

Fermenting Community – *Xingar*, *Matraila*, and *Artekia*: Pork Fermentation at GAEC Haranea in Itsasu, Pays Basque

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Figure 1 Pork fermentations hanging in the sechoir, the drying room at Haranea farm.
Photo credit Susie H. Moskowitz

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Abstract: This paper adds to the field of agroecology by examining how pork fermentation contributes to food sovereignty in a case study in the Northern Basque Country (Iparralde), where such questions have not been analyzed. I examine how three pork ferments at GAEC Haranea farm, *xingar* (ham, PDO Jambon du Kintoa), *matraila* (guanciale), and *artekia* (pancetta), together contribute to biocultural diversity and resilient autonomous local food systems which are preconditions for food sovereignty. Using the holobiont theory, I extend this relationship between fermentation and food sovereignty to imagine practices of fermentation as co-evolutionary forces in human-microbe relationships and then explore the political ramifications of this extension for food sovereignty. I argue that fermentation should be included as an agroecological practice to both expand agroecological practices beyond agronomy and to push fermentation research, which has been largely centered on scientific microbiological processes and food technology for high-cuisine restaurants, to factor in the cultural context of fermentation in a more ethnozymological way. I conclude that fermentation is an important but not a necessary nor sufficient condition for creating food sovereign communities because the relationship between fermentation and food sovereignty is contextual to local cultures and ecologies.

Keywords: Basque, Fermentation, Pork, Agroecology, Food Sovereignty, Ethnozymology

Fermentation techniques are vital cultural information. Fermentation is not one singular body of knowledge, to the contrary, it comprises a broad range of extremely diverse practice, integral to food traditions everywhere, that evolved differently in different places as specific manifestations of place. This cultural distinctiveness must be recognized, celebrated, valued and most of all used and shared. Through disuse, this knowledge can easily be lost.

Katz, 2020, p. 54

Nothing Ferments Alone (Preface)

This thesis discusses how one Basque peasant farm uses fermentation to diversify their market channels and perpetuate cultural identity. I hope that this study will bring increased attention to Basque efforts to assert their distinct cultural identity through gastronomic and agricultural means but also to all minority groups that feel marginalized by hegemonic nationalist forces. I also hope that this study will bring increased attention to the role of fermentation practices in maintaining agroecosystems and the importance of analyzing the cultural contexts of fermentation practices and not just the microbiological processes involved. In many parts of the world, peasant farmers struggle against laws that restrict or attempt to sanitize home fermentation processes or allow for the patenting of microorganism involved in the development of fermented foods and medicines. I hope that this European example inspires policy makers who are against these disempowering models.

It all began in March of 2020, when I was in the first of what would be many stay-at-home orders and began combing the bibliography of a book I had just finished after two years of on-and-off reading: *The Art of Fermentation* by Sandor Katz (2012). I was in Manado, Indonesia at the time, coincidentally staying with a few people who recently completed or were in the process of completing PhDs in various ecological and ethnographic fields. Shortly thereafter, I returned home to my parents' house on Long Island, New York and found myself with no plan or direction but with a large folder of recently downloaded articles about fermentation on my computer.

At the time, I had never heard of the Basque country or the Basque language. I began imagining combining my passions for fermentation and sustainable agriculture and applied to the Masters in Agroecology and Food Sovereignty at the University of Gastronomic Sciences in Italy. I then learned about Food Sovereignty, the important social equity dimensions of global food systems, and the work of La Vía Campesina and was inspired by professors including Miguel Altieri, Michel Pimpert, Jan Douwe van de Ploeg, and Paola Migliorini.

The process of matching students to communities for the three-month research/collaboration/work/living phase was complicated and needed to include the wants and interests of both the Terra Madre Communities and the students as well as logistical factors and covid restrictions but eventually I was matched with GAEC Haranea. I had opened my application essay with, "I believe fermentation technologies can be instrumental in creating more food secure communities" and that belief was only furthered during my research.

Thanks are due to everyone I met in Itsasu and beyond who opened their lives to me and spent time answering my questions. This thesis is first and foremost for them, the people of Haranea farm, who made my three months there exciting, interesting, and collaborative.

I regret that this research was not done more collaboratively. Many conversations and shared experiences informed this thesis but in the end the writing is entirely my own and any faults or misrepresentations are my responsibility alone. However, like the ferments and communities that make them, nothing ferments alone. There are many people to thank for inspiring me, supporting me, and nourishing my curiosity throughout this process and many non-humans for the same.

To Christian Aguerre for encouraging me to experiment with my own fermentations in his home, for the many bottles of cider, and the many conversations your delicious, fermented apple juice inspired. To Gilles Billaud and Martine Bouquerot for adding to my experience, inviting me along to events and activities, and helping me learn about the many products of the farm. To Roberto for your patience in teaching me and for

detailing the ways Hegoalde and Iparralde differ in history and customs but also the many more ways they are one and unified. To Maialen for offering a balance of perspectives on Basque life, language, and history and for showing me the non-farmer side of the interior Basque country. To Ellande and Xan for always bringing me around and to the gastetxe Itsasu for including me, teaching me some Euskera, showing me the possibility of a vibrant young rural life, and for challenging my opinions and observations during my time in the Basque Country.

To all my professors during my time at UNISG especially Professor Volpato, for your guidance and probing questions, and Professor Migliorini for introducing me to the world of agroecology and food sovereignty. To Charlotte, Jesse, and all my classmates for your support throughout the program.

To my friends and family for your support and willingness to taste many of my ferments and especially to my immediate family, Eema, Abba, and Shira, for your always honest feedback and belief in my crazy projects and ideas. Also, I want to especially thank my friend Paul Kim for gifting me *The Mushroom at the End of World* by Anna Tsing (2015). This book, though it neither mentions fermentation nor food sovereignty, has been the single biggest influence on this thesis and without you it would have sat, digitally collecting dust, on my ever-growing list of books to read. To my editors and proofreaders, especially Savta, for your willingness to read my confusing drafts at a moment's notice. Without you, this thesis would be filled with more errors and unnecessary complexity.

To the pigs for contributing to our lives and ecosystems in countless ways only one of which is as food. To the microbes that keep us alive, transform our food, and inspire me every day. Without you, we would all be dead. Literally. My own obsession with all things fermented is still bubbling rapidly and I hope some of that spills out onto the readers through this thesis.

Ari Moskowitz
Bra, Italy
September 2021

Glossary of Non-English Terms and Abbreviations

AMAP – Association pour le maintien d'une agriculture paysanne or association to maintain peasant agriculture in English. Consumers pay the farms in advance for an entire season and then the farmers distribute produce at a designated location twice per month. These associations are organized by local consumers.

Artekia – fermented pork belly. More famously called pancetta in Italian and Spanish or jaleak in Hegoalde.

Basque, Euskera – In French and English, the Basque language is called Basque but it is called Euskera in the Basque language. This led to a constant but not confusing mixing of terminology during the research period because the entire community is multi-lingual. In this thesis, I will use Basque to refer to the language and the people but will use Euskera in cases of ambiguity.

Gaztetxea – young people's association. Most medium-sized and large Basque towns, including Itsasu, have one.

GAEC – Groupement Agricole d'Exploitation en Commun or farming association in English. It is a French legal distinction that allows associated farmers to carry out joint work under conditions comparable to those existing on family farms.

Hegoalde – The part of the Basque country located within the borders of Spain. Also called the Southern Basque country or Spanish Basque country. It consists of the provinces of (in Basque then Spanish) Bizkaia (Vizcaya), Gipuzkoa (Guipúzcoa), Araba (Álava), Nafarroa (Navarra).

Ikastola – Basque language immersion school.

Iparralde – The part of the Basque country located within the borders of France. Also called The Northern Basque Country or French Basque Country. It consists of the provinces of (in Basque then French) Lapurdi (Labourd), Nafarroa Beherea (Basse-Navarre), and Zuberoa (Soule).

Itsasu – spelled Itxassou in French, is the town in which GAEC Haranea resides.

Lukainka – Basque pork sausage of Iparralde. Refers to both fresh and confit sausage though sometimes lukainkak gurinean is used to refer to sausages cooked confit. More famously called salchicha in Spanish or lucanica in Italian.

Matraila – fermented pork neck. More famously called guanciale in Italian or hirugiharra in Hegoalde.

Odolkia – blood sausage in English or boudin in French.

PDO – Protected designation of origin. It is a European Union geographical indication used for food products that have the strongest links to the places in which they are made of all the other geographical indications. In French it is called AOP for Appellation d'origine protégée and in Italian it is called DOP for Denominazione di origine protetta.

Repos – The resting room for the pork ferments. This is the second room and is kept at 4 degrees Celsius and 75% humidity.

Saloir – The salting room for the pork ferments. This is the first room and is kept at 4 degrees Celsius and is not humidity controlled.

Sechoir – The drying room for the pork ferments. This is the third room and is kept at 12 degrees Celsius and 82% humidity.

Xingar – fermented pork hind leg. More famously called Jamón in Spanish, Prosciutto in Italian, Jambon in French, or Urdaiazpikoa in Hegoalde. At Haranea, Xingar refers to the PDO Jambon du Kintoa.

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1 Introduction

Agriculture is one of the most visible ways in which humans interact with their environments. Fermentation practices, while less visible, have shaped agriculture, human culture, and even human evolution. Though not always explicitly recognized, fermentation practices contribute to food sovereignty strategies in many places around the world and this thesis seeks to explore the relationship between pork fermentation and food sovereignty at GAEC Haranea farm in the town of Itsasu in Pays Basque (the Basque Country) in the department of Pyrénées-Atlantiques in the region of Nouvelle-Aquitaine in the country of France.

1.1 Research Question

The research question of this thesis is:

How does fermentation contribute to food sovereignty?

More specifically this thesis seeks to answer how do three Basque fermented pork products contribute to food sovereignty in the community of GAEC Haranea? The three Basque pork ferments that are the focus of this research are: *xingar*, which come from the hind legs and is similar to the English ham, Italian prosciutto, Spanish jamon, and French jambon, *matrailia*, which comes from the neck of the pig and is similar to the Italian guanciale, and *artekia*, which comes from the pork belly and is similar to the Italian pancetta and American dry-cured bacon.

1.2 Outline

Context of the community and definitions of key terminology must be built before answering the research question of this thesis. In section 2, I will detail the present situation of Haranea farm, I will identify the knowledge gaps of the academic and citizen research areas to which this thesis hopes to contribute, and then I will justify why this case study is novel and interesting to the research topic.

In section 3, I will explain the methodology of the research and the limitations of the study. I will also introduce details of my personal family history that are relevant to identifying my own biases regarding the research topic. I will situate the finding of this thesis as a meeting of people who each have their own histories and predispositions: myself, the farmers of Haranea, and the community members of Itsasu.

Section 4 has three main parts. The first will both define and resist precise definitions of the borders of the community and key terms from the research question, namely, fermentation and food sovereignty. This “anti-definitions” section will explore how definitions from academic literature differ from the community’s emic understanding of these terms. The second main part will answer the research question and the third part will expand the research findings and argue for the inclusion of fermentation in agroecological practices as well as discuss the political ramifications of centering fermentation in the holobiont theory. This section will be punctuated by interludes where themes of the thesis will be woven with stories from the research period. Fermentation and food sovereignty are the main research themes of this thesis while notions of borders, membranes, autonomy, diversity, and preservation will be recurring ideas throughout. These ideas will be explored in relation to human communities and microbial communities as well as in the interlap between human, animal, and microbial communities.

