nourishment for fertilisation and egg-laying processes, as well as subsequent development of their offspring into fully mature organisms through habitat creation and subsequent feedings.

Mosquitoes depend, among other environmental conditions, on aquatic sites for egg-laying and larval development (Takken 2022: 113). These small critters undergo a metamorphic cycle lasting around ten days, transforming from egg to larva, pupa, and finally into an adult (Nading 2014: 5). Adult mosquitoes seek shelter in garbage piles or weed patches. Additionally to the wet conditions of open soil in rainy season, the ubiquity of water used in slaughter and animal husbandry leaves many waste piles, puddles and drainages as fluid or convenient habitats in the abattoir for the whole metamorphic circle all year around. Further, the number of mammal bodies, from humans to others, offers a wide variety for blood meals needed by female mosquito species as requisite nutrients to support egg development (Hawkes and Hopkins 2022: 20). Therefore, mosquito co-dwellers as vectors for infectious diseases bring attention to their socio-ecologies or bodily movements within certain spaces (Beisel and Wergin 2022: 33).⁵¹ As Kelly (2021: 566) highlights, research about malaria, its infection pathways and potential control, is conceptualised strongly in regards to the domestic. It situates domestic and fluid topographies of peri-domestic spaces as central for infectious

⁵¹ I acknowledge that malaria is not considered in many discussions as a zoonotic disease because it is not transmitted between vertebrate animal-other to human or vice versa (Keck and Lynteris 2018: 22). However, this vector borne disease emerges through more-than-human co-habitation and was the most impressionably present in my time spent in the abattoir. Thus, I will take it into this elaboration. Malaria is a high burden endemic disease in Nigeria, with most related annual deaths among African countries (26,6%), caused by Plasmodium parasites and transmitted by female "Anopheles" mosquitoes that feed on human blood (Aju-Ame 2020, Okeke 2012, WHO 2021). The genus "Plasmodium" is responsible for human malaria, with "Plasmodium falciparum" and "Plasmodium vivax" being the most common culprits of the disease. In Nigeria "Plasmodium falciparum" is the most common prevalent malaria parasite species with "Plasmodium malariae" and "Plasmodium ovale" accounting for the rest of cases (Oyibo et al. 2023). Other diseases can be transmitted via mosquitoes, e.g., yellow fever, dengue, rift valley fever and others (Dzingirai et al. 2016: 2).

human-mosquito contacts.⁵² According to Kelly and Lezaun (2017: 570), these “spatiotemporal in-betweens [...] play a critical role in the transmission of malaria” because mosquitoes are most active in nocturnal-hours and twilights of mornings and evenings, when house-ing and socialising activities of people are often centred in and around domestic spaces.

On top of the peri-domestic meeting places in the active times of mosquitoes, human activities and mosquito habitats interact constantly. This creates new temporary as well as ongoing entanglements along pathways, as Figure 17 and the following vignette show:

I sit on the bench in-between two stables full with rams. We talk, like most mornings, while she waits for her customers to come and eat their early lunch or late breakfast. She cleans the drainage that goes by the shed while we talk. It rained for the first time in a long time yesterday and the previously unnecessary drainage now becomes useful. However, it is currently full with plastic, ram faeces and other kinds of waste. She uses a stick, while standing more or less in it with her flipflops, to move the mass onto the road. I see insects flying above and around her activities and a strong smell of animal dung mixed with dump site surrounds us. After a while I stand up to go into the market and notice three throbbing and swollen bites on the back of my thigh, slowly starting to itch – mosquito bites I now got through my trousers treated with mosquito repellent. My malaria treatment just ended a week ago, leaving me exhausted but relieved for relatively mild symptoms, while I still take my prophylaxis every day as before. I wonder about the number of bites she must have gotten.

Field journal, end of dry season

This vignette brings up important information for human-mosquito meshwork entanglement. It elaborates again how I get intimately entangled with the abattoir in my times spent there – being bitten by mosquitoes and infected with malaria as a consequence in both fieldwork periods. Through this I became more aware of these co-dwellers that most often only become visible through annoyingly itchy skin or symptoms of the dangerous parasitic infection in a body. What this vignette further shows is that mosquitoes do not only follow clear temporal patterns of activities. Sure, they are most active in gradients between day and night, the twilight hours, and most numerous in rainy season. However, they also make use of many habitats in both seasons and get roused up by activities of other co-dwellers to then not shy

⁵² Takken (2022: 113) adds that the most important African malaria vectors are highly anthropophilic and developed the habit to take their blood meals in and around domestic spaces during gradients of nocturnal hours. This mostly refers to Anopheles species that prefer human blood over the blood of other species (Takken 2022: 113). I acknowledge that there are many species that are not Anopheles and feed on blood from non-human-mammals which can result in malaria symptoms in the affected species. However, I do not have much information on that in the abattoir context and it would also extend the frame of this thesis. Nevertheless, it is important to consider for a wider meshwork analysis of multispecies co-dwellers, mosquito and other mammals, in the abattoir. There is a gap of research on effects of Malaria on, e.g., livestock and humans (Ruiz-Castillo et al. 2021).

away of a given blood meal (also see Figure 16). This underlines how for my interlocutors mosquitoes and malaria are both omnipresent co-dwellers and signify a recurrent health problem. Even though rapid tests for malaria are easily available with relatively low costs, it leads for many to regular treatments without medical tests when experiencing a variety of symptoms – fevers, general weakness, chills, headaches, and other. For many, these symptoms or the malaria diagnosis are a constant by-product, produced by the fluid and multispecies conditions of the abattoir being a hotspot for this parasitic infection.⁵³ Following I.A.8: “in any contaminated place you find mosquitoes. You know if there is mosquito there is malaria. That is like that here.” As part of that, labour and living conditions of



Figure 166: Drainage in the process of being emptied. A cleaner is pushing the water to flow down into the stream. Through the movement a cloud of insects is flying above the water.

people at the periphery of society in the abattoir draw attention to how “neglect remains central to malaria’s high profile” (Kelly and Beisel 2011: 72) despite receiving much focus in public health.

4.2.2 (In-)Visible Traces along Multispecies Pathways

Against this backdrop, accepting occasional bouts of malaria especially in rainy season without undergoing medical tests to determine the specific type of infection can be problematic not only because of the side-effects of the strong medication on bodies. Besong et al. (2022) highlight this in their investigation of Leptospirosis, a zoonotic infectious and waterborne disease with both national and global significance. The endemic bacterial infection manifests with symptoms similar to those of malaria. It is transmitted through bodies of vertebrates such as livestock, dogs, and rodents, as well as through soil, mud and water, particularly in

⁵³ According to some of my interlocutors, Malaria rapid tests, even though they are relatively cheap (around 1000 Naira) are still too expensive on top of cost for medication (800-3000 Naira) to do every time related symptoms are experienced. Some of my interlocutors earn little more than 1000 Naira a day to support themselves and their family. Thus, their economic situation is one reason they self-medicated with malaria medicine when symptoms become too strong. Moreover, treatment methods vary from bio-medicine to “herbal medicine”, both easily available inside the abattoir by street vendors, unregistered small shops or surrounding pharmacies. As I.A.9 explains: “In time I do local medicine o. Me I dey do local medicine. If I do tablet now, sometime it no go work for my body, I go for local medicine.”

humid and flooded environments (Karpagam and Ganesh 2020: 835, Alinaitwe et al. 2019: 636).⁵⁴ Building upon previous chapters, the conditions of the abattoir, characterised by its multispecies social dynamics and its interaction with soil, particularly in form of a flooded mud landscape which species engage with, create a complex web of relational threads with a potential for entanglement with microorganisms like *Leptospira* bacteria. But how exactly is this relevant for this focus on malaria? Here, Besong et al. (2022) research shows a significant seroprevalence for Leptospirosis in patients that originally came for clinical testing and treatment for malaria in Southwest Nigeria. Further, they state that “malaria is the usual presumptive diagnosis among febrile patients [...] [causing] a high probability of misdiagnosis and under-diagnosis of leptospirosis, sometimes with fatal outcomes” (ibid: 2).

This example serves to underscore challenges of co-habitation, when certain expectations among human inhabitants lead to a reluctance to undergo tests and instead resort to self-medication in times they experience a range of symptoms. This is driven also by other factors such economic constraints. Expectance of malaria as the causing infection for a wide range of symptoms extends not only to sick individuals but also to medical personnel responsible for conducting tests.⁵⁵ These challenges are discussed worldwide in many contexts, from Brazil to Malaysia, where Leptospirosis is a growing health concern (Sukeri et al. 2018: 1-2, Karpagam and Ganesh 2020: 835, Martins and Spink 2020: 19-20). Leptospirosis remains a neglected tropical infection, as it predominantly affects poor communities in developing countries which leads to negligence in public health. Among other, this is also because diseases such as malaria receive higher recognition and thus higher information and treatment priorities in public health.

Therefore, the example of Leptospirosis being invisible partially through a high prevalence and health risk of malaria is connected to Ruth Prince (2019) argument of how epidemics interpellate publics and public health. She notes (2019: 135) that those epidemics that gain visibility “focus funding, intervention, expertise, and global attention on a particular disease” and through that form “pandemic publics” that influence multi-scale and multi-actor stages

⁵⁴ It is not displaying symptoms in many other-than-human animals though leading to a variety of symptoms in humans (Besong et al 2022). Contaminated soil, mud, and water, primarily from the urine of infected animals, serve as reservoirs for the bacteria.

⁵⁵ For example, in the PHC facility next to the abattoir the standard test for a wide span of symptoms is for malaria and typhoid.

of discourse and engagement. However, this centred visibility renders other health challenges or life struggles epistemically less visible or even invisible in the public (health) sphere (ibid: 148-150). I use her argument to give more scientific ground to how the visibility of the malaria epidemic in Nigeria, and especially in hotspots like the abattoir, develop to make infections like Leptospirosis invisibility and by that increase health risks for infected people.

This argument can also be extended to COVID-19, as my abattoir interlocutors all say that the disease is not a reality in their life and that they do not know anyone who got infected by it. This perception is strongly challenged by positive test results of sampled animals by NVRI colleagues. Moreover, test results in the adjacent PHC show that almost one third of HCW were positive in tests of the other project modules in the study.⁵⁶ On top of that, a veterinary colleague and I both came down with the disease during fieldwork in rainy season, detected by rapid-tests. This means that COVID-19 was, at multiple times, part of the multispecies dwelt community and its vicinity but did not get recognised as such. This gap is most likely also due to symptoms that are easily connected to known infections like malaria (or typhoid). Synergies like these are discussed widely by scholars that research about COVID-19 in African counties (Macgregor et al. 2022: 6-8). These findings are interesting to briefly extend, as the wider research project centred funding flows and research focus on COVID-19 but in the reality of the abattoir the disease was never perceived as a relevant health challenge at all.⁵⁷ This shows two things. On the one hand, it underlines again how infections can dwell undetected among multispecies communities, being part of pathways. On the other hand, it highlights how global health funding regimes might meet unexpected local realities. This described interplay of multispecies enmeshment and disease (in-)visibility can lead to multi-scale neglect and to a longer period that a pathogen can circulate undetected between multispecies populations, potentially burdening humans and animal-others alike. Therefore, disregarding malaria in this exploration along traces in the multispecies dwelt community – because it is often not considered as a zoonosis with a global threat potential⁵⁸ – would create a gap. It would limit

⁵⁶The NVRI and FLI colleagues sampled ruminants, dogs, rodents and domestic animals of HCW and found positive samples in various species for SARS-CoV-2, the virus causing COVID-19 disease. Further, NCDC sampled the HCW in the PHC facility next to the abattoir and got 7 positive results out of 25 samples taken via nasal swab.

⁵⁷ Apart from the state measures for controlling infections, e.g., lockdowns, business restrictions, and more which directly affected their livelihoods in the abattoir.

⁵⁸ Among other, malaria has the most devastating effect on neglected communities and is not present (yet/anymore) in most of the richest countries, in Europe or anglophone America. However, these countries heavily direct funding flows for research and health initiatives in neoliberal global health – which can be seen in

a wider understanding of how certain entanglements form knowledge, practices, perceptions, skills, conditions and “intersecting precarities” (Macgregor et al. 2022: 2) along life lived as part of the abattoir dwelt community.