In section 5, I will conclude the thesis, suggest further studies based on the results of the research, and provide recommendations for the community in the form of an action plan. It is an aim of this thesis to

open agroecology to fermentation and to open fermentation to agroecology by describing a place and time where the two movements meet to support Basque food sovereignty struggles.

2 Background and Theoretical framework

2.1 Community Context



Figure 2 Mount Ursuia from the farmhouse. The view is east-northeast. Photo credits Ari Moskowitz, July 2021

GAEC Haranea is an approximately 15-hectare farm in Iparralde (the Northern Basque Country) in the town of Itsasu. The farm is co-owned and operated by Christian Aguerre, Gilles Billaud, and Martine Bouquerot though the land that the farm is on is owned solely by Christian. The farm is distributed across disjointed but geographically close plots, which is common in this area because of the long history of family inheritances. I conducted my research with the farm from late-April until early-August 2021, when the fields were green, the weeds were tall, and the trees came into bloom, lost their flowers, and then began fruiting one after another. The fields are all surrounded by dense forest lines filled mostly with acacia, chestnut, and oak. The property also has wild plum trees, wild cherry trees, cherry trees of the unique Itsasu varieties, and over 40 varieties of local apple trees. The main farmhouse and living houses of the owners are in a small valley between the Northern face of Mt. Mondarrain (749m) and a thin rift that separates the towns of Ezpeleta and Itsasu (213m). There is no flat land in sight. Everything is sloped in the immediate area. Facing east from the farmhouse, you can see the town of Itsasu at the base of stunning Mt. Ursuia (681m) (figure 2). The view to Ursuia is unobstructed except for the frequent fog that often blocks the peak of the mountain as if its head has been cut at the shoulders and sometimes even blocks the entire mountain and the town from view.

These mountains are the northwestern foothills of the Pyrenees and many mountains to the south and east are taller. To the north, green fields flatten until the Adour River and thus from any nearby peak (even the 213m ridge), you can see all the way to the Atlantic coast (The Bay of Biscay). You can watch the clouds forming over the ocean slowly waltz until they are stopped by these first mountains. It rains seemingly every day, though sometimes it is just a light misting. This region has the most days of rain per year of any in France and the dense greenery is proof of that. The DPO regulations for the Jambon du Kintoa (xingar) describes the region as such:

Its oceanic climate is characterised by high levels of rainfall (1200 to 2000 mm/year), which is evenly spread throughout the year, without any dry period. It is also characterised by mild temperatures, even in winter. The southerly Föhn-type wind intermittently brings intense heat and dry air throughout the year — especially in spring and autumn — alternating with wetter and cooler periods tied to the passing of oceanic disturbances (Hogan, 2019).

Historical agriculture practices have adapted to the steepness and frequent rain by relying heavily on animal agriculture to keep the whole region from becoming a forest. There are very few solely vegetable farms in the area and the cuisine reflects that. There are semi-wild groups of horses and goats on the mountains and there is even a special Mondarrain breed of cow that lives near the farm and grazes rotationally. Sheep are the most common livestock in the valley, moving between pastures and along the road. The history of agriculture feels evident in the patchwork of the mountains. There are few if any private or public parks. All the mountains have hiking paths, many cutting through private farms. This abundance of paths makes the scenery feel in-use and lived in.

The farm produces porc kintoa Basque (pigs), piment d'Espelette (peppers), grand roux maíz (corn), chickens, and eggs from hens. The farm also produces apples that it turns into juice and cider, cherries for preserves, and plums for marmalades, all for home consumption, sharing with friends, and for ecosystem services like erosion prevention and shade for chickens and pigs. The peppers are dried and turned into powder or paste, the corn is dried and stone-ground into flour and meal, and the two crops are rotated every year. The farm has about 75 pigs across five fields, though the fields are never all occupied at the same time. The farm is constantly experimenting with new methods and ideas; for example, during my time, mustard seeds were planted to create a new product from the farm. That said, the farmers describe the current state of the farm as an equilibrium with no goals to drastically expand production or farm size.

The farm has about 650 chickens for meat and receives them from a local breeder when they are one day old and raises them until they are between 90 and 120 days old (industrial chickens are usually killed at less than 60 days). The farm has about 250 hens of three different breeds for eggs and they are raised until they are two years old when they stop laying eggs.

The farm receives pigs at three months old from breeders within the porc kintoa Basque Slow Food presidium. The pigs are raised until they are 18-24 months, all outside in semi-forested fields. The porc kintoa Basque breed association has 57 breeders, 16 farmers, 1 slaughterhouse, 4 butchers, and 2 dryers and meets every two months to deliberate on issues related to the association and once a year to vote on big decisions. The farm transforms the pigs into many different products including p ate, blood sausage, confit sausage, hoof terrine, head terrine, stock, chinch n, lard, chops, steaks, roasts, ham (xingar), cured belly (artekia), cured neck (matraila), soap, and sometimes new experiments or seasonal products like tripe and pepper stew. From 2000 until 2004, Haranea used a shared curing room for making xingar but in 2004/2005, after some financial calculation, Christian invested in building a xingar maturation space in his home.

The farm was founded in 1998 by only Christian and began only with chickens. Since the farm's inception, it has been associated with ELB (Euskal Herriko Laborarien Batasuna), a La V a Campesina member organization. After a few years Christian added white pigs. Using local and diverse breeds was always a priority of the farm but it wasn't until a few years after the farm's inception, after a little proving time, that they began with the porc kintoa Basque breed pigs. Neither of Christian's parents were farmers but the farmland and old house that he later renovated had been in his family for generations before he started the farm. Both his parents, all his grandparents, and seven out of eight of his great-grandparents are from Itsasu. Because he is not the son of a farmer, he was not beholden to specific farming traditions when

he started the farm and he was able to innovate more freely. In the first year of the farm's founding, Christian partnered with three other neighboring farms to found Basaburuko Saskia, a local farm delivery service that brings a mixture of the four farms' produce to customers in the area. Later, they co-invested in renovating a part of Christian's farmhouse into a professional-style kitchen that is shared among the four neighbors to transform and package foods. Though they have since bought a new refrigerated truck and expanded their client list, still the four farms co-operate Saskia.

The farm and farmers of Haranea are involved in countless associations and sell through a wide array of market channels. They participate in Slow Food Terra Madre and are involved in four different presidia (porc kintoa basque, Basque green seignaux mild chili pepper, gran roux maíz, and itxassou cherries). Few other local farms are involved in Slow Food Terra Madre and the involvement of Haranea is seen as Christian's more than Gilles' or Martine's. The farm also sells products through three AMAPs (association pour le maintien d'une agriculture paysanne; association to maintain peasant agriculture) that are organized by local consumers that want to support local peasant agriculture. The farm identifies as a peasant farm and is a member of the Idoki association. The Idoki association is one of the most important associations to the farm. It is a group of more than 100 farmers in Iparralde that predates the founding of Haranea. Idoki enforces several regulations for their farm members that notably include the use of local breeds, limitations on the number of employees a farm can have relative to the number of owners, and mandatory on-farm transformation of products. Haranea also sells products through a stall in Les Halles market of Saint-Jean-de-Luz with 12 other Idoki farmers. Two years ago, the farm joined a different group of 12 local farmers to create a store in the town of Ezpeleta selling local and non-local products for local customers. The farm also sells direct to consumers and restaurants.

The farm also partners with a bee farmer that uses part of the pig fields for beehives. Five years ago, Christian started a restaurant, Haraneko Borda, on the farm property. The restaurant is now run by a couple that uses many products produced on the farm as well as other local produce. The farm also recently helped start a seed bank for the gran roux maíz corn and shares a mobile stone corn mill with other farms that grow the corn. The farm also participates in an equipment share that shares tractor attachment for the planting of piement d'Espelette for an annual fee and daily usage cost.

In 2000, Gilles joined the farm after working in a cheese cooperative in a nearby town. In 2001, he became a part-owner of the farm. Martine joined the farm as an employee right before Gilles joined and she became a part-owner in 2009. Ten years ago, Roberto joined the farm. Roberto is the sole employee on the farm. He works with all the different types of produce and is skilled in all areas of the farm work.

There are many friends and neighbors that help with certain processes or at certain moments of the year and this dense social network forms a part of the farm's system. Friends come help to plant peppers, other friends come help to breakdown pigs, and some other friends help cover during the farmer's infrequent vacations. Though the four of them share much of the farm work, Christian is in charge of the pig production and transformation, while Gilles and Martine are in charge of the chickens, hens, and peppers. Roberto works in all areas of the farm.

The farm is situated within a Basque history of re-peasantization and sovereignty struggles that are too complicated to describe here. The farm is part of a dense network of communities of farmers, consumers, and associations that have formed and were formed by local ecologies and a history of the Basques' continued presence in this region since before recorded history (at least since before Roman times) (Kurlansky, 2001).

2.2 Literature Review: Previous Research and Knowledge Gap

The inherent invisibility of microorganisms to the naked eye and the only recent discovery of the microscope has made microbial life often overlooked when considering factors that affect human cultures and diet. This thesis seeks to contribute to conversations among scholars living and past and to address knowledge gaps among, what I view as, six overlapping fields of academic and citizen research. In the spirit of agroecology as a transdisciplinary field, it is important to acknowledge that these divisions between areas of research are arbitrary and often authors have contributed to more than one of these artificial categories.

Additionally, while English speaking academic institutions have dominated research agendas over the past few hundred years along with other European and colonial languages, it is important to note that I am limited by my language capabilities to only consume content written in or translated into English and a wealth of information about fermentation and food sovereignty has been written or recorded orally in the many languages I do not speak.¹

The six overlapping fields of research that I see are: food sovereignty research in the Basque country, microbiology research of food fermentation, citizen and academic research of fermentation revivalist movements, anthropological research pushing the boundaries of academic disciplines by focusing on the holobiont theory, global agroecology research, and gastronomic ethnobiology, ethnozymology, and the environmental humanities.

2.2.1 Food Sovereignty Research in the Basque Country

Much of the research that has been done in the Basque country on the topics of communal identity, human-ecological relations, and food sovereignty has been focused in the Hegoalde, the Southern (Spanish) Basque country, as would be expected because of the larger population, landmass, and formal governmental recognition. Rita Calvário's work on food sovereignty struggles, re-peasantization, alternative food economies, and emancipatory rural politics has been particularly inspiring to me (Calvário and Kallis, 2016; Calvário, 2017; and Calvário et al, 2020). In much of her research, she works with Euskal Herriko Nekazarien Elkartasuna (EHNE)-Bizkaia, a Vía Campesina member organization. Many of the community members I worked with in Itsasu knew of and had interacted with this organization but they worked more closely with organizations based in Iparralde. Many of the factors influencing the past decades of struggles for Basque independence have been shared across the Northern and Southern Basque country but naturally differences persist because the dominant government powers are France or Spain, respectively.

There are some notable and exciting works on the French side of the Basque country but very few discuss food sovereignty, peasant farming, or fermentation.² Very little research has been done about the factors contributing to food sovereignty struggles in the Northern Basque country and while much work has been done documenting sovereignty struggles in the Basque country, the role of fermentation in these efforts for food sovereignty has not yet been explored.

¹ An example to highlight this linguistic limitation: Kyung Koo et. al. published an article in English where they combed through Korean and Chinese historical texts that are more than 1000 years old for references to the fermented fish sauce, *Jeotgal*. This example both highlights the perceived value of English because the authors chose to write or translate the text in English and my inherited biases of not being able to read many source texts. (Kyung Koo et al, 2016)

² Welch-Devine and Murray (2011) examine how the EU's CAP has caused a need for small farmers to diversify household economic strategies and the implications for the economic health and rural livelihood of farmers in the Basque region of France.

2.2.2 *Microbiology Research of Food Fermentation: Fermentation as a scientific process*

In the 1960s, 70s, 80s, and beyond, pioneering microbiologists like Keith Steinkraus (1996), C.W. Hesseltine (1967), Hwa Lih Wang, Haman Dirar (1994), G. Cambell-Platt (1987), and C.S. Pederson (1979) among others set out, independently and in collaborations, to catalog the microbiological processes of fermentation. Keith Steinkraus' work at Cornell University became an English language resource text for anyone deeply interested in fermentation and is cited in popular fermentation revivalist texts as well as academic research. These texts were focused on the science of fermentation more than the cultural value of fermentation and you can see a direct through line from this approach to contemporary high-scale restaurants in Europe and the United States that have “brought back” fermentation as an entryway to new flavors. Examples that illustrate this connection are at Noma in Copenhagen (Zilber and Redzepi, 2018), Mugaritz in the Basque Country (Cantabrana et al, 2015), and Momofuku in various North American locations (Felder et al, 2011).

The Noma Guide to Fermentation (Zilber and Redzepi, 2018) became a celebrated text among home fermenters because it gave bacteria-phobic cultures, like those in Europe and the United States who had lost the arts of home fermentation, the confidence to ferment at home by providing precise weight measurements and detailed scientific descriptions of the processes. In so doing, these fermentation processes like Miso, Shoyu, and Fish Sauce were disentangled from their modern and ancient cultural connections and gifted to masses of eager home fermenters without any significant look into the role these processes played in historical diets and in shaping the specific ecologies where these processes originate. An example of the ramifications of this disentanglement is that by using all the Japanese terminology for these fermentation processes, European and American restaurants reinforce the privileged role of Japanese culture and Japanese-Western relations relative to other East Asia countries even though Shoyu and Miso making originated in China. On the other hand, by generalizing and neutralizing these terms and using the terms amino pastes or amino sauces, the microbiological similarities of vastly different culinary ingredients are emphasized over the cultural contexts of the fermentation practices.

Additionally, the regionalism of these fermented products was glossed over in favor of showing a technique for which any ingredient meeting a set of macronutrient criteria (ratios of proteins, fats, and carbohydrates) could suffice. Fermentations, which are seen as distinct in the cultures from which they originate, are lumped together based on their microbiological fermentation processes like sauerkraut and kimchi in the lacto-fermentation chapter. Zilber and Redzepi (2018) admit how ridiculous the lacto-fermentation category is by comparing the label of “lactic acid bacteria” to “four-legged animals” in trying to express how diverse the metabolic functions of this class of bacteria are. Another example of a similar phenomenon is Mugaritz whose hazelnut tempe (Cantabrana et al, 2015) can be categorized similarly. These restaurants and chefs have undoubtedly inspired millions, including myself, to take interest in and experiment with fermentation but this overly scientific way of categorizing fermented foods has pitfalls and cultural blind spots with repercussions.

By framing fermentation as a technological tool to increase the flavor of foods or a set of practices to be made more industrially efficient, traditional knowledge regarding fermentation processes is marginalized and the roles of local fermentation practices in maintaining local ecosystems are threatened. This thesis will leverage microbiological research regarding similar pork fermentations but seeks to address the knowledge gap of this field by highlighting the connection between these fermentation processes and food sovereignty efforts.

2.2.3 *Citizen and Academic Research of Fermentation Revivalist Movements*

What I have termed fermentation revivalists, Dr. Miin Chan (2021) has termed “the fermentation community” and describes it as “a loose collective of fermentation enthusiasts and experts, mainly from the West, who celebrate and teach fermentation, as well as those who research fermented foods and sell fermented products.” She continues, “the community is grounded in reconnecting people to traditional food systems, lost tastes, and microbial heritages” but she also argues that the community often falls short of these standards. She highlights the rampant appropriation of fermented products by white producers for disproportionate profit even though many fermented products they tout and sell originate from Black communities, indigenous communities, and/or communities of color (Chan, 2021).

Fermentation revivalists Sandor Katz (2012), Holly Davis (2017), and Pascal Baudar (2020) have inspired me most. Their texts are less focused on precise measurements and are more focused on translating home-practices from all around the world into home practices for what they perceive as modern home cooking. I think this community preserves the inherent variability of traditional home fermentation processes by giving guidelines in place of strict weight measurements but, as in all acts of translation, there is reduction. Content and recipes that were never available in English are now literally translated through these books but again, like with the Scientific Fermentation category, there is a reduction of communal and human-natural connections that have been embedded in these fermentation practices for centuries in some cases and millennia in others. They lose the aesthetics of fermentation that fit into a cultural tapestry of other food practices, ecological management strategies, and social relations (for example, which ferments are given as gifts, which are made in the home, and which are made at a central location by a local specialist). Important to this aesthetics of fermentation is what products are not paired with certain fermentation techniques. Fermentation revival and science domains both think more in terms of what is theoretically possible in fermentation and less in terms of what is or is not fermented in specific cultures. Additionally, these texts project an English language (and historically modern) definition of fermentation onto languages and cultures which may locally categorize fermentation differently.

They often cite some of the early microbiology writers but veer towards more approachable language to encourage fermentation in the home. Typically, here, health is a driving factor for eating fermented foods but there is also encouragement of a social movement against industrial food systems as you can see in Sandor Katz’s second book “The Revolution Will not be Microwaved,” which he wrote after going on tour promoting his first book about “Wild fermentation” (Katz, 2020).

Fermentation revivalists are often concerned with aggregating fermentation practices from all over the world into themed chapters based on substrate or technique as opposed to identifying the local relationships among fermented foods within specific cuisines. Here again, you find a conflation of complex and distinct fermentation practices by type of microorganisms (e.g., lacto-fermentation) or by category of substrate (e.g., milk fermentation). The revivalist movement benefits from not being strictly academic and there is a whole diverse array of home fermenters who communicate, share, and teach across many social platforms and in many languages.

I think the revivalist movement would benefit from more specific work and a deeper exploration of what cultural information is carried by fermentation practices. I think the revivalist movement would benefit from a deeper analysis of who benefits from the sharing of these traditional recipes. How and for whom profit is generated from this knowledge should be hugely important. Understanding the social relations that create, share, and profit from knowledge is a specialty of ethnographic and anthropological research. The fermentation revivalist movement would benefit from this deeper socioeconomic research.

2.2.4 *Anthropology and Holobiont Research*

Donna Haraway, Anna Tsing, Val Plumwood, Melvin Sheldrake, and David Griffith, among many others, have advanced new frames through which to understand intra- and inter-species relations. They have pushed the boundaries of biological sciences and called for a more ecological approach, that is analyzing relationships between and within species from an ecosystem perspective and not just from the perspectives of individuals or individual species. They also reject the reduction of ecosystem complexity to a cost versus benefit analysis. All these writers have pointed towards or explicitly called upon the holobiont theory that views a host organism in interaction with all associated microorganisms as an entity for selection in evolution. They have questioned our relationships with mushrooms and microorganisms and the relationships between these species and other non-human species not simply through the lens of a species' usefulness to humans.

Flachs and Orkin (2019) summarize: “‘holobiont’, an evolutionary ecology concept wherein humans, and all complex multicellular eukaryotes, are understood to be assemblages of host organisms and their associated microbes. From this perspective, evolutionary forces (e.g., natural selection and genetic drift) act on the phenotypes arising from the organismal assemblage and the totality of its multispecies genomic information, or ‘hologenome.’ Viewing organisms as multispecies assemblages, the holobiont concept extends a Lamarckian evolutionary logic wherein subsequent generations inherit externally acquired microbes along with their corresponding genomes and fitness effects. Thus, to be human is to enter into a multispecies partnership, where some microbes are welcome allies for wellbeing and some are dangerous but where an absence of microbes is unnatural and undesirable” (p. 37).

The authors listed above also use examples of non-human species interactions as models for the methodologies of their research and use this new view of evolutionary biology to challenge deeply embedded human social constructs like heteronormativity and the existence of the ethical self by showing naturally occurring examples that counter the supposed naturalness of these social constructs (Snelgrove, 1998; Griffiths, 2015).

The gap I see in this space is that most of this work (with the exception Sheldrake's final chapter in *Entangled life* which consider alcoholic fermentations and Katz's connection of fermentation to symbiogenesis) does not bring in the human domestication of (or by) microorganisms through fermentation or highlight this essential link in human-non-human interactions as relevant to the holobiont theory. They often talk about human dependence on the gut microbiome as evidence for our evolutionary dependence on non-human species but few go so far as identify fermentation practices as a nexus point where humans unknowingly cultivated these microenvironments and interacted with the macroenvironment in developing culture.

2.2.5 *Agroecology*

Agroecology is seen as a science, a practice, and as social movement (Wezel et al, 2009) and claims to be a transformative framework for food systems, yet nearly all the practices of agroecology focus on agronomy (Wezel et al, 2014). Agroecology, towards the goal of applying holistically to agri-food systems, has defined a set of principles that include socio-economic relations but very few practices. When comparing organic and agroecological practices, Migliorini and Wezel (2017) write, “clear indications about food processing are provided by organic EU regulations and IFOAM norms, whereas in agroecology there exist, to our knowledge, so far, no specific indications” (p. 62).

The High-Level Panel of Experts on Food Security and Nutrition’s report on Agroecological and Other Innovative Approaches (2019) details the challenges and diverging opinions within agroecology. The concept of fermentation only appears twice in the text: once in the context of fermenting microbial cultures in soil in Zero Budget Natural Farming (p. 42) and once as a part of technologies that can prevent post-harvest losses along with freezing, drying, canning, pasteurization, and sterilization. The contributions of fermentation to the social movement dimension of agroecology by strengthening communal identity and maintaining traditional knowledge as well as the ways fermented food can help peasant farmers diversify market channels and therefore gain power and flexibility in when and to whom to sell their products is not mentioned.

More deeply investigating the relationship with fermentation and food sovereignty can be directly relevant to agroecology which states global food sovereignty as its goal. Including fermentation practices in agroecological practices has the potential to bridge the gap between the principles of agroecology and the reality of applying agroecology in communities. This thesis hopes to contribute to this gap.

2.2.6 *Gastronomic Ethnobiology, Ethnozymology, and Environmental Humanities*

The field of ethnobiology, particularly gastronomic ethnobiology, ethnozymology, and environmental humanities, best capture the discipline of this thesis. Gastronomic ethnobiology encompasses the “study of the complex interactions between human societies, food, and their environment” (Pieroni et al, 2016) and ethnozymology is seen as a domain within gastronomic ethnobiology. Local bio-fermentative processing of food and food ethnozymology describe the “science of fermentation in traditional diets” (Quave and Pieroni, 2014). Flachs and Orkin (2019) describe the environmental humanities as one of the intellectual camps of recent anthropological and ethnobiological research into fermentation and human-microbial relationships. They write, “the environmental humanities investigates how human existence is made plural through entanglements with microbes” (p. 36) and that scholarship in this field “emphasizes pungent and hyper-local cultural keystone ferments through which communities and ethnic groups stake claims to identity” (p. 37).

All three of these fields are recently codified and few studies have taken up the challenge of contributing to these disciplines. That said, the field is not new. Andrea Pieroni, Cassandra Quave, Gary Nabhan, Renata Sõukand, and Łukasz Łuczaj among many others are the prolific contributors to this field who have most influenced this thesis. Their work in ethnobotany and ethnozymology often includes the precise identification of taxa used in fermentation practices, which is helpful for recording the nuance of fermentation practices around the world or between different identity groups within one community. Because of the relative recentness of the academic interest in this field and the inherent specificity of ethnography, many places and many fermented foods have not had this ethnozymological lens formally applied to their food cultures.