I was, however, also told repeatedly that many abattoir workers did not fall sick of malaria (or related symptoms) in years. Here, Aju-Ameh (2020) comments, it is too simple to say that only mosquitoes are responsible for high malaria rates. Studies show that in high burden endemic locations infection rates in mosquitoes are often lower than in humans. One way to add depth to the circle of transmission, then, is by the symptomless group of people who “are the inadvertent parasite reservoirs responsible for continued transmission” (Aju-Ameh 2020: 2). Thus, temporarily killing mosquitoes as a method of malaria control would fall short of the long durée, if people do not treat their symptomless infections (Takken 2022: 116-117). Observing diseases through this lens of dwelling in a meshwork of relational permeable bodies together with the parasite and other micro-organisms re-focuses transmission on complex multispecies ecologies in understanding of constant mutual becoming. Hence, human-mosquito-parasite-abattoir entanglements produce risks, uncertainties and complex public or political encounters and negotiations about unruly bodies that are all beyond simple control or understanding (Segata 2022: 166-167).⁵⁹

Concluding, multispecies entanglement of day and night gradients and shadows and luminosity expand to include dry and rainy periods as well as temporalities of intensities in peri-domestic in-betweens that exist in the abattoir. They all come together in emergent “partial affinities” (Despret 2013) through permeable and leaking bodies that include potential circulation of pathogens. Conceptualising the abattoir as a dwelling is a remarkable illustration of how co-habitation experiences are distorted and condensed along threads of a meshwork, in both social and pathological ways. Malaria traces along meshwork threads more constantly or visibly through symptoms, public focus and relatively easy access to tests and

the example of COVID-19 and the money that got mobilised by these countries to find treatments, vaccines and disease emergence research as they were heavily impacted by the disease (Ohiri et al. 2022).

⁵⁹ However, until a vaccine is available mosquito control (chemical, biological, genetic), human behavioural changes (treatment, strategies of contact avoidance) and house-ing improvement are the only Malaria prevention method (Takken 2022: 114-116). Many debates among social scientists and anthropologists concern themselves with the moral landscapes of public and global health efforts on malaria prevention through mosquito control or eradication, environmental planning, genetic manipulation, and so forth (see e.g., Hall and Tamir 2021).

medicine. However, as the examples of Leptospirosis and COVID-19 show, that does not mean that other pathogens are not also co-forming live-lines of dwellers. They tend to co-form meshwork threads pertaining invisible next to the deep traces of malaria. Therefore, the abattoir dwelling realm, alive through emergent multispecies agencies and countless micro-organisms, variously detectable in plain sight, at imperceptible edges, through itchy skin or a range of symptoms, requires not an elucidation but an exploration of the obscure and mundane in order to fully grasp interplays between entanglement, engagement and detachment along multispecies meshwork threads in ethnographic enquiry.

Overall, chapter 5 highlights in its two parts an attentiveness to activities of other species. Rats would not go to empty spaces without humans, their domestic animals, and their traces of food, water and other materials (van Dooren et al. 2016, Bonwitt et al. 2017, Kelly and Sáez 2018). The same accounts for mosquitoes and their dependence on fluids or water for larvae and in some cases blood from other species for egg laying. Therefore, within and around this multispecies dwelling, inhabitants build an interdependent sense of voluntary or involuntary meshwork community that emerges through continuously embodied codes of co-existence of attentiveness, skilled performances of engagement, experiences with one another and inherent shared negotiating sociality that is part of this becoming community. Through their entangled sociality, they co-produce a complex web of meanings and lifeworlds. These processes of multispecies co-habitation are influenced by many temporal (past, present, future, urgency, seasonality), socio-economic, cultural, political, and historical factors and extends far beyond the original purpose of the abattoir as part of the meat industry. All co-create an abattoir dwelling and its interplaying various meanings, elements, and permeable bodies over time.

These various qualities and activities continually create an intense web of “unusual encounters”.⁶⁰ After all, if it was not for the abattoir, these meshwork entanglements would not exist in their divers and numerous proximity and specificity. Here, the meshwork metaphor reminds us that species are always participating in engagement, creating

⁶⁰ In relation to the understanding of “Anthropocene as a period marked by a proliferation of unusual encounters (Erev 2018: 130).” The term “unusual encounters” means that familiar things or species come together in unfamiliar or unsettling ways, when encounters are engagements across divers and plural differences among beings and things (Faier and Rofel 2014: 3).

knowledge through contacts or practices, while at any time being already entangled in knots of other lines of becoming that change and entangle differently over time (Klenk 2018: 320). Summarising, as Ingold observed, human actions do not only establish conditions for other humans and their domesticated species inside the abattoir but always also for a wide range of more-than-human beings and vice versa. This means that “forms of organisms are not compendia of difference but ever-emergent outcomes of processes of growth” (2011: 27). This very view is the bridge to the next chapter of the abattoir and its streambed as a multispecies niche.

5. A Fluid Niche

When spaces become the sum of pathways and events rather than locations on maps, where to draw the line of examination without cutting off important complexity of multispecies entanglement in the messiness of real-life in a research setting? I examined multiple influences on abattoir meshwork threads within the brick walls of the abattoir dwelling space so far, with few comments of multispecies activities in and beyond these confines. However, as meshwork-thinking shows, these surmountable walls are no barrier for movement and entanglement of critters, humans and micro-organisms. Thus, I aim to elaborate further on explicit abattoir activities beyond these assumed borders. For this I concentrate on an area that is officially not part of the abattoir anymore but crucial to include along multispecies lives of the dwelt community. I concentrate on the streambed that is bordering the Northern side of the abattoir.

5.1 Entanglement in an Abattoir Backyard

I follow him as he walks around the streambed in his rubber boots. He is using an old plastic bag that he picked up from the ground as a glove to collect body parts from all around the established incineration site. After this procedure we stand on muddy ground, where maggots crawl in decomposing fluids around the pile of old and to-be-burned organic material. Different kinds of birds observe us from the distance while first two young women and then a man with a sewing machine on his shoulder pass us in flip flops that sink deep into the mud. A group of goats is coming from further downstream towards us, stopping regularly to feed on what they find in piles of plastic and organic material. He starts the fire and the tyres create deep black, biting clouds. While we talk he rearranges the pile occasionally, head and upper body disappearing inside dark clouds.

Field journal, rainy season

Later he tells me:

“I bring bad organs with tyres there and start build pile, burn it. Then I collect organs from around, dog carry and chop [eat] it, you see it last time. [...] I do not have gloves. Sometimes I beg I.A.6 for some glove and he gives me.”

Interview I.A.17



Figure 17: Condemned body parts from the slaughterhouse after a workday ready to be burned in the streambed.



Figure 178: My interlocutor I.A.17 in the daily process of incinerating disposed bodies and body parts of abattoir activities.

To continue analysing specificities and proximities of interspecies thread-entanglement I draw on the involvement of my interlocutor I.A.17 with the streambed. I remember the worried comments of my veterinarian colleagues in the project after I tell them about the day and show them photos (see Figure 17 and 18). They want me to protect myself better to not get bovine tuberculosis (BTB) or something else from the pile. They add that I.A.17 most probably is infected with BTB or other pathogens due to his daily work. Further, the first time I inspect the pile of disposed organs of a slaughterhouse workday in conversation with I.A.6, an abattoir veterinarian, he anxiously raises his voice to stop me from leaning closer. Both, my colleagues and my interlocutor worry that I get infected through pathogenic traces in the air or by accidental physical contact. These moments accentuate how the entanglements with disposed organic materials and the streambed activities of I.A.17 are in their intensity potentially harmful for his health.

That day, his lack of personal protective gear during his streambed activities is striking compared to face masks, gloves, and cotton uniforms worn by abattoir veterinarians in their post-mortem check routine in the slaughterhouse and the fear of my colleagues and

interlocutors. The next time I follow him to join his work in the streambed he wears gloves, thin white ones from the veterinarians. I notice that they have multiple cuts already, leaving his skin exposed. After I ask him he says that this happens quickly and often he also cuts himself at tyres. He washes the wound with hot water then but it would regularly be swollen and painful for several days afterwards. One of his colleagues later explains to me on that matter:

“Yes. So, the hand gloves is of two types. We have the red one and the red one is really hard and rubber. But with this one we find very difficult to carry the meat and so. So, we often cannot use that hand glove. But we are advised on using it but we are not used to it. Sometimes we beg for the skinny one because of when they advised us that we should not do it empty handed.”

Interview I.A.16

I.A.16, also a cleaner who is occasionally in charge for incineration, explains that they would have gloves. However, the kind of multi-use gloves they are provided with are too big, too hard, inconvenient to handle. Thus, he and his colleague prefer the thin ones from the veterinarians, even though they would rip more easily. Or they end up not using any, even though they are advised otherwise. But would it be sufficient to use the multi-use gloves for proper protection? How would they be taken off, cleaned, stored, when would they be renewed? What about tyre smoke or pathogens in the air? What about their activities in the abattoir before and after incineration when the gloves come off? What about the butchers that process the animals from which the parts are condemned without any PPE? ⁶¹

Hanna Brown (2019: 132) reminds us that PPEs operate under the assumption that it is feasible to disentangle individuals' intricate connections with the world and simplify them into a more linear network of relationships and interactions. Further, she argues, that in a way the use of protective equipment aims to transform complexities into more streamlined encounters and interactions, striving to create a world where certain elements can be separated from others (Brown et al. 2015: 3, Talia 2017: 286). However, as this example highlights, materials can never be taken out of their complex social worlds in which they become meaningful, are used or not used (Drazin and K uchler 2015: 1-5, Brown 2019: 132).

⁶¹ There were several occasions when butchers brought condemned organs that were heavily marked by lesions to the veterinarians. They carried the body parts in their hands and afterwards continued their work.

Thus, what the accounts of I.A.16 and I.A.17 show is that by giving equipment it cannot be assumed that it is used properly, in which situations and which not, or that it is simplifying entanglement. Moreover, the notion of adequate protection solely through the utilization of gloves is significantly undermined by their profound involvement with various materials, species, soil, and other factors such as wind within the abattoir setting. The objective of this account is to contribute to understandings of the intricate abattoir meshwork comprised of knowledge, multispecies entanglements and material usage, as well as emergent meanings attributed to objects within their respective contexts. This shows how anthropological inquiries can enhance insights into ecologies of materials for health professionals tasked with developing effective strategies for health protection (in argument of, e.g, Ingold 2012, Brown and Kelly 2014, Brown et al. 2015: 3).

5.1.1 Canine-Abattoir Threads

To continue, before and after I.A.17's activities in the streambed, his work is situated in and around the slaughterhouse, cleaning and tidying up the environment in sociality with colleagues and other co-dwellers. He and his actions are one part of the streambed-abattoir meshwork, joined by many other people. However, other species are in even more constant entanglement with the composition of the abattoir and streambed. Dogs are among the most striking co-dwelling species. They are intensely enmeshed with the streambed and simultaneously in intimate sociality with other abattoir co-dwellers and the spatial setting. As the photos of Figure 19 underline, they move freely through the lairage, market, slaughtering sites and surrounding settlement. As I.A.6, tells me "[...] so for the dogs that roam around here, most times they are usually around here". They are "scavenger dogs" (I.A.15) that roam free and eat what they find or are occasionally fed by their owners, mainly abattoir butchers. For them they function as hunting dogs in dry season.



Figure 19: Photo above, roaming dogs licking up remnants from a late slaughter at the slaughter slab and de-furring site. Lower photo, dog gnawing on left-overs of the incineration site in the streambed.

An example of complexities surrounding potential pathogenic manifestations of multispecies entanglement in and with a peri-domestic space in public health concern can be found here. As I.A.17 tells me, the half-burned organic materials he has to collect every time to pile again for burning are dragged away and consumed by dogs. For many of my interlocutors, these dogs are an intrinsic part of the abattoir dwelt community, as elaborated in chapter 5.1. However, as I.A.15 tells me, there are also risks perceived in their presence.

“So, I don't think that the dogs are supposed to be here but due to the nature of our environment and how things are in this country we try to work together. We try as much as possible to collect all the condemned organs, organs that are not good actually, or diseased organs too. We incinerate them in a proper way there [the streambed] actually, to avoid all these scavenger dogs from coming in contact with them or even eating them actually. We try as much as possible to prevent such things.”

Interview I.A.15, abattoir veterinarian

I.A.15 tells me that abattoir activities arrange to the presence of dogs and as part of that try to incineration organic waste properly to disconnect dogs from hazardous abattoir waste. The accounts and experiences of the daily re-collection practices before incineration, also visible in Figure 20, underline day-to-day difficulties of this preventive method. As I.A.15 and others argue, there can be multiple health challenges connected to dog ecologies around abattoirs. Concerns about diseases transmittable between humans and dogs through



Figure 180: Carcass parts around the streambed.

direct or indirect contact with infected animals, their secretion and through consumption of contaminated raw meat and abattoir effluents are raised – from salmonella and E.coli species, Brucellosis, to various parasites (Ibrahim et al. 2021: 2)⁶². Further, when dogs come in contact with livestock or livestock feeds, there is added risk of introducing or perpetuating diseases in livestock populations. The wide range of free movement and intense entanglements of dogs with abattoir activities, co-dwellers and all their traces and materials have the potential to circle various pathogens through the dwelling as well as to other inhabitants.

In a Moroccan abattoir study, Bardosh et al. (2016: 92-93) used an ethnographic approach to analyse health concerns related to dogs in close proximity to abattoirs. Specifically, they focused on “Echinococcus granulosus”, a zoonotic tapeworm that is distributed worldwide and is mostly transmitted between dogs, livestock and people.⁶³ Following Bardosh et al. (2016), detecting, treating and eradicating the tapeworm is costly and challenging due to its complex transmission network. In Nigeria, the exact proportion and impact of the zoonotic disease is unclear, following Ohiolei et al. (2020: 1). However, cases are being reported, with

⁶² Mostly my interlocutors referred to rabies as an endemic Nigerian health concerns in relation to dogs (Mshelbwala et al. 2021). Rabies is the deadliest disease on earth with a most gruesome course for the infected species of humans, canines, and others (Nadal 2020: 2-3). However, as I.A.15 and I.A.6 both abattoir veterinarians underline, the owners of the dogs mostly participate in the free state-led annual vaccination campaigns for their dogs.

⁶³ Mature tapeworms inhabit the small intestines of dogs, their definitive hosts, releasing eggs excreted in faeces. Ruminants on contaminated pastures ingest these eggs, leading to the development of hydatid disease in humans who accidentally ingest the eggs through water, vegetables, or contact with dogs (Zhan et al 2012: 1-2). It is also known as cystic echinococcosis (CE). Following Bardosh et al. (2016: 95), the disease causes significant morbidity and death in some cases.

highest case rates in hunting dogs or in cattle from Northern states (Ohiolei et al. 2020: 2). The dogs of the abattoir assist their owners in hunting and otherwise mostly roam free, leaving their faeces on dry or muddy abattoir ground all year around. They come in intimate contact with spaces of co-dwelling ruminants and humans. Further, ruminants are brought into the abattoir mainly from Northern states, co-dwelling in the lairage for varying amounts of time. Thus, entanglement with spatial qualities and other stationary or fluctuating co-dwellers is intense and continuously ongoing. This creates dwelling conditions for the whole transmission cycle of a tapeworm by the example of Bardosh et al. (2016), that primarily impacts economically vulnerable communities.

Important do underline again, apart from malaria and in a way COVID-19, it is not clear exactly what parasites or harmful bacteria dwell among the abattoir community to what extent. This example is supposed to highlight other challenges that can result along processes of intense multispecies co-habitation when certain pathogens move into the specific conditions of the sociality of a dwelling space such as the abattoir. However, as has been clarified before, transmissions of pathogens are not simple linear processes, but rather intertwined with complex biosocial dynamics that defy easy understanding or control (Brown and Nading 2019: 11-12). In this example I highlight conditions that co-habitation ecologies can create for pathogen circulation. I do not go into detail on diverse forms of (bio-)political, economic, and individually motivated purposeful attentiveness and responsiveness on symptoms and diseases among inhabitants – knowledge and skills that might develop out of intense relational enmeshment of owners and their dog companions.

5.1.2 Zoonosis-as-Emergence and Blind Spots in Multispecies Entanglement

Here this elaboration needs caution. The research on the emergence of zoonosis emphasises, as highlighted by Porter (2013: 143), the interdependence and complexity of interspecies relationships, which can also serve to reinforce existing hierarchies based on race, class and gender (Lynteris and Keck 2018: 8). In that respect, certain professions in the abattoir, such as hazardous waste disposal, hunting, animal slaughter as well as certain house-ing arrangement, can expose individuals to health risks. This can lead to stigmatisation of certain professions

(“dirty work”⁶⁴) or put blame on behaviours (no gloves, socialising with or keeping dogs, dwelling activities) when fear of zoonotic pathogens becomes part of considerations. Embedded power hierarchies and resource limitations – e.g., when adequate financial support for materials or medical care is not provided, available or too expensive – can then too quickly be overlooked. In light of that, an abattoir veterinarian explains to me:

“Sometimes they get blood samples from dogs for various, depending on the topic or the project they are working on. Sometimes they do come for blood. Sometimes they are working on blood parasites or something like that. They usually have positive results actually.”

H: “And is there then a follow up treatment or something like that?”

“No, I wouldn't say that. It is actually hard because of, I know it has something to do with money and monitoring something and getting the drugs and other things actually. They are expensive. And these people, again, they don't mostly allow anyone to just come with any injection and use them on their dogs.”

Interview I.A.15, abattoir veterinarian

As I.A.15 highlights here without providing specific details, researchers often obtain positive results when taking samples from abattoir dogs for various studies. Yet, this typically does not result in any follow-up action of treatment or monitoring, due to multiple reasons. As Keck and Lynteris (2018: 8) argue, although “zoonosis-as-emergence” draws on critical animal studies and posthuman frameworks that highlight interspecies entanglements, it is important to approach the topic in consideration to broader social and economic contexts in which zoonotic diseases emerge and persist. For Baquero et al. (2021: 1-2), this means asking questions on well-being and suffering in peripheral multispecies communities and the marginalising apparatus that defines such health and rights to have it. Accordingly, for the abattoir this means considering the socio-economic background in which people make their living. Among other, this also means acknowledging that dogs’ function as vital sources of income through their bush meat hunting in dry season for their owners. These owners, predominantly butcher assistants, are working in informal employment settings of the abattoir, dependent on the market of meat demand for their income. Thus, in Baquero et al.’s (2021) understanding, it is important to emphasise again that many people in the abattoir live in the periphery of society with precarious and minimal income, having to weigh whether money can be spent for medical treatment, food, accommodation, family, the next journey home, or for other means of daily survival.

⁶⁴ “Dirty work” as a stigma of dirtiness in or of certain occupations, e.g., in slaughterhouses (McCabe and Hamilton 2015: 96).

Finally, the example of dog enmeshment also highlights potentials of ethnography to illuminate "blind spots" (Keshavjee 2014) within a given multispecies context. In contrast to the portrayal of rats as epidemic villains in local and public health narratives, as well as by abattoir workers and NVRI colleagues, dogs are perceived as posing less health risks and are widely accepted as part of daily abattoir life. They are viewed as companions, hunting allies, and scavengers, constantly visibly present as co-dwellers in the abattoir community. Whereas rats are hunted or also killed with poison, dogs are left to roam. This, however, does not negate the fact that dogs, due to their close involvement with abattoir activities, their special integration into the community, their wide range of movement, and also limited socioeconomic possibilities of their owners can contribute significantly to health concerns. While rats are exemplified as potential carriers of pathogens, the role of dogs in this regard is often less noticed in contexts of abattoir research in Nigeria. This can lead to a blind spot in understandings of and attention to intricate dynamics and interconnections of species in relation to health investigations.

Concluding with a connection to chapter 5, this example of human-livestock-dog-parasite-abattoir meshwork highlights, once again, the depth and shifting nature of how co-habiting species are and can be perceived and differently socialised with in the abattoir. Dogs are trained, rewarded, fed and petted to serve as companions and allies for hunting and security. Yet, their entanglement with multispecies abattoir activities can quickly render them a potential threat and reconfigure them as unwanted pests that need to be kept at a distance while their owners can become the focus of blame. These different perceptions and their influence on purposeful sociality dwell together, fluctuating and interdependent, within the abattoir meshwork community. The permeable and leaking threads of cleaners, PPE, dogs, veterinarians, organic materials, microbes and other species and elements gain significance and value as they intertwine, reinforcing each other and forming dynamic patterns within the unfolding fabric of the abattoir-streambed-lifeworld.

5.2 A Niche for Multispecies Muddles

Taking the opportunity of being alone in the streambed I walk around, my rubber boots sinking into the mud. I hear some activities of the abattoir – hacking, cut-off conversations and screams of to-be slaughtered goats. But it is distant and I start to concentrate on other details in my immediate surrounding: I hear splashing of stream water, sounds of different kinds of birds, buzzing of many flies and other flying insects all around me. The ground is covered in old and new plastic waste, blank but dirty bones, egg shells and other undefinable things. Here and there a meaty carcass part that was not collected to be burned again. I walk to the busy drainage at the edge of the slaughter slab and de-furring site and follow the flow of fluids digging their path through the mud until they reach the stream. There they mix with stream water and get carried away with the current. The different fluid colours, dark brown to black from the drainages and lighter grey of the stream, are easy to differentiate as far as I can see. The dung pit is steaming and under a closer look it is vibrating in front of my eyes from miniature life flourishing in its warmth and on its rich nutritious material. In a drastic realisation that I cannot even start to comprehend the sheer amount of species around me – in the mud, the various amounts of waste, the incineration site, the dung pit, in fluids – goosebumps start to cover my arms in a mix of excitement and disgust.

Field journal, dry season

Organic waste as part of the streambed-abattoir meshwork, where many pathways knot together, illustrates complex but ongoing interdependence and enmeshment of co-dwelling species of the abattoir. Humans utilise the streambed terrain by disposing of their waste



Figure 21: Decomposing fluids and materials with maggots crawling in them.

materials through burning or dumping, but it is not just the humans who react to or benefit from this. Other co-dwelling species are drawn to the streambed either because it is their natural habitat, a place of migrating through, or because of opportunities created by human activities, as has been elaborated previously with dogs. This convergence of species leads to a meshwork of unexpected intensities and combinations, including microbes from slaughter activities, passing humans, roaming dogs, birds, rodents, insects and other creatures crawling on and in the soil (see Figure 21).

In relation to chapter 4.2, Puig de la Bellacasa (2019: 385) adds that there “is more life underground than above ground” that takes in the activities on its surface. And as Appadurai

(2015: 222) notes, “there are more forms of [interspecies] social life on earth than we have grown used to imagining”. While all these different dwellers interact in sociality with one another, they leave microbial marks and take new ones along, building up their meshwork threads (Ingold 2011). They feed on leftovers from incineration or prey on species that feed on it. They drink or live in the mix of fluids from drainages and the stream, thrive or die in conditions of the muddy streambed. And they assist the decomposition process in the steaming dung pit. As Raffles (2010: 2) notes, these “pollinators, pests, disease vectors, decomposers [...] [are] not just deeply present in the world but deeply there, creating it, too.”

Pests and parasites can thus become allies and perform activities their human co-dwellers are not able to perform. In accordance with chapter 4.2, Jean-Henri Fabre (1913) wrote about the capacity of maggots and flies “to purge the earth of death’s impurities and cause deceased animal matter to be once more numbered among the treasures of life” (in Raffles 2010: 130). Further, Michel Serres (1982) explores how parasites can also be beneficial to the host, when performing functions that the host is unable to do on their own and can even help the host to survive in a difficult environment. The latter can be seen with the rats and chicken discussed in chapter 5.1 that feast on remnants of abattoir activities, clean up the market and remaining areas of leftovers and other bodies-out-of-place, such as maggots (Evans 2018). In these non-linear processes, what is disposed from abattoir activities manifests in bodies and landscapes and thus, in and beyond meshwork threads of the porous spatial borders of the abattoir dwelling. In notion of Tsing (2012: 151), “[b]iological and social diversity huddle defensively in neglected margins. In urban jungles as well as rural backwaters, the jumble of diversity that imperial planners tend to consider excessive still teems.” In understanding of Ingold (2011), these ongoing practices in the streambed can be understood as tracing along paths, where well-worn paths through regular movements “trace deeper grooves and make certain forms endure” (Wentworth 2016: 122).