There is ethnobotanical work in the Southern Basque country (e.g., Akerreta et al, 2007; Menendez-Baceta et al, 2017) but most is very recent and there is no ethnozymological work in any part of the Basque country, to my knowledge. This paper will constitute a new case study location for the field of ethnozymology but also hopes to contribute to this field that is in the phase of being built and help define what ethnozymology is and can be by including concepts from the environmental humanities.

2.2.7 Knowledge Gap

These are the disciplines to which I hope this thesis can contribute because these are the writers and academics whose work has deeply inspired my own. These disciplines are not siloed or as narrow as I have made them seem above. Sandor Katz's *Wild Fermentation* (2004) was cited as hugely influential in *The Noma Guide to Fermentation* and Andrea Pieroni writes directly about food sovereignty which is a ubiquitous theme in agroecology writings. Environmental humanities scholars contribute to the holobiont theory and microbiologists are often cited by anthropologists to justify their observations. These groupings intersect regionally and across decades but each has a gap, and this thesis hopes to contribute to the intersection of these gaps. This thesis is important to expanding agroecology and the greater goal of transforming global food systems towards more ecological and socially just practices.

2.3 Case Study Approach; Why here?

Calvário et al (2020) outlines why their article about food sovereignty struggles focuses on the Southern Basque country and much of their rationale holds true for this thesis. "First, food sovereignty is central in configuring rural politics and influencing the nature of activism in Basque society at large. Second, in the Basque Country, food sovereignty is also linked to the goals of self-determination, thus bringing into discussion the connections between food sovereignty (and) political sovereignty" (p. 858). Iparralde especially has maintained a strong peasant agriculture identity and avoided the invasion of heavy industrialization and intensive agriculture more common in Hegoalde. While food sovereignty is a continuous process and not a specific destination per se, the community near Haranea farm seems to exercise a high degree of food sovereignty within the context of global struggles for food sovereignty.

Additionally, fermentation, as it is conceptualized by many modern consumers, is often associated with Asian products like kimchi, shoyu, miso, and fish sauce, Eastern European products like sauerkraut and kvass, or common products like alcoholic beverages. In Europe, cheese is more often thought of in this way than meat products. In English, meat is often described as salted, dried, or cured, and thus the associations with microorganisms are often ignored or at least misunderstood. Alcohol is a defining feature of community identity and cohesion in most parts of the world and therefore can be a contributing factor to food sovereignty but this connection is well-studied and seems obvious to anyone from a culture where alcohol is commonly consumed.

This study was conducted within the context of the Agroecology and Food Sovereignty master's program at the University of Gastronomic Sciences. The university partners with the closely related Slow Food organization to pair students from this master's program with farms interested in hosting. The practical logistics of this pairing between myself and GAEC Haranea should not go unmentioned.

The interconnectedness and history of sovereignty struggles in the Basque country make the Basque country an interesting case study for food sovereignty studies. The high degree of food sovereignty at Haranea and the pork processing methods uncommonly associated with fermentation make this a fringe case study for understanding the role of fermentation in food sovereignty and therefore can serve to illuminate non-obvious connections between fermentation and food sovereignty.

3 Methodology

This thesis is based on fieldwork conducted between April and August 2021 at Haranea farm. The research for this thesis was conducted using informal interviews throughout the community and participant observation. One semi-structured interview in the *sechoir* room, where the pork ferments are hung, was

conducted with Christian. These anthropological fieldwork methods, including extensive literature review, were combined with action research methods. Participants were given an explanation of the aims, methodology, and outcomes of the study. The ethical guidelines followed were those adopted by the International Society of Ethnobiology (2006).

Action research names observation, reflection, participation, dialogue, and visioning as core competencies (Mendez et al, 2016). These skills formed the basis of my research and evidence of each will appear in this thesis. From this it is obvious that I participated in the community and it is important to recognize that my identities as well as people's perceptions of me inevitably shaped how I was received in the community and what information was and was not shared with me.

3.1 Limitations

This thesis represents a single case study, from a single perspective, at a singular point in time. It does not claim to describe the entirety of the Basque country, Iparralde, or even the town of Itsasu. This research represents my experience and knowledge in collaboration with Haranea farm. All my relationships in the community were made through Christian or others at Haranea and the relationships and biases of the owners, employees, and friends of Haranea informed my own.

My language skills served as another limitation of this research. I arrived at the farm with basic conversational Spanish skills but with no French or Basque speaking abilities. Many people in the community speak Spanish because they have one parent from Hegoalde, attended a University in Hegoalde, are from Hegoalde, or, in the case of Christian, lived and worked in Argentina for almost three years. Roberto is a native Spanish speaker in addition to native Basque speaker because he is from Hegoalde. Gilles, a native French speaker, and I spoke a mixture of Spanish and English and Martine, also a native French speaker, and I mostly spoke English. I was able to communicate with everyone on the farm but I could hear us all changing out language usage when speaking to each other, whether it was Christian simplifying his grammar or vocabulary in Spanish to explain something to me, or me doing the same in English when speaking in group settings. Therefore, few direct quotes are used in this thesis and my methods relied more on observation and participation.

Human interactions are translations from one perception of reality to another. Writing encapsulates this act of translation. Almost none of what was observed in the research was said in English and thus, the entirety of this project is an exercise in translation. My perspective is a translation of one sliver of the farm and this thesis is not my full experience living/working/collaborating/researching in the Basque Country but rather it is a summary of the components of my experience that are translatable into academic language.

Action Research's *participation* calls attention to the position of the researcher relative to the community. My previous experiences, my biases, my knowledge, and my relationships with community members all informed how I interacted with the community and the information I gathered. My position in the community, as all researcher's positions do, inevitably affected the community and affected the research results. This does not invalidate my findings but rather strengthens them. The knowledge gained and conclusions drawn from this research are partial, situated, and limited but that does not make them irrelevant.

In ethnography there is no reality of an objective academic researcher writing about "untainted" communities. There never has been and never will be. Gone should be the days of anonymous researchers presenting their findings as immutable truth. All knowledge must be situated amongst the spatial and temporal contexts that frame it. Anthropological and cultural studies authors commonly use the term *contamination* to challenge socially constructed myths of purity. Nature is not pure, cultures cannot be pure,

and academic disciplines are not pure. “Everyone carries a history of contamination; purity is not an option” (Tsing, 2015, p. 27). Claiming the ubiquity of contamination is intentionally provocative towards those that seek to control and clearly delineate boundaries because contamination is undesirable, polluting, and uncontrollable. My presence contaminated the field in which I researched and the people, non-human beings, and non-living elements of the space and time where I researched also contaminated me. I cannot quell, limit, or hide this but I must acknowledge which of my identities and characteristics affected the space in ways that are relevant to the research question.

3.2 Fermentation as a Methodology

This thesis is fermented. Fermentation can be a state of bubbliness in the context of food or in the context of human activities and bubbles are inherently uncontrollable. Inspired by Anna Tsing (2015), parts of this thesis are written as interludes from the straightforward argument. She imagined her interludes as parallel to her experiences mushroom foraging in the forests. Foraging creates divergences and requires attention to the non-obvious and non-primary part of the experience. It requires attention to the hidden.

This thesis itself is the product of fermentation, that is bubbling excitement in place. I stayed in the community for three months and remained porous to the happenings around me, trying to always be eager to help with a task or go along for a ride, rarely knowing for what purpose or to what destination. My research was unplanned, with a constant eye and nose towards the fermented. Smelling for the moments of exchange and the fermenting of community.

The interludes are bubbles, moments when ideas and experiences meet, contaminate each other, and produce energy. I tried to mirror the micro-subjects of the research and write about ideas that connect in seemingly invisible ways until enough of them coalesce into a visible network.

Seemingly distinct parts of the research find each other and ferment the central aim of this thesis. These divergent sometimes conflicting examples serve to strengthen the point. Tsing (2015) writes, “for many cultural anthropologists, science is best regarded as a straw man against which to explore alternatives, such as indigenous practices. To mix scientific and vernacular forms of evidence invites accusations of bowing down to science. Yet, this assumes a monolithic science that digests all practices into a single agenda. Instead, I offer stories built through layered and disparate practices of knowing and being. If such components clash with each other, this only enlarges what such stories can do” (p. 159). And so I have tried to include stories in this thesis and part of my work as a researcher was collecting these stories.

In my methodologies, I tried to follow the fermentation processes. Constantly in the process of contamination. Keen to the invisible worlds floating in the air and on the surfaces of things. I was contaminated by the ideas and experiences I had during my research, and I think those I met were contaminated by me. None of us left unchanged. I have tried to trace these contaminations though only a partial tracing is possible. It is impossible to tell this story of collaboration without introducing myself. Identifying the parts of me that are relevant to the research question is essential to giving an idea of how I was perceived in the community and preconceptions that informed my research.

3.3 Who am I? (Author’s Introduction)

Somewhere between 1942 and 1964 (the year my youngest grandparent was born and the year my parents were born) my family lost the art of fermentation. My grandmothers are both fantastic cooks but no one in my family ferments. All my grandparents remember their grandmothers fermenting pickles and sauerkraut and remember the many fermented options at the corner deli but sometime between when they were children and when they raised my parents, they stopped fermenting. This timeline is common among

Ashkenazi Jewish families with similar immigration stories. My great grandparents and great-great grandparents came to North America from Jewish shtetls spread across the pale region in what is now modern-day Russia, Belarus, Ukraine, and Lithuania via ports in Canada, New York, and Baltimore between 1890 and 1910.

I speculate a few factors that contributed to this decline in home fermented foods:

- my grandparents' grandparents died and with them the recipes and traditions were lost,
- distaste for the old country hasten the push towards assimilation; they chased the American ideal of success, the American dream, and wanted to emulate American fashion, food, and culture,
- cheap alternative to traditional fermented foods began being mass manufactured and sold in supermarkets throughout the American suburbs where my family lived,
- and the hyper-sanitization/germaphobia craze of the 50s and 60s pushed the idea that foods were not safe unless they were manufactured under precise conditions.

My interest in fermentation is also an interest in a reclamation of not just the lost heritage from my family and my community, but of so many communities affected by similar factors over the 20th century. This mindset affected the way I analyzed and interacted with this research topic.

The history of assimilation into American culture also affected my family's relationship with pork. My family identifies as reform Jews, which is a denomination of Judaism founded in 1850s Germany that then grew significantly in the United States throughout the 20th century. Reform Judaism is very open about navigating assimilation into dominant cultures while maintaining tradition. One of these navigations is keeping kashrut (kosher), the Jewish dietary laws. The spectrum of 'strict' kashrut to not following kashrut at all has a wide range of interpretations that differ from household to household. My great-grandparents all kept a version of stricter kashrut and none of my grandparents keep kosher but they all cook traditional recipes for holiday and those recipes by definition are all kosher. My parents decided to keep kosher later in life and I was raised kosher though none of my aunts, uncles, or cousins keep kosher. I was 20 years old, living outside of my parents' house, when I first tried pork. Because of this, I feel no nostalgia for pork, I have no family recipes that use pork, and I only have a limited number of sense memories associated with pork products. Yet no one in my family, including myself, saw eating pork as an act of rebellion because navigating assimilation and tradition is a personal and communal journey within our faith.