5.2.1 Sympoiesis in Multispecies Muddles

What I describe here and what can be seen in the photos in Figures 22 through the meshwork-lens can also be linked to what Donna Haraway (2016: 32) articulates as the emergence of a “sympoiesis”⁶⁵ – a process of collective becoming – that gives rise to what can be described

⁶⁵ According to Haraway (2016: 58-59), sympoiesis, a term which may appear simplistic at first, carries profound implications. At its core, sympoiesis refers to the act of “making-with” - the recognition that nothing in this world

as "multispecies muddles". These muddles arise from decades of reciprocal adjustments and adaptations, enmeshment within a shared physical environment, as highlighted by Kelly and Lezaun (2017: 392). Such an understanding emphasises interconnectedness and interdependence of all actors in a given ecosystem and ways in which their interactions can give rise to emergent and unpredictable phenomena, from infectious (zoonotic) diseases to queries about immunity. The latter is important to include as well, as "immune systems exist almost ubiquitously across the living world [...] virtually all domains of biology and medicine are connected to immunology" (Pradeu 2019: 1).



Figure 192: Photo on top: Multispecies mingling of a goat, a dog, and flying birds around the incineration site. Lower photo: The dung pit in the streambed with birds searching for food and rising smoke from the incineration site behind.

is truly self-organising or autopoietic which resonates deeply with Ingold's notion of the meshwork. Thus, sympoiesis is a concept that is suited to describing complex, dynamic, and situated systems of meshwork threads in this case, that are responsive to their environment and historical context.

The immune system, in its ongoing efforts to maintain the cohesion of a biological entity, performs a critical function in constant negotiation and re-drawing of boundaries. By determining which elements are permitted to be a part of the individual, the immune system participates in complex processes of differentiation and identification that underlie the very notion of an organism as a discrete bounded entity (discussed by Esposito 2017). As I.A.6 and I.A.15 wondered and observed:

“I think these animals at some point get resistant to this to some of these microbes. I don't know how they develop the resistance. I am only suspecting that this is what happens. Because being exposed to these microbes several times and you still find them alive, running and walking around. So this is amazing but hard to really tell what happened. [...] But it is amazing, you look at them and they look apparently healthy, you know.”

Interview I.A.6, abattoir veterinarian

“[...] funny enough, they hardly come down with any diseases. [...] Maybe it is because they already acclimatised to the nature, I don't know, the environment. I can't really say but they have kind of a very strong immunity to these kinds of diseases or the small, small diseases actually. Even the first year we came here, the first few weeks we spent here, most of us came down with something [...]. But along the line everything was kind of okay. I think we got like an immunity to such things. When you stay longer in this thing you have kind of an immunity to such a disease or something like that.”

Interview I.A.15, abattoir veterinarian

In what both abattoir veterinarians explain, we can see the immune system as a powerful force in the ongoing production of biological enmeshment that does not allow a clear distinction between self and other. Against this backdrop, enmeshed multispecies muddles underline that interspecies relationships are complex and often messy. They involve interpenetration and looping around one another. Species eat each other, struggle with digestion in immune responses and therein engage in partial domination, submission, exclusion, assimilation, or a mix of all (Haraway 2016: 32). In Haraway's view, this results in the establishment of sympoietic arrangements that we commonly can refer to as ecological assemblages. These relationships are characterised by ongoing creative negotiation, invention, and collaboration to stay alive or even healthy and to navigate in a shared environment with a sense of stability amidst constant change. Then, healthy as well as unhealthy ecologies generate a multitude of sympoietic responses in multispecies muddles that are intimately entangled and impact all involved species in differing ways. In the words of meshwork-thinking, entities along their threads within fluid space have the capacity of transformation without necessarily disappearing or creating something fundamentally different (Ingold 2011: 75-86).

Visible in the observations of I.A.6 and I.A.15, sympoietic responses can lead to both disease and (partial) immunity – vitiating, processual and open-ended among species and individuals.

Against this backdrop, Kelly (2021: 568) conceptualises domestic spaces of “modern architecture” from an immunological standpoint of human residences as a means of individuals to live in proximity yet remain insulated from neighbours in a state of co-isolation. However, she (2021: 568) concludes that the price of this safety through seclusion exposes new dangers, as “lasting immunity cannot emerge from compartmentalisation and exclusion” but from “something more complex that implicates and stimulates the common” (Esposito 2011: 18). In this regard, Nading (2013: 71) argues that human and other species’ bodies are not outcomes of linear, taxonomic evolution but rather results from processes of “symbiogenesis,” wherein different species merge and blend, to give rise to new forms of life. Therefore, in intricate choreography of bodily defences, a new paradigm emerges which is challenging the notion of immunity as a rigid military complex (Nading 2014: 95). Instead, the revised body takes on characteristics of a modern workforce, where diverse immune cells navigate porous borders of bodily existence. These immune cells demonstrate remarkable flexibility in the face of antigenic challenges. Then thriving bodies are not those constrained by rigidity and inflexibility. Rather, they possess a capacity for adaptation, embracing the dynamic nature of their surroundings. Thus, scientists have come to recognise that healthy bodies are those capable of responding and adapting to new antigenic realities in changing multispecies landscape.⁶⁶ Additional existing literature (e.g., Helmreich 2009, Benezra et al. 2012, Lorimer 2015, Fuentes 2017, Pradeu 2019) underlines that there is a dire need to understand microbes and more-than-human sociality “not only through their pathogenic threat to human health but also through the crucial roles they play in producing functional immune systems” (Cañada 2021: 166).

However, within the expansive array of microorganisms that are co-forming the abattoir meshwork, certain pathogenic microbes may have the potential to overcome immune responses in moments of bodily vulnerability, such as through synergistic effects of toxins, co-

⁶⁶ Nading (2013: 71) draws on the biologist Dorion Sagan (2011) who emphasised and suggested that the immune system evolved not to eliminate pathogens but rather to select for beneficial symbiotic relationships in the microbial-filled environments of our metazoan ancestors.

infection with other pathogens, malnutrition, or the emergence of novel microbial mutations (Abu-Raddad et al. 2006, Singer and Rylko-Bauer 2021). This can lead then to short- or long-term health impediments, created by existing unusual or human-made “unhealthy ecologies” (Segata et al. 2022: 399) of abattoir livelihoods combined with dwelling activities embedded in wider societal and planetary processes.

5.2.2 Scalability of Meshwork Traces

In light of this, it is important to expand the scale or permeability of this sympoietic meshwork. Similar to movements of dogs, rats, flies, mosquitoes and humans, a multitude of other entangled species traverse the abattoir-streambed terrain. These species participate in varying compositions in sympoietic arrangements, defying spatial boundaries and veering off in unexpected directions. Along their journeys, these species encounter a plethora of new entanglements with other materials and beings, to give rise to novel and unforeseen relationships. For instance, wild birds can be far travellers and simultaneously vectors that may alight on the close-by poultry market or beyond, mingling with landscapes, humans, domesticated and wild species. In Haraway’s (2016: 29) words, species are companions and “species infect each other all the time [...] for good and for ill”.

The stream that runs through the abattoir dwelling space constitutes another vital force. It is a component of this ecological fabric, as it carries with it the traces of livelihood activities and its inhabitants or is habitat to others. As Daniel et al. (2012: 4) and Daminabor and Damen (2020: 1) underline in their studies, abattoir discharge into streams show bacterial counts above recommended levels and also a variety of intestinal parasites that could impact multispecies health. Water bodies like rivers and streams serve as crucial water supply for humans and multispecies others in Nigeria. Thus, abattoir traces are disseminated to other houses, farms and species also through stream water. This creates, once again, a web of interrelatedness that spans beyond the confines of the abattoir itself. And as I.A.15 notes, these slaughterhouse effluents in the stream can in turn also circle back again to the farmed species meant for slaughter:

“To some extent these animals in the abattoir again, they go out grazing sometimes and they then drink this water. So it is just like a circle. We find a disease here and it again comes back to the animal when it drinks the water. So that is what happens actually.”

Interview I.A.15, abattoir veterinarian



Figure 203: Main drainage spilling its contents into the streambed, digging a path into the ground until it reaches the stream.

Similar to what can be seen in Figure 23, many abattoirs in Nigeria are located near water bodies, which makes the enmeshment of this stream with this abattoir and the wider region one example among many other (Daramola and Olowoporoku 2017: 26). Further, as previously discussed, microbes travel not only with forces such as water but also with air flows, or with help of other species' bodies (Cañada 2021: 165). Possibilities for movement and new interactions are endless, and each one gives rise to unique specificity and proximity of entanglements that co-shape meshwork paths of the abattoir but also the wider area in complex ways.⁶⁷

This chapter highlights how human manipulation of the world is creating niches. According to Fuentes (2017: 7-8), human communities “make it” in the world through niche construction in which the rapidly increasing tempo, impact and outcome of construction in the Anthropocene has deep roots dating back to the Holocene and even Pleistocene. In other words, humans are niche constructors that shape more-than-human ecosystems and by that always shape themselves in overlapping, permeable and enmeshed lines, never straight evolving or predictable lines. This intricate web of connections illustrates multifaceted ways

⁶⁷ This becomes evident in multiple accounts of effects of slaughterhouse activities on the surrounding settlements in Nigeria (e.g. Daramola and Olowoporoku 2017: 34, Omole 2008: 85-86).

in which entities, both human and more-than-human, build collectives that coexist and interact with each other and (pathogenic) microorganisms in complex entangled ecologies that evolve to become together in emergent interaction with other determinants of multispecies health and illness.



Figure 214: The streambed water mixing with abattoir effluents. Over the surface small black birds chase insects.

Concluding, the abattoir and its inhabitants are wayfaring in a broader tapestry, woven together through the microbial movements of bodies and fluids alike (see Figure 24). They manifest in and emerge along bodies, landscape and architecture of the surrounding area and further off places. In Ingold's (2011: 31) words: "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?". To extend this notion, I lean on arguments from multispecies anthropologist Anna Tsing and biologist Dorion Sagan and highlight that messy, multi-scalar contexts like this are in need for more in-depth (ethnographic) examination to highlight the porosity of distinctions between local, national and even global entanglements among ecologies and (political, economic, science) systems to better understand pathways of life-making in growing damaged landscapes at the brink of dire repercussions of the Anthropocene (Tsing 2005: 1-18, Sagan 2011, Tsing 2015, Tsing and Swanson 2017).

6. Conclusion

“It is clear, then, that ethnographies do not aim to impartially produce “objective” accounts of the world (whatever these might be). Instead, this approach is grounded in the conviction that making others fleshy and thick on the page, exposing readers to their lives and deaths, may give rise to proximity and ethical entanglement, care and concern.”

(van Dooren and Rose 2016: 89)

In this thesis, I adopt a comparatively novel analytical framework to investigate an abattoir, adding new perspectives to a large body of literature on the global meat industry. Through the utilisation of the dwelling perspective and by leaning on Ingold’s meshwork-thinking, I approach the abattoir in a multispecies way in which no entity is distinct by itself. I show that, even though meshwork-thinking is rather phenomenological and offers little prescribed methodology, it gives tools to investigate open-ended, unfinished, and emergent entanglement in the texture of this lifeworld. The analysis of relational pathways along which life is lived explores the abattoir in an embrace of real-life complexity with no straight-lined answers.

In three comprehensive chapters, I address the central research question of what multispecies co-habitation in the abattoir can mean and how people and other species affect and relate to one another along meshwork traces from different angles. As part of that I explore different temporalities, proximities, and specificities in moving entanglements of species with each other, the dwelt community of the abattoir, and interconnecting forces within shared space. I highlight that all cannot be separated and that action, knowledge, emotion, practice and perception emerge out of entanglement in close co-habitation. Thus, throughout time and across shared space, various social beings gradually dwell together in the abattoir and creatively navigate through it to build themselves a home in it (Vergunst and Árnason 2012: 3). Furthermore, this thesis illustrates the dynamic, non-linear and perpetually evolving nature of these processes, which react to social, political, economic, temporal and environmental forces like rain or light.

Against this background, I introduce some insights into multiple house-ing activities by human dwellers in the abattoir, from cooking and sleeping to individual sentience towards the abattoir. I subsequently build on that and clarify that dwelling is relational, a process of rebuilding by multispecies inhabitants. Thus, the abattoir is never final or still. I examine soil,

as a ground force of the dwelling space with its own vitality, and flies as active omnipresent critters. Both are leaking, permeable and interconnecting everything within and beyond the dwelling realm. Soil is alive by taking multispecies life in and giving room to it. It safes remnants and is animated through moving bodies, wind or water. Flies are attentive to their needs in various morphological stages for decomposing matter, body fluids and their spatial and multispecies surrounding. These two examples show that human and more-than-human species develop practical knowledge and skills along pathways that get entangled with soil or flies in the abattoir: from washing clothes and bodies to accommodating to their presence on skin and other products. Both have the potential to harbour and carry along multiple pathogenic agents that become immanent part of the dwelt community through their ubiquity along multispecies movement. Where the infrastructure and certain activities of humans in the abattoir aim to uphold processes and measures of structure and order in space, fly critters and the soil continuously challenge or even defy these ideas of separation.

I continue to build on these first clarifications of how no being in the abattoir is distinct but already enmeshed in the wider abattoir meshwork in multiple ways. I highlight continuities and mutual becoming of humans and rat critters framed as disease vectors. Herein, I challenge notions of singular “spillover events” or simplistic ideas of “disease reservoirs” through emphasising continuous entanglement. Thereafter, I immerse deeper into human-mosquito co-habitation through a focus on malaria, the only human disease I know for sure to be recurrent part of the dwelt community. I lay an initial focus on varying intensities of co-habiting with mosquitoes and Plasmodium parasites. As part of that, I argue that the dwelt community changes proximity and specificity depending on seasonality – with rainy season resulting in smaller shared spaces and certain species increasing in numbers that lead to a negative health impact on others. On that basis, I explore how intimate co-habitation can create expectancies among abattoir workers as well as medical personnel that can lead to potentially harmful invisibilities of other diseases when experiencing a wide range of symptoms. I argue that this can affect humans and other species alike and is an important part of what makes this multispecies lifeworld and beyond. Nevertheless, inquiries on mosquito-plasmodium-multispecies-meshworks with a focus on mosquitoes that feed on other-than-human blood, which can cause symptoms in animal-others such as livestock, remain unexplored but important to investigate in future work.

In my last chapter, I explore the streambed and how materials, such as PPE, can never be extracted from the setting they are immersed in. I challenge their idea of simplifying entanglement into more linear and controllable momentary (dis-)connections. Their use emerges from dwelling together with people in contexts in which blueprints of these materials become meaningful, disregarded or otherwise adapted in immanent social life. Afterwards, drawing further from the example of the streambed as a crucial part of the abattoir lifeworld, I follow intense entanglements of dogs with hazardous abattoir waste, their human owners and other abattoir critters through their free movement. I argue that an epistemic focus on species framed as “epidemic villains” in health research, such as rats, can lead to blind spots of other ecological complexities with pathogenic potential. Continuing with the streambed, I take more emphasis on a topic that peeks out in previous chapters in various degrees: co-habitation creates familiarity that not only carries pathogenic potential but also leads to immunity or resistance to pathogens in bodily response. The abattoir is a lifeworld for multispecies muddles that navigate life through sympoietic arrangements. This creates a niche for a multispecies dwelt community which is part of a broader tapestry of life. Traces of it manifest as parts of other multispecies pathways of the neighbourhood, along the stream or further off places through wayfaring species, via wind, or other forces. One of the most interesting questions remains: is this multispecies familiarity that develops in human-moulded niches the reason why not more is happening in spaces like the abattoir? Is strict controlled separation or compartmentalisation in highly mechanised industrial farms and abattoirs really safer in the long durée?

With these open questions in mind, this study posits that numerous abattoirs in Nigeria share remarkable resemblances with the particular case examined here. The cited studies about Nigerian abattoirs within this thesis, though predominantly epidemiological and anthropocentric, still assert that a substantial number of these places harbour heterogeneous multispecies communities consisting of domesticated species, humans as well as a multitude of other critters and microorganisms. Moreover, many are located in close proximity to water bodies. Consequently, this thesis provides valuable insights into a lifeworld akin to others prevalent throughout Nigeria. Thus, the various descriptions of this abattoir lifeworld possess the potential to be related to broader contexts. They serve as a foundation for comprehending intricate complexities that necessitate consideration in the formulation of health policies,

interventions and planning discourses surrounding health support, preparedness and preventive measures.

In light of this, my thesis challenges a prevailing ignorance habitus often perpetuated by public health authorities and researchers, who tend to portray local populations as uninformed, unhygienic or lacking awareness regarding risks (discussed in Roth 2022). My research unravels a rich composition of knowledge possessed by many human individuals and also other species. Abattoir dwellers have developed in-depth and specialised understanding of co-dwellers and other characteristics of their environment. This knowledge, nurtured through intimate coexistence with multiple species, holds significant implications for the development of health policies and interventions aimed at enhancing biosecurity. It is imperative for initiatives that focus on improving biosecurity, including utilisation of PPE and implementation of hygiene measures, to acknowledge and leverage the knowledge generated within multispecies dwelt communities. Needless to say, including local communities into planning increases legitimacy, creates less unintentional harm and ultimately makes implementation more effective (in, e.g., Kelly et al. 2019, Roth 2022).

As Lakoff (2019) notes in this context, outbreak preparedness and response governance in public or global health develop outbreak scenarios to prepare for, often in straightforward guidelines. This means that real-life complexities are simplified to be manageable. However, when outbreak realities defy pre-developed scenarios of response strategies in complex worlds they too easily become unfunctional, follow conflicting logics or are contradictive. This can have devastating consequences for multispecies communities. Therefore, one central need is a more in-depth (ethnographic) understanding of lifeworlds before, after and during outbreaks to better understand complexities, potential conflicts and challenges that inform strategies to be flexible in the messiness and orders of life (Brown 2019). So, in-depth data about local contexts like the abattoir that can potentially become hotspots for infection – or are considered one already – are crucial to make health improvement efforts and interventions more flexible and adaptable.

Nigeria's population and its demand for meat are expected to grow while already being the biggest consumer in the West-African region (FAO 2018). Thus, broadening understandings of

abattoir lifeworlds is crucial for public health to increase the health of farmed species and critters, workers and consumers along supply chains and ultimately also the environment. This is needed to adapt to continuous change of the market or in regards to expected climate change impacts.⁶⁸ As Haraway notes, other species are not only here to think with, they are here to live with (Haraway 2008). Therefore, in a world that humans cannot exempt themselves from we need to explore the kind of worlds, like the abattoir, that multispecies entanglements create and make possible – for better or worse.

6.1 Limitations

At this point I need to accentuate that with the meshwork concept it is challenging to come to a saturating point where enough entanglement is explored along its threads. There is an ongoing challenge to lose analysis in multiplying complexities, an entanglement in entanglement, and so on. It loses itself in explorations of lines that make a species pathway along its life. Through that it also gets difficult to understand, philosophica, and as a result potentially detached from the grasp of real life needs. This, at one point, makes explorations blurry and not clear to conclude something in an operational manner anymore. Where oversimplification and categorisation are dangerous I argue that too much complexity has the potential to paralyse.

For the health interest of this thesis, I set meshwork-thinking in relation to literature and concepts that operationalise on the basis of separating objects, subjects, species, culture and nature. As part of that, I also found myself using certain separations to remain close to the main characters, humans and other species, of this multispecies ethnography. Thus, I acknowledge here that I tweaked the meshwork concept to shed light on the wide idea of entanglement and how life is lived along relational exchanges by all entities. However, I put it into direct relation to human-made concepts and theories that explore other social influences and work with categorisations. In other words, in this thesis I set out to try an exploration of the meshwork concept proposed by Ingold as a relatively novel approach to understanding the complexities of a multispecies lifeworld. The concept offers a lens through which to

⁶⁸ Evident in recent years and in future prognosis, Nigeria is one of the most vulnerable countries to climate change in the world with increasing temperatures, variable rainfalls, extreme weather events, and desertification trends which, among other, directly impacts the country's livestock industry and Nigeria's food security (Majekodunmi 2022).

examine the entanglements and relational exchanges among different species that I want to explore in detail, which tend to be oversimplified in public and global health agendas that understand life as separated variables. However, through the course of my analysis, I have come to the conclusion that the meshwork framework, in its pure form that does not consider any power flows, may not be suitable for contexts characterised by capitalist power dynamics and other dire inequalities of the Anthropocene. Marvelling in meshworks is interesting and sheds light on entanglement. Nevertheless, in contexts of suffering and inequality disregarding power disregards dying, pain and arising health effects among species.

I have to highlight three more points of caution that influence the findings of this thesis. First, due to my language limitation to English and light Pidgin English, which I began learning with support of a research assistant in the field, the ethnic and religious composition of individuals I engaged with does not accurately represent the distribution within the abattoir. The predominant languages spoken there are Hausa and Pidgin. Although I was accompanied by the assistant who could provide translation, I primarily interacted with individuals who were proficient in English or soft Pidgin. Consequently, my closest informants were those most fluent in English, despite being in the minority within the abattoir. This is affecting my results strongly, as they are the source of the majority of my information.

Speaking good English often also meant that people had a higher level of education and a rather higher position in the economic or status hierarchy. Individuals who spoke English or soft Pidgin were typically among the minority of non-Hausas and Christians. In anthropological research, it is preferable to engage with interlocutors in their native language, as it is crucial for understanding their culture (Stodulka 2021). Therefore, this is an important point of consideration in regards to my findings. Moreover, the majority of my close interlocutors and key informants were men, as butcher work is predominantly considered male labour. And again, many of the few women working as animal health inspectors, cleaners, or carriers could not speak English or soft Pidgin. This means that my data is predominantly informed by men meeting my observations and inquiries as a female researcher. It is important to keep this possible bias or shortcoming in mind and note that more conversations with women would potentially depict other enmeshment with or in the dwelt community. Finally, what happens during nights and very early morning hours in the abattoir was only told to me, as I was not

allowed to do research in dark hours. This was due to security reasons. I tried to get as many personal accounts of evening and night activities as possible but, in the end, my findings remain disconnected from my own observational perspectives and impressions.

6.2 Outlook

As the previous reflection of my limitations starts to acknowledge, my chapters carry ambivalences and many scientific arenas I intentionally did not explore – such as more-than-human or speculative ethics and animal rights. I purposefully do not attempt to answer what is morally good or bad or go into explicit explorations of power manifestations in a postcolonial manner. Further, I do not include political influences, laws and legislations regarding abattoirs. This thesis is concerned with describing a lifeworld with only fragments of how this lifeworld came to be or could develop in the future. I do not see that as a failure of analysis. This thesis is a work on which further explorations can build on with other foci. As with all ethnographic findings, much can be analysed very differently, told differently, and embedded differently with existing literature.

Against this backdrop, my thesis offers valuable insights for further One Health research. The One Health agenda represents a collaborative effort to adopt a holistic approach to understanding and addressing the interconnectedness of human, animal and environmental health (Wolf 2015: 5). As noted by Rock and Degeling (2013: 347), the concept of One Health aligns with the concern for achieving a state of "being alive well" that can be linked to meshwork-thinking. Therefore, to promote well-being beyond anthropocentrism and human exceptionalism, it is essential to develop a comprehensive understanding of health in local multispecies contexts. In the Anthropocene, it is often human activities that contribute to unhealthy ecologies and negative effects of mingling species that result in the emergence of diseases (Brown and Nading 2019: 9-10). In the face of climate change, these considerations become even more crucial as species confront rapidly changing landscapes that can facilitate the emergence of new infectious diseases through novel transmission pathways (Ortega et al. 2022: 4-7). By comprehending intricacies of multispecies entanglements in the abattoir lifeworld, my thesis can inform One Health approaches that develop strategies to enhance health, moving beyond a narrow focus on biosecurity or species separation and control, which are too often difficult to implement in contexts with economic limitations.

As part of One Health, but also beyond, it is important to consider biopolitical influences on the abattoir dwelt community. In this thesis, I specifically kept my distance from biopolitical considerations of power flows and influences by the state or other authorities that are otherwise widely used in studies of (global) health (Davis and Sharp 2020). However, analysing biopower and biopolitical mechanisms in the context of the abattoir can guide research on the relation of the state to the population and individual subjects. This can be used to understand how life is optimised, controlled and regulated to allow certain groups to die while others are “made to live” (Kirksey 2014: 8). Thus, biopower is important to explore to understand other forces that influence how life is lived by multiple species in the abattoir. How are multispecies populations controlled by state institutions, granted or denied access to services, and how do these populations react, navigate and transform these influences in daily abattoir dwelt life? The dilemma of the Anthropocene, that governance is needed to mitigate problems that human government itself created, is evident in many stories of multispecies communities living in strongly human-influenced (unhealthy) ecologies (Hetherington 2020: 4). A forthcoming paper, as part of the wider research project at ZIG, will explore those challenges, needs and questions.