I know of the historical complexity of this association. Pork was not just something Jews did not eat. Pork was used to smear Jews. There were laws forbidding Jews and pigs from cities in medieval Europe. Pigs were violently used to against Jewish culture and some modern antisemitic rhetoric can be traced back to pig related slander from hundreds of years ago (Essig, 2014). Identity is complex and ever shifting. I was maybe keener to the complexities and challenges of clearly defining community boundaries in the Basque country because I've navigated the incongruities of my own identity.

This fieldwork was not a unidirectional relationship between researcher and research subject, it was a meeting of people with stories and history. It was a cooperative participation in understanding the role of fermentation in the community, experimenting with new product developments, and visioning for the future. I am a fermentation obsessive. I see ferments everywhere I go. I ferment everywhere I live. I cannot pinpoint exactly when my interest in food became an obsession with fermentation but as is such with fermented products, it is hard to pinpoint the exact beginning of what are ongoing, unceasing, and inevitable processes of transformation. My fermenting affected the space. The challenges of articulating this partial and incomplete definition of myself are similar to the challenges in defining the concepts core to this thesis.

4 Results and Discussion

4.1 Anti-Definitions

A species name is a useful heuristic with which to introduce an organism but the name does not capture either the particularity of that organism or its position within sometimes-rapid collective transformation. An ethnic name has the same problem. But doing without these names is worse: we are left imagining that all trees, or Asians, look alike. I need names to give substance to noticing but I need them as names-in-motion.

(Tsing, 2015, p. 29)

Answering the research question of this thesis requires defining and unpacking a few key concepts: the boundaries of the case study community, fermentation, and food sovereignty. However, these questions require more than a standard English language dictionary definition because, firstly, local ecology and cultural history affect terms associated with food sovereignty and secondly, English is not a common language in this community. In ethnographic field work, it is important to work towards an emic understanding of key terminology, that is, how those within the community understand terms related to the research topic. This involves questions like “what does fermentation mean in this community?” and “what are the borders of this community?” However, the community is not siloed from ideas and definitions of other communities in the past and present. How top restaurants in the Basque country use the term fermentation obviously influences how the community defines the term. How La Vía Campesina defines food sovereignty also influences how the community defines that term.

The following section seeks to simultaneously define and resist definitions of these key terms. Ideas of community identity and food sovereignty are always especially rife with nuance and local debate, and it is important to describe the constant negotiations that occur within farms, towns, and academic literature. Sometimes these terms will be defined in the context of the case study, sometimes more generally using academic sources, and sometimes more personally to my experience. All these definitions will fall short of the wishes of strict repeatable science, and yet, hopefully, will give a sense of the nuance these terms hold at GAEC Haranea.

4.2 The Borders of Community

The most defining feature of the community around Haranea farm is the shared notion of being Basque. To the Basques, cultural preservation has always been a fight. To speak their language, to grow their food, to assert their sovereignty has always been a struggle among bigger forces. This was most clearly on display at the many events celebrating the return of political prisoners to the Basque country, supporting the Basque political prisoners and their families while they are still incarcerated, or supporting Basque political prisoners after their release as they reenter the community. There are signs and graffiti common in the area calling for “INDEPENDENTZIA” (independence), or “Preso eta Iheslariak Etxera” (bring the prisoners and fugitives home). A few people I spoke with expressed the view that the current amnesty is one-sided and that there will not be a real peace until the prisoners in France and Spain are released and returned. This shared notion of being Basque means many things. Basques are not French nor Spanish, Basques speak Basque, and Basques live in the seven Basque provinces. Yet what falls inside and what falls outside the bounds of this community still resist clear definitions.

4.2.1 *Basque*

In the Basque language, Euskaldi or Euskal Herria refers to the region known in Spanish as Pais Vasco, in French as Pays Basque, and in English as The Basque Country but it was explained to me that this phrase more closely translates to “the place where Euskera is spoken” or “the people of Euskera.” The Etymological Dictionary of Basque notes that “herri(a)” can refer to an “inhabited place” or “people” (Trask, 2008). A few people, during my time in the Basque country, reminded me of the centrality of language to defining the notion of being Basque, yet this notion is complicated.

During the Franco dictatorship (1936-1975), speaking Euskera was repressed and severely punished in schools and in public (Kurlasky, 1999). Many Basques born during this period were not taught Euskera by their parents out of fear that it would bring them punishment. Thus now, there are old men and women, who are Basque in every sense of the word: their families have been in the Basque country as long as you can trace it, they cook Basque food, they keep Basque gardens, they dance Basque dances, they practice Basque traditions and yet they do not speak Euskera.

The Basque country is also a surprisingly tolerant and accepting area for immigrants and refugees from outside of Europe. In the Basque Autonomous Region of Spain, the government has implemented policies for the economic integration of immigrants and local organizations have established solidarity links with immigrant communities. This tolerance is not surprising within the context of Basque politics and sovereignty struggles but is surprising within the context of rural Europe because many rural areas in Europe have had a surge in right-wing populism over the past 20 years (Calvário et al, 2020). Now there are new Basques, immigrants to the Basque country who have learned Basque by attending Basque immersion schools (ikastola) but who do not trace their family history through the Basque country.

The bias in research attention defines the Basque country in a way that overemphasize the Basque Autonomous Community of Spain where the largest Basque cities are, the languages of Spanish and Euskera are co-official, and the government of the Basque Autonomous Community resides. This marginalizes the Northern Basque Country from these definitions of what it means to be Basque and marginalizes the dialects of Iparralde from the standardized language.

Being Basque is a term in motion. It moves and changes, maintaining some parts and evolving as contexts change. Though being Basque is an identity marker of Haraneia, and the produce and animals they raise and grow, there is more to the farm’s identity than just being Basque.

4.2.2 *More than Basque*

At a nighttime event at the Itsasu Gaztetxea, I met a man and his friend both in their early 20s. One of them was from Zuberoa, the most interior province of Iparralde, and he argued that to be Basque was fundamentally incompatible with being French. To be Basque is to speak the language and to identify with the fight against French homogenization. His friend awkwardly interjected. He explained that he was born in Bordeaux and lived there until he was four years old because only one of his parents is Basque. But at four years old, he moved to the Basque country and began attending an ikastola. All his friends are Basque, he speaks Euskera fluently, and he is Basque but he is also French, he explained. He wants his Basque friends to be able to have Basque passports and self-identify but he would not renounce his French identity. And then he said to me, if you stay here, learn the language, and fight with us, you could be Basque too. The friends continued to disagree and the first friend finally validated his friend’s feelings but added he thinks his friend is in the minority and his views are not common. By listening for these exceptions, I learned exceptions were more common than a single outlier.

Gilles is one of the three co-owners of the Haranea farm. He does not own the land like Christian does but for over a decade Christian, Gilles, and Martine have co-owned the farm. Gilles is from Deux-Sèvres in center-west France but has now lived in the Basque country for 40 years. When he first moved to the Basque country, he took adult night classes to learn Euskera and now speaks and understands the language at an intermediate level. When I asked him if he feels Basque, he said that he has lived in the Basque country longer than he has lived anywhere else and yes, he does. He refrained, however, from the stronger claim that he *is* Basque. I supposed he refrained from claiming to be Basque because he deeply understands what it means to be Basque and the historical baggage that comes with that identity that is not the story of his family. Yet, for the purpose of this thesis, he is firmly at the center of the word “community” that I am struggling to define. Martine also has a similar story. She is from Indre in central France, has lived in the Basque country for decades, and sent her sons to an ikastola. They are two of the co-owners of the Basque farm around which I am defining community, yet they are not Basque. The land is Basque, the crops are Basque, the pigs are Basque, the preservation, fermentation, and transformation methods are Basque, most of the clients are Basque, and the farm is undoubtedly Basque, yet two-thirds of the ownership are not fully firmly Basque. They are unquestioningly part of the community of GAEC Haranea, yet Gilles, Martine, and Christian are individually involved in different and intersecting communities. Christian is predominately responsible for the pork production and terra madre involvement, so this feels like his initiative and responsibility but it is still the farm that is connected to these organizations. Likewise, Gilles and Martine handle the chicken and hen operation and are directly involved in selling at two AMAPs with which Christian does not frequently engage but the farm is part of these communities. Another way to think about community would be using the strict definitions of a formal association like the Porc Kintoa Basque community or Idoki community, yet these don’t encapsulate all the relationships of the farm. The farm is involved with so many explicitly defined associations.

4.2.3 *More than Now*

Community here is also intergenerational. All the farms in the area, including Haranea, have a succession plan for the next generation to take over. Christian and the ELB organization participate in farm occupations when local farmland is threatened to be converted into estates by outside investors. Preserving farmland for young farmers and not selling land despite high price offers is seen as critical to maintaining the diverse rural life that is fundamental to the communal strength of the interlocking communities in this region. Therefore, the boundaries of the community extend beyond what exists now. There is a constant eye towards the future generations who are already a part of the community.

4.2.4 *More than Community*

What other words, besides community, can we use? “Ecologists turned to the term *assemblages* to get around the sometimes fixed and bounded connotations of ecological ‘communities’...assemblages are open-ended gatherings. They allow us to ask about communal effects without assuming them” (Tsing, 2015, p. 22). This benefits from including non-humans but seems improper here where there are explicitly defined social entities that intersect less-formal communities and open-ended assemblages. So, I will keep the word community with a mountain of qualifiers highlighting its imprecision. In this community varied ideologies, trajectories, and aspirations negotiate collaboration. This constant compromise and evolution matters and these negotiations are not only human-to-human.

4.2.5 *Defining Community: Conclusion*

Returning to the research question, *how does fermentation contribute to food sovereignty*, we are still left with the question of what community's food sovereignty is being affected by fermentation. The community here is nebulous: fully or partially intersecting with well-defined and spontaneously formed communities. The community in question is dynamic, constantly evolving over time, yet with many consistent agents. The community here is place-based and language-based, yet not exclusively so. The community includes non-humans, animals, plants, and microorganisms that meet to create the possibility of life in this territory. An autonomous local food system is not an isolated community. The community here forges alliances with other local and global communities. It is the redundancy of these relationships and the overlaps of these communities that forge the resiliency of the local food system but it is in these bonds that the borders of the community become hard to precisely define. The fuzziness of these borders does not bother me.

❖ *(Interlude) Borders, Membranes, and Definitions*

Political borders are contrived, arbitrary, and imposed. The inhabitants of many border regions experience every day the porosity of borders, with families, jobs, and other social, cultural, and economic aspects of life spanning the divide.

(Katz, 2020, p. 55)

The notion of borders has always been contentious in the Basque country. While working on the farm, I often heard the refrain, "there are no borders in the Basque country." The Basque country is one unified whole, neither Spanish nor French, yet the divisions within the Basque country are seen differently. To assert the unity of the seven Basque provinces is defiant against Spanish and French nationalism but to claim there are six provinces, that Lower Navarra and Navarra are one province, and therefore to imply that the division into "French" Lower Navarra and "Spanish" Navarra is an intentional effort by the national governments to divide and reduce the power of the Basque country, is even more defiant.

It is not just the national borders that are questioned. Borders of communities are also difficult to define. The borders of the community are porous and selective. The definition of the community is understood by those inside the community and yet it is riddled with dissonance. To be a Basque speaker is a necessary condition of being of the Basque country, yet it is not fully encompassing of all who are Basque. To be a peasant farmer and transform your own products is a significant part of Haranea's identity and association with Idoki, yet the farm's community includes some that do not transform their own products.