Finally, conceptualising the abattoir as a dwelling led to the decision to leave out actual abattoir labour of care work in domestication and killing as part of slaughter and further meat processing. However, the interest in embodied care and killing practices is important. Care is a multispecies matter and central to daily life and killing is rarely simply a matter of animal death (Baker et al. 2006: 4, Mol et al. 2010: 7, Puig de la Bellacasa 2018: 197). As Brown and Nading (2019: 10) note, “interspecies care is not the opposite of animal commodification, but a mutable position on a relational continuum”. Therefore, in knowing the other through ubiquitous forms of care (and killing), with desired or undesired embodied intimacy and separation, species affectively co-create their entanglement and inhabitation of spatial lifeworlds or their dwelt life (Ingold 2000, Ingold 2011, van Dooren 2019). This creates (dis-)connection and (non-)belonging which are important considerations for the analysis of co-habitation with health-related questions. Important aspects to consider in the abattoir are ontologies of butchers regarding the use and significance of body fluids from cattle. For example, the use of bile to cure maladies of the body or fresh vein blood of strong cattle to transfer strength from the animal-other to the self. How do practices of care and killing

emerge, are performed, put into meaning and influence pathogenic potential? Insights of this analysis are important for a better understanding of how multispecies lives are entangled, shaped and become meaningful in the abattoir.

Appendix

Table of Interviewees:

Season	Interviewee Abattoir No (I.A.)	Profession	Gender
Dry	I.A.4	animal dealer (cattle)	male
Dry	I.A.6	veterinarian	male
Dry	I.A.7	animal dealer (goat)	male
Rain	I.A.5	animal dealer (cattle)	male
Rain	I.A.6	veterinarian	male
Rain	I.A.7	animal dealer (goat)	male
Rain	I.A.8	market seller	male
Rain	I.A.9	slaughterhouse butcher	male
Rain	I.A.10	slaughterhouse butcher	male
Rain	I.A.11	butcher, dealer, supplier	male
Rain	I.A.12	slaughterhouse butcher	male
Rain	I.A.13	Mallam	male
Rain	I.A.14	driver	male
Rain	I.A.15	veterinarian	male
Rain	I.A.16	cleaner	male
Rain	I.A.17	cleaner	male

References

- Abrams, C. (1966). Man's Struggle for Shelter in an Urbanizing World. Cambridge, The MIT Press.
- Abu-Raddad, L. J., et al. (2006). "Dual infection with HIV and malaria fuels the spread of both diseases in sub-Saharan Africa." Science **314**(5805): 1603-1606.
- Adesina, A. S., et al. (2021). "Globalisation of Diseases: The Challenges of COVID-19 Pandemic and Public Health System in Nigeria." The Nigerian Journal of Sociology and Anthropology **19**(1): 107-117.
- Aju-Ameh, C. O. (2020). "Mosquitoes are not the major culprits for the high burden of malaria in Nigeria: A commentary." Pan Afr Med J **35**: 11.
- Akinbobola, J., et al. (2017). "Bovine tuberculosis: A 3-year retrospective study on incidence and economic implication of gross pathologic condemnations at Karu Abattoir, Abuja, Nigeria." International Journal of Veterinary Science **6**: 118-120.
- Alinaitwe L, et al. (2019). "Bovine leptospirosis in abattoirs in Uganda: Molecular detection and risk of exposure among workers." Zoonoses Public Health **66**(6):636-646.
- Allan, H. T. and A. Arber (2018). Emotions and Reflexivity in Health and Social Care Field Research. London, Palgrave MacMillan.
- Ameso, E. A., et al. (2017). "Ethnography of the slaughterhouse: A case of Nanyuki slaughterhouse in Laikipia County, Rift Valley, Kenya." Pastoralism **7**(1): 32.
- Anderson, J. L. (2019). Capitalist Pigs: Pigs, Pork, and Power in America. Morgantown, West Virginia University Press.
- Anunobi, J. T., et al. (2019). "Risk of Soil-Transmitted Helminthiasis among Agrarian Communities of Kogi State, Nigeria." Ann Glob Health **85**(1): 120.
- Appadurai, A. (2015). "Mediants, Materiality, Normativity." Public Culture **27**(2 (76)): 221-237.
- Aronsson, A. and F. Holm (2020). "Multispecies entanglements in the virosphere: Rethinking the Anthropocene in light of the 2019 coronavirus outbreak." The Anthropocene Review **9**(1): 24-36.
- Aronsson, A. and F. Holm (2021). "Finding Agency in Nonhumans: Introduction." Relations Beyond Anthropocentrism **8**(1-2): 7-14.
- Aronsson, A. and F. Holm (2022). "Multispecies entanglements in the virosphere: Rethinking the Anthropocene in light of the 2019 coronavirus outbreak." The Anthropocene Review **9**(1): 24-36.
- Baker, S., et al., Eds. (2006). Killing Animals. The Animal Studies Group. Illinois, University of Illinois Press.
- Banks, M. (2007). Using Visual Data in Qualitative Research. London, SAGE Publications.
- Baquero, O. S. (2021). "One Health of Peripheries: Biopolitics, Social Determination, and Field of Praxis." Front Public Health **9**: 617003.
- Bardosh, K., Ed. (2016). One Health: Science, politics and zoonotic disease in Africa. Pathways to Sustainability. Oxon and New York, Routledge.
- Bardosh, K. L., et al. (2016). "Zoonotic Encounters at the Slaughterhouse: Pathways and Possibilities for the Control of Cystic Echinococcosis in Northern Morocco." J Biosoc Sci **48 Suppl 1**: S92-s115.
- Beisel, U. (2010). "Jumping Hurdles with Mosquitoes?" Environment and Planning D: Society and Space **28**(1): 46-49.

- Beisel, U. and C. Wergin (2022). Understanding multispecies Mobilities: From Mosquito eradication to coexistence. Mosquitopia: The Place of Pests in a Healthy World. M. Hall and D. Tamir. London and New York, Routledge: 32-46
- Bello, M., et al. (2015). "Management of slaughter houses in northern Nigeria and the safety of meat produced for human consumption." Food Control **49**: 34-39.
- Bello, M. O. (2009). Squatter Settlement, Accessibility of Land and the Urban Poor. FIG Working Week 2009.
- Bello, Y. and D. Oyedemi (2009). "The Impact of Abattoir Activities and Management in Residential Neighbourhoods: A Case Study of Ogbomoso, Nigeria." Journal of Social Sciences **19**: 121-127.
- Benezra, A., et al. (2012). "Anthropology of microbes." Proceedings of the National Academy of Sciences of the United States of America **109**: 6378-6381.
- Bertoni, F. (2013). "Soil and Worm: On Eating as Relating." Science as Culture **22**(1): 61-85.
- Besong, M., et al. (2022). "Seroprevalence of leptospirosis among presumptive malaria patients in a secondary health facility in Oyo state, Southwest Nigeria." AFENET **5**(3): 16.
- Biehl, J. and P. Locke, Eds. (2017). Unfinished: The Anthropology of Becoming. Durham and London, Duke University Press.
- Biehl, J. and F. Neiburg (2021). "Oikography: Ethnographies of House-ing in Critical Times." Cultural Anthropology **36**(4).
- Bischoff, C., et al., Eds. (2014). Methoden der Kulturanthropologie. Bern, Haupt Verlag.
- Blanchette, A. (2020). Porkopolis: American Animality, Standardized Life and the Factory Farm. Durham, Duke University Press.
- Bonwitt, J., et al. (2017). "Participation of women and children in hunting activities in Sierra Leone and implications for control of zoonotic infections." PLoS Negl Trop Dis **11**(7): e0005699.
- Bonwitt, J., et al. (2016). "Rat-atouille: A Mixed Method Study to Characterize Rodent Hunting and Consumption in the Context of Lassa Fever." Ecohealth **13**(2): 234-247.
- Borkfelt, S. (2022). Reading Slaughter: Abattoir Fictions, Space, and Empathy in Late Modernity. Cham, Switzerland, Palgrave Macmillan.
- Breidenstein, S. H., Herbert Kalthoff, Boris Nieswand (2020). Ethnografie: Die Praxis der Feldforschung. Konstanz, UVK Verlagsgesellschaft mbH.
- Brown, H. (2019). Complexity, anthropology, and epidemics. The Anthropology of Epidemics. A. Kelly, F. Keck and C. Lynteris. London and New York, Routledge: 121-134.
- Brown, H. and A. H. Kelly (2014). "Material proximities and hotspots: Toward an anthropology of viral hemorrhagic fevers." Med Anthropol Q **28**(2): 280-303.
- Brown, H., et al. (2015). "Extending the "social": anthropological contributions to the study of viral haemorrhagic fevers." PLoS Negl Trop Dis **9**(4): e0003651.
- Brown, H. and A. M. Nading (2019). "Introduction: Human Animal Health in Medical Anthropology." Med Anthropol Q **33**(1): 5-23.
- Cañada, J. A. (2021). Scalability and partial connections in tackling antimicrobial resistance in West Africa. With Microbes. C. Brives, M. u. Rest and S. Sariola. Manchester, Mattering Press: 164-183.
- Carsten, J. (2018). "House-lives as ethnography/biography." Social Anthropology **26**(1): 103-116.
- Carsten, J. and S. Hugh-Jones, Eds. (1995). About the House: Lévi - Strauss and Beyond. Cambridge, Cambridge University Press.

- Carter, P. (2013). Meeting place - the human encounter and the challenge of coexistence. Minneapolis and London, University of Minnesota Press
- Casanova, L. M., et al. (2010). "Effects of Air Temperature and Relative Humidity on Coronavirus Survival on Surfaces." Applied and Environmental Microbiology **76**(9): 2712–2717.
- Charmaz, K. (2006). Constructing Grounded Theory. London, SAGE Publications.
- Cutcliffe, J. R. (2000). "Methodological issues in grounded theory." Journal of Advanced Nursing **31**(6): 1476±1484.
- Daminabo, V. and J. Damen (2020). "Prevalence of Intestinal Parasites from Abattoir Effluents in Jos Metropolis, Nigeria." International Journal of Photochemistry and Photobiology **4**(1): 1-10.
- Daniel, N., et al. (2012). "Bacteriological Quality of Abattoir Effluents Discharged into Water Bodies in Abuja, Nigeria." ISRN veterinary science **2012**: 515689.
- Daramola, O. and O. Olowoporoku (2017). "Living with a Fatal Choice: Effects of Slaughterhouse Activities on Residents' Health in Osogbo, Nigeria." International Journal of Environmental Problems **2017**: 26-35.
- Davenport, B. (2008). "Doing Health Anthropology: Research Methods for Community Assessment and Change by Christie W. Kiefer." American Anthropologist - Amer Anthropol **110**: 263-264.
- Davis, A. and J. Sharp (2020). "Rethinking One Health: Emergent human, animal and environmental assemblages." Soc Sci Med **258**: 113093.
- Degeling, C. and I. Kerridge (2013). "Hendra in the news: Public policy meets public morality in times of zoonotic uncertainty." Soc Sci Med **82**: 156-163.
- Deleuze, G. and F. L. Guattari (1987). A Thousand Plateaus: Capitalism and Schizophrenia (B. Massumi, Trans.). Minneapolis, University of Minnesota Press.
- Despret, V. (2013). "Responding Bodies and Partial Affinities in Human–Animal Worlds." Theory, Culture & Society **30**(7-8): 51-76.
- Dictionary.com (2023). mallam. Accessed under <https://www.dictionary.com/browse/mallam>. Retrieved 20.06.2023.
- Dilger, H. and D. Mattes (2018). "Im/mobilities and dis/connectivities in medical globalisation: How global is Global Health?" Glob Public Health **13**(3): 265-275.
- Douglas, M. (1991). "The Idea of a Home: A Kind of Space." Social Research **58**(1): 287-307.
- Drazin, A. and S. Küchler, Eds. (2015). The Social Life of Materials: Studies in Materials and Society. London and New York, Routledge.
- Dzingirai, V., et al. (2016). "Zoonotic diseases: Who gets sick, and why? Explorations from Africa." Critical Public Health **27**(1): 97-110.
- Elliott, D. and D. Culhane, Eds. (2017). A Different Kind of Ethnography: Imaginative Practices and Creative Methodologies. Ontranto, University of Toronto Press.
- Erev, S. (2018). "What Is It Like to Become a Bat? Heterogeneities in an Age of Extinction." Environmental Humanities **10**(1): 129-149.
- Esposito, R. (2011). Immunitas: The Protection and Negation of Life. Polity. New Jersey, Wiley.
- Evans, N. H. A. (2018). "Blaming the rat?" Medicine Anthropology Theory **5**(3): 15-42.
- Faier, L. and L. Rofel (2014). "Ethnographies of Encounter." Annual Review of Anthropology **43**(1): 363-377.
- FAO (2018). ASL 2050 Country Brief Nigeria. FMARD. Accessed under <https://www.fao.org/3/ca0282en/CA0282EN.pdf>. Retrieved 20.06.2023.