This inherent imprecision of borders holds true for borders between modern nation-states to us, human individuals, all the way down to the membranes of microorganisms. "The skin on each of us, which we think of as the boundary between ourselves and the world beyond, is home to many more microbes than there are humans on the Earth...Our skin, like the membrane of every living organism and cell (in fact, like all borders, membranes, and edges), is complex. From a distance, or in the abstract, these edges may appear to be sharp, hard dividing lines. But up close they are textured, supporting a multitude of smaller structures, biodiverse and selectively permeable" (Katz, 2020). This is especially true of the pork fermentations at Haranea farm. The yeasts and bacteria grow on the surface of the meats. Their presences are ubiquitous yet they are only visible as a community once they have sufficiently invaded the surfaces of the meat.

The porousness of boundaries leads to unexpected collaborations. Never was this clearer than the day I was cutting links of lukainka (sausage) to confit in lard. The sausages are cooked confit to preserve the shelf-life and done only when there are not enough orders for the fresh sausages. The lukainka are dried for ten days in the *sechoir*, the drying room, with the xingar, matraila, artekia, and other experiments and then they are taken out of the room, cut into individual links, and cooked confit in lard. They are then left to sit in lard for a couple weeks until they are removed and packaged vacuum sealed to sell to customers.

It was in this moment, after 10 days drying in the sechoir with all the other ferments, that I noticed a white mold forming on the surfaces of the sausages. I exclaimed with joy, “these are fermenting” to which Christian shrugged and said, “no, they will be cooked confit.” This fermentation was unexpected, unintended, and seemingly irrelevant to the process of preserving them in fat but the conditions were right. The room was already so dense with invisible beneficial yeasts and bacteria that fermentation was inevitable. It was the permanence of the space for fermentation and porousness of the surfaces of the meat that allowed these communities of microorganisms to take hold.

We see this mirrored in the human communities. When Christian began the farm in 1998, he joined with three neighboring farms to create Saskia. Later, Christian and his neighbors decided to invest in building a professional style kitchen on the bottom floor of his house so that they could share a space to transform their own products. Transforming products on the farm is a big priority of Haranea, so much so that they are an Idoki farm which requires the on-farm transformation of all products sold. Not all Haranea’s neighbors feel this strongly. Some sell milk to centralized cheese makers. However, this differing in philosophy does not create dissonance in the community. Collaboration flourishes across different actors along different lines. For Saskia, the priority was local, these four neighbors all in Itsasu. For Idoki, the priority was self-transformation, self-ownership, and local breeds. Diversity flourishes because of the porousness of ideologies and the permanent spaces, like the shared kitchen, that support this collaboration. This semi-permeability leads to unexpected collaboration. Supporting local produce is both an axis of commonality and a point from which individually specific ideologies divide. For Haranea, local produce includes local transformation as well as local growing and selling but for some, local transformation is not an element of this matrix.

Fermentation requires permanent space. Whether it is a room for apple juice to turn into vinegar or an attic for xingar to mature, fermentation requires the designation and protection of permanent spaces for microbial communities to take hold. Fermentation is more about creating an environment of favorable conditions than it is about mixing ingredients in specific proportions like a recipe.

Understanding that fermentation is the cultivation of microbial ecologies requires the fermenter to define and maintain space for the fermentation over a long period of time. In the case of xingar, this is years and when fermentation is done in constant rotation, this is a permanent space for fermentation. Now, this room is so dense with communities of microorganisms that the proliferation of these communities is seemingly inevitable. Hang sausages for 10 days without intending to ferment them and white surface molds begin to develop because the air is saturated with these invisible communities. The same is true of Iparralde and the Basque Country: the air is saturated with invisible communities. The permanence of Basques in this region combined with the openness and porousness to distinct ideologies creates the conditions for unexpected communities. These communities are mutually casual and cyclically co-dependent.

Do not expect strict definitions in this thesis. They are not realistic to fermentation nor to this community. Fermentation encourages us to think beyond these strict ideas of borders and towards the idea of membranes. Fermentation itself is a visible reminder to this idea of liminality because fermentation exists

in the space between fresh and putrid, between safe and unsafe. Further, the definitions of putrid and unsafe are socially constructed and vary culture to culture, community to community (Prado, 2017).

Definitions are in motion. Communities are in motion. Fermentation is motion. This research questions supposes an impossible pause in time without which the subjects of the research would be a blur but with which we are left with crude approximations of definitions and groupings that seldom capture the nuance of these happenings. As fermentation is an ongoing happening, so too is food sovereignty. They can both only be defined against a backdrop of time in motion. Fermentation does not happen in a snapshot; it is a transformative process. Similarly, a community does not wake up one morning food sovereign, it is a series of ongoing negotiations within and around food systems. It is dependent on systems outside of human control like photosynthesis, animal digestion, and cellular respiration, and it is dependent on completely artificial human constructs like capitalist markets and social cooperation across and within identities. This “anti-definitions” section is trying to capture in static words what is capturable only in dynamic motion.

The Basque language is a testament to the age of the community and is an underlying reminder to the endurance of community. So too are the fermentation practices. Borders of communities and strict definitions imply absoluteness but beyond borders are membranes which allow for the movement of contents between sides. This is key for creating stable systems and preserving equilibrium. As with cell membranes, it is the selective permeability of cell walls that allow for equilibrium. Together, porousness and permanence breed diversity and through this diversity community is strengthened.

4.3 What is Fermentation?

Fermentation is not obsolete and it is not a fad. It is a fact. It is an inevitable life force that cultures have harnessed to create alcohol; to generate compelling flavors to preserve food from times of abundance for times of scarcity; to make otherwise toxic plants safe to eat; to increase the nutritional value and make foods more easily digestible; to sustain health and heal illness; to restore and diversify our microbiota; to conserve and produce energy; and to regenerate soil fertility.

(Katz, 2020, p. 106)

4.3.1 Definitions from Science

The International Scientific Association for Probiotics and Prebiotics (ISAPP) organized a meeting of “clinical and scientific experts in family medicine, microbiology, food science and technology, ecology, immunology, and microbial genetics in September 2019 to develop a consensus report on fermented foods” with the goals of better understanding health benefits, industrial regulation, and consumer education (Marco et al, 2021, p. 196). This meeting was notably without the goals of understanding traditional contexts and uses of fermented foods, connecting fermentation processes to the management of local ecosystems or sustainable agriculture practices, or connecting fermentation to the empowerment of cottage-scale farm industries. Their final definition of fermented foods was, “foods made through desired microbial growth and enzymatic conversions of food components” (Marco et al, 2021, p. 196). While this definition may serve probiotic health food marketers and governmental organizations that seek to precisely regulate fermentation industries, the definition is incomplete and insufficient for the purposes of this thesis because it lacks an awareness to historical practices that date back before the invention of the microscope. The sciences’ definition of fermentation is an anachronism. The panel highlights that they are discussing a group of human food management techniques that “likely facilitated the transition from hunter-gatherer

communities to sessile agricultural communities in the Neolithic revolution about 14,000 years ago” (Marco et al, 2021, p. 196) yet they rely on technologies discovered in the last 200 years to define the term. How can communities that predate the invention of the microscope have used microorganisms in an intentional or desired manner?

Steinkraus (2002) details big moments in the history of microbiology in his attempt at a definition of fermented foods: “microorganisms, knowledge of which we obtained only about 300 years ago when Leeuwenhoek discovered tiny animacules under his primitive lenses and only a little more than a hundred years ago when Pasteur demonstrated the role of microorganisms in fermentation and Koch showed that microbes cause disease. And it is only in the last 50 years that knowledge of the role polymeric deoxyribonucleic acid (DNA) plays in all forms of life was discovered” (p. 24). He defines fermented foods as “food substrates that are invaded or overgrown by edible microorganisms whose enzymes, particularly amylases, proteases, lipases hydrolyze the polysaccharides, proteins and lipids to nontoxic products with flavors, aromas and textures pleasant and attractive to the human consumer. If the products of enzyme activities have unpleasant odors or undesirable, unattractive flavors or the products are toxic or disease producing, the foods are described as spoiled” (Steinkraus, 2002).

Here fermented foods are defined in opposition to spoiled food. The concept of foods being “invaded or overgrown by edible microorganisms” is beautiful because it recognizes the agency of microorganisms in affecting their own habitats and building their own worlds and hints at how their world-building projects intersect with human world-building projects in beneficial and detrimental ways. However, this idea of beneficial versus detrimental can be seen throughout his work and is problematic. He writes, “there is a never-ending struggle between man and microbes to see which will be first to consume the available food supplies” (Steinkraus, 2002). While this view of individual organisms in unceasing competition is common, it fails to account for the complexity of how organisms, as individuals and in communities, make their worlds habitable through interdependence.

Tsing (2015) uses her research of matsutake mushrooms to challenges this premise. “Until quite recently many people – perhaps especially scientists – imagined life as a matter of species-by-species reproduction. The most important interspecies interactions, in this worldview, were predator-prey relations in which interaction meant wiping each other out. Mutualist relations were interesting anomalies but not really necessary to understand life. Life emerged from the self-replication of each species, which faced evolutionary and environmental challenges on its own. No species needed another for its continuing vitality; it organized itself. This self-creation marching band drowned out the stories of the underground city (that is the interconnected network of mycorrhizal fungi found in forests). To recover those underground stories, we might reconsider the species-by-species worldview, and the new evidence that has begun to transform it” (Tsing 2015, pg 139).

Steinkraus was also one of the first to coin the term “indigenous fermented foods.” He defines it as “group of foods that are produced in homes, villages, and small cottage industries at prices within the means of a majority of the consumers in the developing world” (Steinkraus, 1985). This conflates notions of indigenous and developing implying that indigenous people only exist in the developing world and, in recommending technological improvements for industrial fermentation, this notion of unidirectional development is reinforced. This text is from 1985, when notions of indigenouness were conceptualized differently than they are today, so the term indigenous fermented foods also feel incomplete in the context of this thesis; however, the inclusion of the qualifier “within local means to procure” is important because it captures the embeddedness of fermented foods in local communities and local ecosystems.

Neither the ISAPP's definition nor Steinkraus' definitions of fermented foods fully capture the understanding of fermented foods in the Basque country or in the Basque language.

4.3.2 *Definitions from Linguistics*

Fermentation carries microbial activity, which is a relatively new concept in the scientific community and even newer in popular consciousness, therefore, it is complicated to create a consensus when defining the word. The etymology of the English word fermentation (and equivalent Spanish and French words) is from the Latin root *fevere*, which means “to boil” and in modern English can be used to describe both the literal phenomenon of cellular metabolism and a general state of agitation, excitement, and bubbiness (Katz, 2020, p. 9).

In Basque dictionaries, the term *hartzi(dura)* is defined as fermentation, however, when I asked about this word to Basque speakers in the community at Haranea, they told me this word was unknown. The word *iraki(dura)* was known, and interestingly *diraki* means “to boil,” which indicates a similar etymology to the Latin-root word (Trask, 2008). I was told though, this word is also uncommon and that sometimes the word “ferment” is simply borrowed and modified with the correct Basque prefixes, suffixes, or conjugations. This exposes more confusion around the term. Fermentation is often associated with bubbles but there are many microorganisms that do not visibly bubble.

4.3.3 *Towards an Emic Definition*

In this thesis, from the influence of ethnozymology, I tried to work towards an emic understanding of fermentation. Even though all the processes on the farm that I would consider fermentation have pre-industrial origins, it is impossible to define fermentation now without discussing the influences of Europe as the center of globalized science for many centuries. Restaurants in Europe and the United States have popularized the term fermentation to create a new high cuisine. Christian has dined at one of the most famous of these restaurants, Mugaritz, which is nearby in Hegoalde. The accessibility of scientific information in languages spoken in the community via the internet also reinforces the definition of fermentation as the product of microbial action.

Still, even when you are looking for them, microbes can be elusive. Pascal Baudar (2020) changed my perception of fermentation when he described an Armenian sorrel drying technique where the leaves were braided and hung to dry. He collected sorrel leaves and dried them in a dehydrator to replicate the process but did not understand why his attempt was missing flavors he remembered from the original. He then realized that the thick braid that was traditionally used was causing uneven drying that allowed the center of the braid to ferment before it completely dried over the course of a few days. This awakened me to the reality that all foods that are dried outside over the course of many days inevitably ferment unless they are in extremely cold or dry climates.

I asked the farmers at Haranea whether they thought of the Piment d'Espelette peppers as fermented. They, and everyone else I asked, agreed they were not and yet I learned that it is a requirement of the EU PDO (protected designation of origin) to dry them outside for a minimum of two weeks before oven-drying and then pulverizing them. They agreed that the flavor completely changes in this drying period and that the peppers would not be the same if they were dried in ovens directly after harvest (even in low-temperature ovens).

Here we see the inherent challenge of defining an ancient word with modern, esoteric, and scientific techniques. English uses salting, curing, drying, fermenting, and preserving to encapsulate many techniques

that modern scientists would define as fermentation, yet no combination of these words fully encapsulates what scientists are trying to define without including techniques that scientists are trying to exclude.

4.3.4 *Why use the word at all?*

So why use the word fermentation at all? Why not just name the specific food products and identify their effects on food sovereignty? Because there is power in sharing terminology across cultures.

People are becoming more aware of the impacts of microorganisms on their lives especially during the COVID-19 pandemic. Berger and Montereau (2020) noted that “(Google) search interest for the keywords yeast and sourdough quadrupled in tandem with the global spread of the virus” in March 2020. As evidenced by the supposed need of the ISAPP to define the term fermentation for consumers, consumers know about and are asking questions about fermentation. Farmers, like those who market raw milk cheeses or natural wines, are increasingly interested in concepts once reserved for microbiologists. Fermentation is a powerful way in which humans interact with environments.

Thinking back to the early peasantization movement and anti-industrial agriculture movement of the 1980s and 1990s (Herenández Xolocotzi, 1985; La Vía Campesina, 1996) there was power in combining the efforts of geographically diverse struggles against centralized national and corporate powers without flattening the nuances of these locally specific struggles. Similar too, there is power in recognizing how widespread and diverse fermentation practices are across the world and using that as a connective tissue in fights against the destruction of the climate and rural life. “Fermentation, with its complex impacts on microbial ecologies inside and outside human bodies, illuminates how biological and sociopolitical mechanisms become entangled when they shape and are shaped by larger environments” (Flachs and Orkin, 2019, p. 36). There is power in this term and yet it needs to be seen as a definition-in-motion, constantly changing in relation to socioecological factors.

My arrival at Haranea brought a new factor of influence to the farm regarding fermentation. I influenced the definition of fermentation on the farm because my research, before I arrived, was explicitly about fermentation (though it was unclear to me before I arrived what role fermentation would play in the community). I am sure that the word fermentation was used more in my research period than it was normally used to describe farm processes but that is not to say I was the first to use this word.

4.3.5 *Fermentation as Preservation*

A few weeks into my research period, I realized the term fermentation was mostly conceptualized as a tool for preservation with the most obvious example being apples, that would otherwise spoil, being fermented into long-lasting cider but the microbial associations with the term were also known. Fermentation was often discussed as implicitly without the use of heat treating, extreme drying, vacuum sealing, or refrigeration, even though some degree of temperature and humidity control are currently used in certain fermentation processes on the farm. Preservation without the use of modern technologies would be a close approximation to an emic definition of fermentation in the community but traditional processes like cooking confit in olive oil or lard are not seen as fermentation and the pepper drying is also not understood as fermentation; therefore, this is not a comprehensive definition.

4.3.6 *The Microbes of Xingar, Matraila, and Artekia*

Though no microbiological analysis was conducted within this study, similarly processed dry-cure hams have been analyzed. Comi and Iacumin’s study (2013) entitled “Ecology of moulds during the pre-

ripening and ripening of San Daniele dry cured ham” is a similar case study from the microbiological research perspective. They write, “during pre-ripening and ripening, a composite mould population grows on the surface and is present in the air of the production rooms. The main strains isolated are Aspergilli and Penicilli, which predominate either in the air or on the dry-cured ham until the end of the ripening” (p. 1118). From their literature review they say, “Penicillium spp., Aspergillus spp. and Eurotium spp. seem to be present the most during all stages of ham production” (p. 1113) and note that “the presence of different moulds on home-made hams is subject to the climate conditions in the production chambers” (p. 1114). This affirms what Christian shared about the impact of climate on his xingar making processes. In observation in the drying room where the xingar, matraila, and artekia are kept for varying amounts of time (what Comi and Iacumin refer to as the pre-ripening room), there are visible molds on all the fermented meats (see figure 4).

4.3.7 Defining Fermentation: Conclusion

Xingar, matraila, and artekia fall within the boundaries of all these definitions of fermentation. The meat has been intentionally transformed by the action (or invasion) of microorganisms. Locally, they are not always associated with fermentation because translations of the word fermentation are not common and these pork fermentations lack the bubbles so emblematic of fermentation yet they fall within the pre-industrial techniques of preservation, which are seen as overlapping (or the same as) the category of fermentation. Despite the lack of use of the word fermentation or equivalent words in Basque, it is useful to use this word to connect struggles for the preservation of traditional ecological knowledge across the world.

❖ *(Interlude) Recipe for Xingar, Artekia, Matrailia*

“In my house there has always been ham for the family...I cannot imagine pigs without ham.”

(Aguerre, C., 2021, Interview and translation by the author)

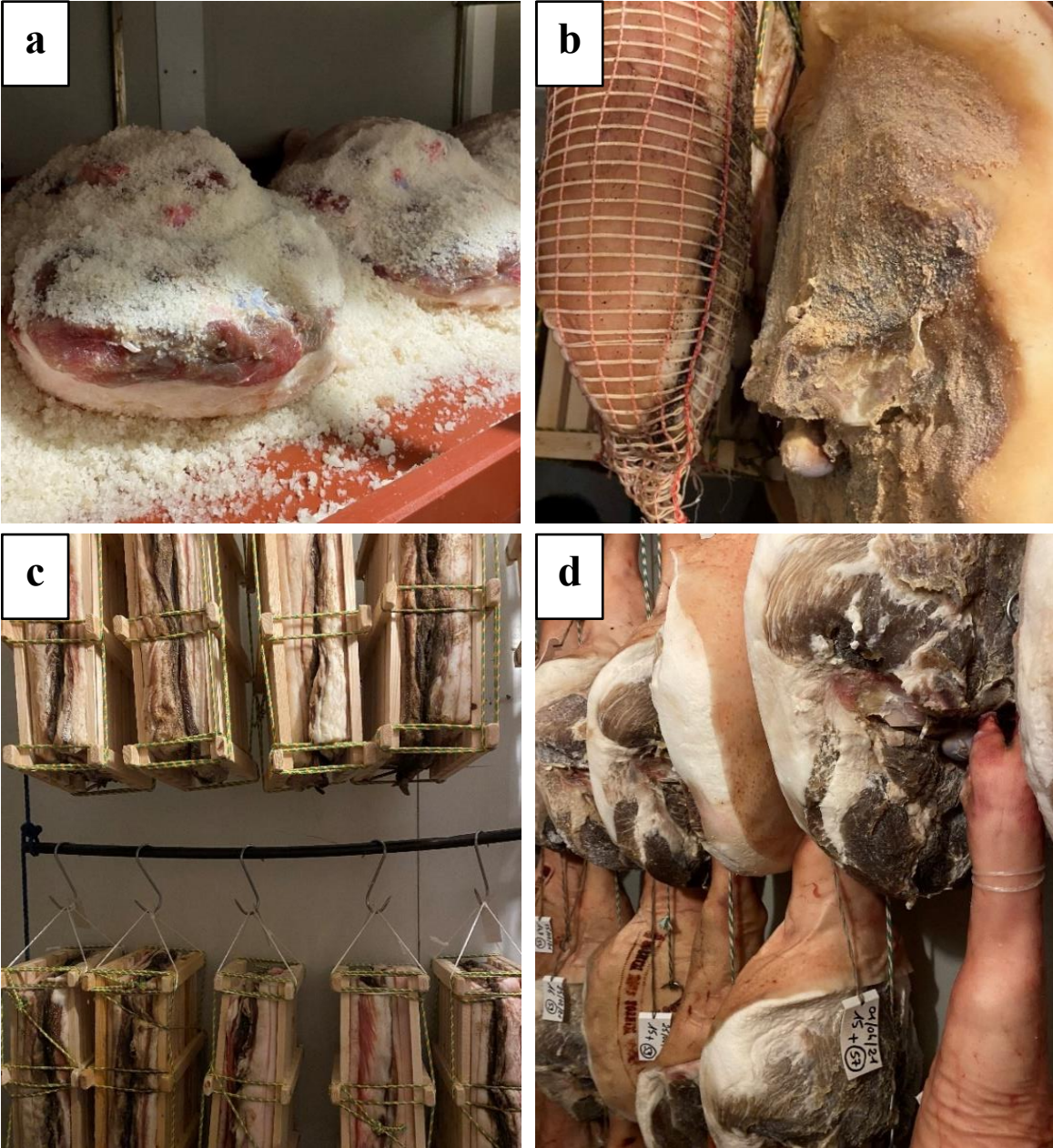


Figure 3 Pork ferments in various stages: **a** xingar in the saloir, **b** xingar and matraila hanging in the sechoir with visible surface molds, **c** artekia hanging in the sechoir also with visible surface molds, **d** xingar hanging in the repos. Photo credits Ari Moskowitz

How can you write a recipe that's main ingredients are animal breed, age, exercise, diet, and the climate? You cannot. No words or pictures can encapsulate, translate, or summarize the smell of the aging rooms or the hands that clean and trim the meat but what is a thesis about food processing without a recipe? I have tried to capture the craft, which to my eyes looked so simple but to my hands I am sure would have been so difficult to replicate.

Five pigs are chosen for slaughter and driven to the slaughterhouse in Saint-Jean-Pied-de-Port in a trailer on a bed of hay on Thursday. On Friday they are killed and on Monday they arrive early in the morning whole and cleaned with offal and blood in separate bags and containers. This happens a little less than once per month on average and more frequently in the winter months than in the summer. Only the hind legs are made into xingar. The legs are shaped and blood is pushed out of and removed from the three veins in the leg. If the blood is not removed, the xingar will develop bad flavors and ruin. Then the legs are salted with PGI 'Sel de Salies-de-Béarn.' The legs are labeled with a string tag with the initial weight, amount of fat, and date. The legs are buried in salt and laid flat in the first room, the *saloir* as it is labeled in French, for 12 to 17 days depending on the weight of the leg. The first room is kept at 4 degrees Celsius and the humidity of the room is not important. Then the legs are moved to the second room, the *repos*, where they are hung for two to three months. The *repos* is kept at 4 degrees Celsius and 75% humidity. The low temperature of this room is very important because this is the most likely time when putrefaction could occur. Then they are moved to the third room, the *sechoir*. This room is 12 degrees Celsius and 82% humidity. Here they lose a lot of weight and stay for a long time, six to eight months. A traditional Bayona ham would be finished now after nine months total of aging but for these hams this is less than half of their curing life. In the third room, you can see and smell the microbes that grow on the surface of the hams. After leaving the *sechoir*, the xingar will have a weak ham flavor.