- Fuentes, A. (2017). "Human niche, human behaviour, human nature." Interface Focus **7**(5): 20160136.
- Fuentes, A. (2019). "Holobionts, Multispecies Ecologies, and the Biopolitics of Care: Emerging Landscapes of Praxis in a Medical Anthropology of the Anthropocene." Med Anthropol Q **33**(1): 156-162.
- Gibbs, E. P. (2014). "The evolution of One Health: A decade of progress and challenges for the future." Vet Rec **174**(4): 85-91.
- Giddens, H. L. (2015). Neolithic meshworks: A multi-scalar approach to understanding social relations within the LBK, Cardiff University. PhD in Archaeology.
- Gin, F., U. Beisel and M. Barua (2014). "Flourishing with Awkward Creatures: Togetherness, Vulnerability, Killing." Environmental Humanities **4**: 113-123.
- Godsil, B. P. and M. S. Fanselow (2004). "Light stimulus change evokes an activity response in the rat." Learn Behav **32**(3): 299-310.
- Götz, N. and J. Holmén (2018). "Introduction to the theme issue: "Mental maps: geographical and historical perspectives"." Journal of Cultural Geography **35**(2): 157-161.
- Graczyk, T. K., et al. (2001). "The role of non-biting flies in the epidemiology of human infectious diseases." Microbes Infect **3**(3): 231-235.
- Green, A. (2008). "The control of blowflies infesting slaughterhouses. Field observations on the habits of blowflies." Annals of Applied Biology **38**: 475-494.
- Greenberg, B. (1973). Flies and Disease: II. Biology and Disease Transmission. Princeton, Princeton University Press.
- Guattari, F. (2015). "Transdisciplinarity Must Become Transversality." Theory, Culture & Society **32**(5-6): 131-137.
- Haraway, D. J. (2008). When Species Meet. Minneapolis and London, University of Minnesota.
- Haraway, D. J. (2016). Staying with the Trouble: Making Kin in the Chthulucene. London and New York, Duke University Press.
- Harbers, H. and J. Pols (2010). "Animal farm love stories About care and economy Telecare What patients care about." Care in Practice. Bielefeld, Transcript Verlag: 141-194.
- Hatley, J. (2011). Blood Intimacies and Biodicy: Keeping Faith with Ticks. Unloved Others: Death of the Disregarded in the Time of Extinctions. D. B. Rose and T. van Dooren, ANU Press. **50**: 63-76.
- Hawkes, F. M. and R. J. Hopkins (2022). The Mosquito: An Introduction. Mosquitopia: The Place of Pests in a Healthy World. M. Hall and D. Tamir. London and New York, Routledge: 16-31.
- Federal Ministry of Health (2019). One Health Strategic Plan 2019 - 2023. Federal Ministry of Agriculture and Rural Development and Federal Ministry of Environment. Accessed under: https://ncdc.gov.ng/themes/common/docs/protocols/93_1566785462.pdf. Retrieved 20.06.2023.
- Helmreich, S. (2009). Alien Ocean Anthropological Voyages in Microbial Seas. Oklahoma and California, University of California Press.
- Hetherington, K. (2020). The Government of Beans: Regulating Life in the Age of Monocrops. Durham, Duke University Press.
- Hinchliffe, S. (2015). "More than one world, more than one health: Re-configuring interspecies health." Soc Sci Med **129**: 28-35.
- Huttunen, K., et al. (2021). When cultures meet: Microbes, permeable bodies and the environment. With Microbes. C. Brives, M. u. Rest and S. Sariola. Manchester, Mattering Press: 121-142.

- Ibrahim, S., et al. (2021). "Role of slaughter facilities management in zoonoses and safety of meat produced for human consumption in Nigeria: a review." Bulletin of the National Research Centre **45**(1): 137.
- IOM (2014): Migration in Nigeria: A Country Profile. Accessed under https://publications.iom.int/system/files/pdf/mp_nigeria.pdf. Retrieved 20.06.2023.
- Ingold, T., Ed. (1996). Key Debates in Anthropology. London and New York, Routledge.
- Ingold, T. (2000). The Perception of the Environment: Essays on Livelihood, Dwelling and Skill. London and New York, Routledge.
- Ingold, T. (2008). "Bindings against Boundaries: Entanglements of Life in an Open World." Environment and Planning A: Economy and Space **40**(8).
- Ingold, T. (2011). Being Alive: Essays on Movement, Knowledge and Description. London and New York, Routledge.
- Ingold, T. (2012). "Toward an Ecology of Materials." Annual Review of Anthropology **41**(1): 427–442.
- Jahan, M., et al. (2023). "The Movement of Pathogen Carrying Flies at the Human-Wildlife Interface." Ecohealth **19**.
- John, W. (2019). "Labour Migration: Causes and Patterns in Nigeria." International Journal of Research and Innovation in Social Science (IJRISS) **III**(X): 116-123.
- Jones, O. (2009). Dwelling. International Encyclopedia of Human Geography. R. Kitchin and N. Thrift, Elsevier: 266-272.
- Kaisto, V. and C. Wells (2020). "Mental Mapping as a Method for Studying Borders and Bordering in Young People's Territorial Identifications." Journal of Borderlands Studies **36**(2): 259-279.
- Karpagam, K. B. and B. Ganesh (2020). "Leptospirosis: a neglected tropical zoonotic infection of public health importance: An updated review." European Journal of Clinical Microbiology & Infectious Diseases **39**(5): 835-846.
- Keck, F. (2020). Avian Reservoirs: Virus Hunters and Birdwatchers in Chinese Sentinel Posts. Druham, Duke University Press.
- Keck, F., et al. (2021). "Social representations of animal diseases: Anthropological approaches to pathogens crossing species barriers." Parasite **28**: 35.
- Kelly, A. H. and U. Beisel (2011). "Neglected malarias: The frontlines and back alleys of global health." BioSocieties **6**(1): 71–87.
- Kelly, A. H., et al., Eds. (2019). The Anthropology of Epidemics. London and New York, Routledge.
- Kelly, A. H. and J. Lezaun (2017). "The Wild Indoors: Room-Spaces of Scientific Inquiry." Cultural Anthropology **32**(3): 367-398.
- Kelly, A. H. and J. Lezaun (2021). "The Immune Home: Domestic Enclaves, Diffuse Protections." Cultural Anthropology **36**(4): 563–572.
- Kelly, A. H. and A. M. Sáez (2018). "Shadowlands and dark corners." Medicine Anthropology Theory **5**(3).
- Keshavjee, S. (2014). Blind Spot: How Neoliberalism Infiltrated Global Health. California, University of California Press.
- Kirksey, E., Ed. (2014). The Multispecies Salon. Durham, London, Duke University Press
- Kirksey, E. (2020). "The Emergence of COVID-19: A Multispecies Story." Anthropology Now **12**(1): 11-16.

- Kirksey, S. E. and S. Helmreich (2010). "The Emergence of Multispecies Ethnography." Cultural Anthropology **25**(4): 545-576.
- Klenk, N. (2018). "From network to meshwork: Becoming attuned to difference in transdisciplinary environmental research encounters." Environmental Science & Policy **89**: 315-321.
- Kohn, E. (2007). "How dogs dream: Amazonian natures and the politics of transspecies engagement." American Ethnologist **34**(1): 3-24.
- Laine, N. and S. Morand (2020). "Linking humans, their animals, and the environment again: A decolonized and more-than-human approach to "One Health"." Parasite **27**: 55.
- Lakoff, A. (2019). What is an epidemic emergency? The Anthropology of Epidemics. A. Kelly, F. Keck and C. Lynteris. London, Routledge: 59-69.
- Larkin, B. (2013). "The Politics and Poetics of Infrastructure." Annual Review of Anthropology **42**(1): 327-343.
- Latour, B. (1996). "On actor-network theory: A few clarifications." Soziale Welt **47**(4): 369-381.
- Leach, M. and I. Scoones (2013). "The social and political lives of zoonotic disease models: Narratives, science and policy." Soc Sci Med **88**: 10-17.
- Lederman, Z. (2022). "Zoonoses and Animal Culling: The Need for One Health Policy." The Hastings Center report **52**: 6-7.
- Lorimer, J. (2015). Wildlife in the Anthropocene: Conservation after Nature. Minnesota, University of Minnesota Press.
- Lynteris, C. (2019). Framing Animals As Epidemic Villains: Histories Of Non-Human Disease Vectors. Cham, Palgrave Macmillan.
- Lynteris, C. (2023). "Afterword: Disease Reservoirs and Spatial Imaginaries in the Time of COVID-19." Medical Anthropology: 1-5.
- Lynteris, C. and F. Keck (2018). "Zoonosis." Medicine Anthropology Theory **5**(3): 1-14
- Macgregor, H., et al. (2022). "Negotiating Intersecting Precarities: COVID-19, Pandemic Preparedness and Response in Africa." Medical Anthropology: 1-15.
- Majekodunmi, A. O. (2022). "Nigeria's pastoralists face a triple burden of disease outbreaks, conflict and climate change." Africa at LSE 2023. Accessed under <https://blogs.lse.ac.uk/africaatlse/2022/07/06/nigerias-pastoralists-face-a-triple-burden-of-disease-outbreaks-conflict-and-climate-change/>. Retrieved 20.06.2023
- Makwe, E. and C. Chup (2013). "Seasonal variation in physico-chemical properties of groundwater around Karu abattoir." Ethiopian Journal of Environmental Studies and Management **6**: 489-497.
- Martins, M. H. d. M. and M. J. P. Spink (2020). "Human leptospirosis as a doubly neglected disease in Brazil." Ciênc. saúde coletiva **25**(4): 919-928.
- Mayring, P. (2022). Qualitative Inhaltsanalyse: Grundlagen und Techniken. Weinheim, Beltz.
- Mazhary, H. (2019). "Distancing death: Slaughter, welfare and consumption in the British halal meat industry." Table Debates 2023.
- McCabe, D. and L. Hamilton (2015). "The kill programme: An ethnographic study of 'dirty work' in a slaughterhouse." New Technology, Work and Employment **30**: 95-108.
- Miller, T. L. (2019). Plant Kin: A Multispecies Ethnography in Indigenous Brazil. Austin, University of Texas Press

- Mol, A. (2002). The Body Multiple: Ontology in Medical Practice. Durham, Duke University Press Books.
- Mol, A. and J. Law (1994). "Regions, Networks and Fluids: Anaemia and Social Topology." Social Studies of Science **24**(4): 641-671.
- Mol, A., et al. (2010). "Care in Practice: On Tinkering in Clinics, Homes and Farms." Care in Practice **8**: 7-27.
- Moreroa-Monyelo, M. and M. Basitere (2022). "The challenges and treatment of abattoir effluents: A South African perspective." Water Practice and Technology **17**.
- Mshelbwala, P. P., et al. (2021). "Rabies epidemiology, prevention and control in Nigeria: Scoping progress towards elimination." PLoS Negl Trop Dis **15**(8): e0009617.
- Nadal, D. (2020). Rabies in the Streets: Interspecies Camaraderie in Urban India. Pennsylvania, Pennsylvania State University Press
- Nading, A. (2013). "Humans, Animals, and Health: From Ecology to Entanglement." Environment and Society: Advances in Research **4**.
- Nading, A. M. (2012). "DENGUE MOSQUITOES ARE SINGLE MOTHERS: Biopolitics Meets Ecological Aesthetics in Nicaraguan Community Health Work." Cultural Anthropology **27**(4): 572-596.
- Nading, A. N. (2014). Mosquito Trails: Ecology Health and the Politics of Entanglement. Oakland and California, University of California Press.
- Neiburg, F. (2021). "Multiscale Home: Shifting Landscapes and Living-in-Movement in Haiti." Cultural Anthropology **36**(4).
- Njoga, E. O., et al. (2023). "Pre-slaughter, slaughter and post-slaughter practices of slaughterhouse workers in Southeast, Nigeria: Animal welfare, meat quality, food safety and public health implications." PLoS One **18**(3): e0282418.
- Obiadi, B. and O. Osita (2018). "Abuja, Nigeria Urban Actors, Master Plan, Development Laws and their Roles in the Design and Shaping of Abuja Federal Territory and their Urban Environments." Urban Development Journals **4**: 23-43.
- Odetokun, I. A., et al. (2022). "One Health risk challenges and preparedness regarding bovine tuberculosis at abattoirs in North-central Nigeria: Associated drivers and health belief." PLoS Negl Trop Dis **16**(9): e0010729.
- Odetokun, I. A., et al. (2018). "Staphylococcus aureus in two municipal abattoirs in Nigeria: Risk perception, spread and public health implications." Vet Microbiol **216**: 52-59.
- Odgen, L., et al. (2013). "Animals, Plants, People, and Things." Environment and Society **4**(1): 5-24.
- Ohiolei, J. A., et al. (2020). "Review of Cystic Echinococcosis in Nigeria: A Story of Neglect." Acta Parasitol **65**(1): 1-10.
- Oyibo, W., et al. (2023). "Malaria parasite density and detailed qualitative microscopy enhances large-scale profiling of infection endemicity in Nigeria." Sci Rep **13**, 1599.
- Okeke, E. (2012). "Nigerian malaria: The problems and the fight." Malaria Journal **11**.
- Okely, J. (2020). Anthropological Practice: Fieldwork and the Ethnographic Method. London and New York, Routledge.
- Okolocha, C. F., et al. (2021). "Response to Tragedy: An Ethnography of Gully Erosion Threats in Three Communities in Edo State, Southern Nigeria." The Nigerian Journal of Sociology and Anthropology **19**(2): 14-39.
- Okpala, C., et al. (2021). "Assessing Nigerian Butchers' Knowledge and Perception of Good Hygiene and Storage Practices: A Cattle Slaughterhouse Case Analysis." Foods **10**: 1165.

- Olawuyi, K., et al. (2020). "A review on the state of abattoirs in Nigeria during COVID-19 pandemic era: Potential threats and public health interventions." Integrity Research Journals **3**: 105-118.
- Olawuyi, K. A., et al. (2020). "A review on the state of abattoirs in Nigeria during COVID-19 pandemic era: Potential threats and public health interventions." Journal of Public Health and Diseases **3** (6): 105-118.
- Omole, D. and A. Ogbiye (2013). "An Evaluation of Slaughterhouse Wastes in South-West Nigeria." American Journal of Environmental Protection **2**: 85-89.
- Pachirat, T. (2011). "Every twelve seconds: Industrialized slaughter and the politics of sight." New Haven, Yale University Press.
- Parreñas, J. S. (2018). Decolonizing Extinction: The Work of Care in Orangutan Rehabilitation. London and New York, Duke University Press.
- Pina-Cabral, J. d. (2019). "Partible Houses: Variants of Vicinage in Mozambique, Portugal and Brazil." Articulo Journal of Urban Research **20**: 1-15.
- Pona, H. T., et al. (2021). "Environmental health situation in Nigeria: Current status and future needs." Heliyon **7**(3): e06330.
- Porter, N. (2013). "Bird flu biopower: Strategies for multispecies coexistence in Việt Nam." American Ethnologist **40**(1): 132-148.
- Pradeu, T. (2019). "Immunology and individuality." Elife **8**: e47384.
- Prince, R. (2019). Pandemic publics: How epidemics transform social and political collectives of public health. The Anthropology of Epidemics A. Kelly, F. Keck and C. Lynteris. London and New York, Routledge: 135-153.
- Puig de la Bellacasa, M. (2018). Matters of Care: Speculative Ethics in More Than Human Worlds. Minneapolis and London, University of Minnesota Press.
- Puig de la Bellacasa, M. (2019). "Re-animating soils: Transforming human–soil affections through science, culture and community." The Sociological Review **67**(2): 391-407.
- Raffles, H. (2010). Insectopedia. New York, Pantheon Vintage.
- Ribas, V. (2015). On the Line: Slaughterhouse Lives and the Making of the New South. San Diego, University of California Press.
- Rock, M. and C. Degeling (2016). Toward "One Health" Promotion. A Companion to the Anthropology of Environmental Health. M. Singer. Sussex, Wiley Blackwell: 68-82.
- Rose, D. B. and T. van Dooren (2017). Encountering a more-than-human world: ethos and the arts of witness. The Routledge Companion to the Environmental Humanities U. Heise, J. Christensen and M. Niemann. London and New York, Routledge.
- Rosenthal, G. (2018). Interpretive Social Research: An Introduction. Göttingen, Universitätsverlag Göttingen.
- Roth, E. (2022). How to Live Safely with Bats? Ignorance(s) in post-Ebola Risk Communication (Guinea, Sierra Leone). SOURCES Material and Fieldwork in African Studies **4**: 39-67.
- Rufai, T., et al. (2019). "Migration, Labor Mobility and Household Poverty in Nigeria: A Gender Analysis." Economies **7**(4): 101.
- Ruiz-Castillo, P., et a. (2022). "Insecticide-treated livestock: a potential One Health approach to malaria control in Africa" Trends in Parasitology **38**(2): 112-123,
- Sagan, D. (2011). "The Human is More than Human: Interspecies Communities and the New "Facts of Life". Theorizing the Contemporary, Fieldsights." Society for Cultural Anthropology.

- Schnepel, B. and E. Ben-Ari (2005). "Introduction: 'When Darkness Comes..': Steps toward an Anthropology of the Night." Paideuma **51**: 153-163.
- Segata, J. (2022). Enacting politics with mosquitos: Beyond eradication and Control. Mosquitopia: The Place of Pests in a Healthy World. M. Hall and D. Tamir. London and New York, Routledge: 165-183.
- Segata, J., et al. (2021). "Beyond Exotic Wet Markets: COVID-19 Ecologies in the Global Meat-Processing Industry in Brazil." eTropic: electronic journal of studies in the Tropics **20**(1): 94-114.
- Segata, J., et al. (2022). "Ungesunde Ökologien, prekäre Arbeit und Pandemie in der globalisierten Fleischindustrie im Süden Brasiliens." Peripherie: Politik, Ökonomie, Kultur **164** (3): 386-404.
- Serres, M. (1982). The Parasite. Baltimore and London, John Hopkins University Press.
- Sigmon, S., et al. (2002). "Psychological Home". Journal of Contemporary Research in Social Sciences **1**(1): 87-96.
- Singer, M., Ed. (2015). Anthropology of Infectious Disease. London and New York, Routledge.
- Singer, M. and B. Rylko-Bauer (2021). "The Syndemics and Structural Violence of the COVID Pandemic: Anthropological Insights on a Crisis." Open Anthropological Research **1**(1): 7-32.
- Sodikoff, G. (2019). "Zoonotic Semiotics: Plague Narratives and Vanishing Signs in Madagascar: Zoonotic Semiotics." Medical Anthropology Quarterly **33**.
- Steffan, J. J. Jade A. Derby, and Eric C. Brevik (2020). "Soil pathogens that may potentially cause pandemics, including severe acute respiratory syndrome (SARS) coronaviruses" Curr Opin Environ Sci Health **17**: 35-40.
- Stewart, K. (2011). "Atmospheric Attunements." Environment and Planning D: Society and Space **29**(3): 445-453.
- Stodulka, T., et al. (2018). "Affective Scholarship: Doing Anthropology with Epistemic Affects." ETHOS **46**: 519-536.
- Strathern, M. (1996). "Cutting the Network." The Journal of the Royal Anthropological Institute **2**(3): 517-535.
- Sukeri, S., et al. (2018). "A qualitative exploration of the misconceptions, knowledge gaps and constructs of leptospirosis among rural and urban communities in Malaysia." PLoS One **13**(7): e0200871.
- Swanson, H., et al., Eds. (2018). Domestication Gone Wild: Politics and Practices of Multispecies Relations. Durham, Duke University Press.
- Takken, W. (2022). The Mosquito and Malaria: would Mosquito control alone. Mosquitopia. B. Hall and D. Tamir. London and New York, Routledge: 109-123.
- Talia, D. C. (2017). "Epistemic artefacts: On the uses of complexity in anthropology." Journal of the Royal Anthropological Institute **23** (2): 285-301.
- Thompson, R. G. (2018). Pigs, People, Pathogens: Health and Multispecies Relations in Central Uganda. Edinburgh, The University of Edinburgh. PhD African Studies.
- Timothy, A., et al. (2019). "Sanitary Status and Compliance with the Standard Slaughter Practices in Karu Abattoir Abuja Municipal Area Council of the FCT, Nigeria." International Journal of Current Innovations in Advanced Research **2**(2): 1-14.
- Tsing, A. (2012). "Unruly Edges: Mushrooms as Companion Species: For Donna Haraway." Environmental Humanities **1**(1): 141-154.
- Tsing, A. L. (2005). Friction: An Ethnography of Global Connection, Princeton University Press.

- Tsing, A. L. (2015). The mushroom at the end of the world: On the possibility of life in capitalist ruins. Princeton and Oxford, Princeton University Press.
- Tsing, A. L., et al. (2019). "Patchy Anthropocene: Landscape Structure, Multispecies History, and the Retooling of Anthropology." Current Anthropology **60**(20): 186-353.
- Tsing, A. L. and H. Swanson, Eds. (2017). Arts of Living on a Damaged Planet: Ghosts and Monsters of the Anthropocene. Combined Academic Publishing.
- Ukwubile, C. A. and M. S. Bingari (2018). "Flatworms (Platyhelminthes) Associated with Slaughtered Cows in Abattoirs Found in Bali Town Taraba State Nigeria." International Journal of Research Studies in Biosciences **6**(3): 18-22.
- van Dooren, T. (2014). Flight ways: life and loss at the edge of extinction. New York, Columbia University Press.
- van Dooren, T. (2019). The Wake of Crows: Living and Dying in Shared Worlds. New York, Columbia University Press.
- van Dooren, T., et al. (2016). "Multispecies Studies: Cultivating Arts of Attentiveness." Environmental Humanities **8**(1): 1-23.
- van Dooren, T. and D. B. Rose (2016). "Lively Ethography." Environmental Humanities **8**(1): 77-94.
- Vergunst, J. and A. Árnason (2012). "Introduction: Routing Landscape: Ethnographic Studies of Movement and Journeying." Landscape Research **37**(2): 147-154.
- Viña, C., et al. (2020). "The Control of Zoonotic Soil-Transmitted Helminthoses Using Saprophytic Fungi." Pathogens **9**(12).
- Watson, M. C. (2016). "On Multispecies Mythology: A Critique of Animal Anthropology." Theory, Culture & Society **33**(5): 159-172.
- Wentworth, K. N. (2016). Performing the Slaughterhouse: Making Meaning and Worlds in Daily Practice. Communication (Science Studies). San Diego, University of California. Doctor of Philosophy.
- Whatmore, S., Ed. (2002). Hybrid Geographies: Natures Cultures Spaces. Human Geography. Oxford, University of Oxford.
- WHO (2023). "Malaria." Accessed under: <https://www.who.int/news-room/fact-sheets/detail/malaria>. Retrieved 20.06.2023.
- Wolf, M. (2015). "Is there really such a thing as "one health"? Thinking about a more than human world from the perspective of cultural anthropology." Soc Sci Med **129**: 5-11.
- Wood, R., et al. (2021). "Detection of Lassa virus in wild rodent feces: Implications for Lassa fever burden within households in the endemic region of Faranah, Guinea." One Health **13**: 100317.
- Yin, J.-H., et al. (2022). "Flies as Vectors and Potential Sentinels for Bacterial Pathogens and Antimicrobial Resistance: A Review." Veterinary Sciences **9**(6): 300.
- Yu, H., et al. (2022). "Palaeogenomic analysis of black rat (*Rattus rattus*) reveals multiple European introductions associated with human economic history." Nature Communications **13**(1): 2399.
- Zhan, M. (2005). "Civet Cats, Fried Grasshoppers, and David Beckham's Pajamas: Unruly Bodies after SARS." Am Anthropol **107**(1): 31-42.
- Zhang, W., et al. (2012). "Immunology and Immunodiagnosis of Cystic Echinococcosis: An Update." Clinical and Developmental Immunology **2012**: 101895.