The *matrila* and *artekia* have a slightly different process. They are also salted after butchery but then kept for two days in the walk-in refrigerator, which is slightly colder at 3 degrees Celsius and not humidity controlled like the other rooms. They are then lightly covered with black pepper and pressed together in pairs so that the skin is on the outside. The *matrila* (necks) are pressed together and then pushed into a string net so that they stay together and can hang. The *artekia* (belly) are pressed together between two wooden boards, that Christian crafted, and tied using bungee cords. Sometimes the *artekia* are rolled instead of pressed in pairs. They are then hung for one month in the *repos* and then two months in *sechoir*. The microbes flourish more on exposed meat than fat or skin so there is less microbial development on the *matrila* and *artekia*. Microbial communities are visible on all three pork ferments in the *sechoir*.

When there is more humidity in the *sechoir*, a grey microflora dominates but the goal is to encourage the growth of a white microflora. Early on, Christian experimented with higher humidity in the *sechoir* and the grey microflora developed more but now he has lowered the humidity and in his opinion this improves the taste. Tasting, observing over 20-plus years, and making constant small adjustments: this is the development process. The microflora have lived here since the room was built because the *sechoir* is never cleaned. Christian explained that now that the room has aged, there is an equilibrium of the microflora which gives a specific flavor of the place.

After the *sechoir*, all three products are moved upstairs to the attic. The total process for the *matrila* and *artekia* is 12 months minimum. The xingar is first washed and the exposed meat is covered in a mixture of lard and corn meal. The xingar is kept there for one and half to two years or three years maximum. The legs are periodically checked with a horse bone pick. The pick is inserted into three areas of the meat where rancidity would most likely occur and is smelled for off flavors. The most important location to check is

the upper part of the shin close to the hoof from where the leg is hung. The shin is covered in skin with no exposed meat thus it is hardest for the salt to penetrate to this area. If the salt does not fully penetrate to the shin, off flavors will occur. The wood in the attic is new pine. The walls are limestone which hold humidity. The windows face northeast and southeast because the humidity, in the form of clouds and wind, comes from the ocean to the west and travels until it stops at the mountains. The fluctuations in temperature and humidity, between day and night, summer and winter, are essential for the final flavor of the fermented pork.

4.4 Food Sovereignty

“The term food sovereignty was first brought to international attention at the World Food Summit organised by the United Nation’s Food and Agriculture Organisation in 1996. It was put forward by La Vía Campesina, an international movement which co-ordinates organisations of small and medium-sized producers, agricultural workers, rural women, and indigenous communities from Asia, America, and Europe. During the 1996 World Food Summit, Vía Campesina presented a set of mutually supportive principles as an alternative to the world trade policies and to realise the human right to food” (Pimbert, 2019, p. 181). Then in 2007, an international forum on food sovereignty held in Nyéléni, Mali attended by 500 representatives from eighty countries defined food sovereignty as:

The right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. It puts the aspirations and needs of those who produce, distribute and consume food at the heart of food systems and policies rather than the demands of markets and corporations.

(La Vía Campesina, 2007)

In this original iteration, food sovereignty is a clearly defined right but since its initial introduction to the world stage in 1996, the term food sovereignty has fluctuated between slightly differing definitions.

As it has passed between agricultural, academic, and governmental organizations, many scholars have tried to summarize the diverse definitions of food sovereignty. Wittman (2011) “attempts to consolidate knowledge around food sovereignty as an ‘emergent science,’ viewing it not as an established paradigm/concept but rather a potential new framework emerging from (a) diverse set of contemporary grassroots production practices and political approaches.” Pimbert (2018) describes food sovereignty as “an alternative paradigm for food, fisheries, agriculture, pastoralism, and forest use that is emerging in response to (a) democratic deficit and the many environmental and social crises of food and farming” (p. 1). He also adds to the definition of food sovereignty beyond only a political right and defines food sovereignty as, “a transformative process that seeks to recreate the democratic realm and regenerate diversity of autonomous food systems based on agroecology, biocultural diversity, equity, social justice and ecological sustainability.”

Food sovereignty is simultaneously the goal for radically transforming global food systems and a “framework for overall food system reform” (Wittman, 2011). It is both the means and the end. “The principles of food sovereignty are not a checklist of separate ‘things to do’ [but rather] integrative goals of a praxis that plays out differently from one organization, locale, region, country and transnational context to the next” (Boyer 2010 cited in Wittman 2011). Food sovereignty is a right for individuals and for

communities but it is also guidance for changing international regulations to achieve that right for all people. It is never a checklist but it can be a “emergent science” (Wittman, 2011) or a “transformative process” (Pimbert, 2018). Food sovereignty is at times the goal for what food systems should be and at other times, it is a unifying principle that brings together disparate identities working towards other goals, for example, an emancipatory rural politics against right-wing populism (Calvário, 2020). The specifics of local political structures, food sovereignty struggles against national and international regulations, and the relationship between fermentation and politics is outside the scope of this thesis.³ Thus, food sovereignty will be thought of more as an “emergent science” and “transformative process” than the “right to food” in this thesis. None of these definitions of food sovereignty are mutually exclusive.

Calvário et al’s (2020) research in Hegoalde, elucidates a more specific history of food sovereignty in the Basque country. Though the Northern and Southern Basque countries have differences, many similar forces shaped their histories, and many organizations cooperate across what is seen as a contrived border. “Several factors specific to Basque society help to explain why food sovereignty has had so much adherence. First, baserritarras are an essential part of the Basque cultural identity as they played a crucial role in maintaining Basque language and culture especially during the Franco dictatorship. Second, various communal and non-mercantilist social customs and institutions are historically entrenched in Basque shared values and identities, and several of these remain alive today or are being actively reshaped in both rural and urban areas. Third, ‘sovereignty’ has been and remains a key struggle for Basques. Struggles for Basque self-government have a long history stemming back to the nineteenth century. During the 40 long years of the Franco dictatorship, an alliance between anti-fascist conservative nationalists and Popular Front parties continued, while the struggle against Franco’s violence and repression gave rise to more radical forms of Basque resistance, including the leftist organisation ETA that opted for armed struggle. The unilateral abandonment of armed struggle in 2011 led to the confluence of left-wing political forces in the struggle for a democratic and inclusive Basque state, through the formation of a broad radical left political coalition in 2012” (p. 861).

One interviewee of theirs noted, “there is greater understanding that food sovereignty must be a global struggle of peasants from both wealthy and impoverished countries and that this unity is necessary” (Calvário et al, 2020). This view is consistent with my informal interviews. Christian often spoke about the global interwoven struggles when speaking about food sovereignty. He talked about food sovereignty as a framework for solidarity with global peasant struggles. Because of Christian’s activities with slow food and the global terra madre network, he does see food sovereignty as a goal but more commonly when discussing his goals at a personal and farm level, he used the word “*equilibrium*.”

³ Fermentation is relevant to the political struggle dimension of food sovereignty. Flachs and Orkin (2019) write, “microbiopolitics, particularly as developed by Heather Paxson (2013), focuses on the political ramifications of microbial encounters. This literature calls attention to how people and states seek to live with microbes: either as threats that must be destroyed because they disrupt healthy relationships, or as potential allies in the human quest for wellbeing. Microbiopolitics, following Michel Foucault’s biopolitics, describes the sorts of microbial risks that communities and regulatory apparatus allow through food safety regulations, moral judgements over hygiene, and governance in everyday actions...Home fermenters, along with commercial producers of kombucha or raw-milk cheese beholden to food safety laws, argue that some microbial entanglement can be positive and question the extent to which regulations protect citizens and craft producers versus agribusiness corporations” (Flachs and Orkin, 2019, p. 36).

4.4.1 *Equilibrium*

What is equilibrium? Christian never explicitly defined equilibrium to me but he explained examples of what equilibrium looks like. He said he wouldn't want to increase the number of pigs at Haranea because that would require hiring more people and take time away from other responsibilities. Adding more people could also conflict with the ratio of owners and employees required by Idoki that he supports and follows. The farm has a good working system, a good balance. This is one part of equilibrium.

The primary food production goal of Haranea is to feed local people. Nearly all the food produced is sold through local sales channels (though some is inevitably also sold to tourists). There is a ratio of production quantity and consumers' needs. There is no goal to increase profits or far exceed the local consumers' demand for the farm's products. This is another notion of equilibrium.

Equilibrium also contains a notion of time. Equilibrium is important for the future generations of Haranea and the succession of the farm. There is a notion of equilibrium as stability for the next generation to build upon and grow.

Equilibrium is not without transformation and experimentation, rather, it requires it. As time passes, local dynamics change and socioecological relationships morph; to maintain equilibrium continued transformation is necessary. The farm is anything but static. Christian experiments with products like mustard, vinegar, and soap from pig fat. Five years ago, he built and opened a restaurant on the farm to promote local produce. Years ago too, Haranea switched from horses to a small tractor for weeding the pepper field. Everything on the farm is always changing. The mustard and vinegar are the newest experiments and Christian told me that he doesn't know what will happen with the mustard. People may think that paying seven euros for a local mustard is too much when the one from Canada is only two euros. Mustard isn't a traditional product of the region but Christian decided to try and grow it because it can grow well in this climate and it could be a way to add value to the vinegar made from the apples. Equilibrium is not static but it is stable.

Equilibrium is something that needs to be actively preserved and maintained. Equilibrium is balance. Equilibrium rests on the border between insufficiency and excess. Rather, equilibrium rests on a membrane between insufficiency and excess. A membrane that allows for dynamic responses to ecological, social, and economic changes in the environment.

❖ *(Interlude) Their Autonomy*

When I was young, I used to imagine that everyone around me was a robot, and I was the only one that was real. What else could explain the phenomenon that I could only experience my own consciousness and not the minds of others. This imagining was undoubtedly fueled by the sci-fi trope of waking up in a simulation but at the time, it seemed a plausible answer to the untestable hypothesis that other people existed in their own minds the way I did in mine. It takes a leap of faith to imagine that those outside of your own consciousness, some of whom you've never met, experience the world remotely similarly to you. It takes a belief in the autonomy of another: *their autonomy*.

Early in my research period one Friday night, I stayed late at Indianonea, a restaurant in Itsasu that Christian had brought me to. He wanted me to meet people in the community and encouraged me to stay past when he went home. Less than ten people remained surrounding the bar and a man, maybe ten years older than me, began to ask me about my hometown and we began discussing his view of Basque sovereignty. With a poster behind him from a meeting of eight ethnic minorities in western Europe, held in

Corsica, he explained the importance of other sovereignty struggles to Basque sovereignty, referring to sovereignty struggles of Corsica, Bretagne, Occitan, Catalan, Wales, Ireland, and Scotland, among others.

He explained his opinion that France is contrived, a fiction, a unification of ethnic minorities that had no desire to be unified under a central government that sought to erase these minorities identities and supplant it with a new central nationalism. He explained that there is no recognition of the Basque right to autonomy or Euskera at the governmental level. This dates to the French revolution and constitution, where French language is the only official language. Indivisibility, as it is phrased in the French constitution means that the French people are united with one language, the French language.

The goal of Basque sovereignty is not and never has been to rule the territories of France. He wants autonomy for other minorities. These fights for autonomy against dominant nationalist forces are seen as necessarily intertwined. Through this, communal alliances are forged across different fights along similarities. Fundamental to the fight for autonomy here is a recognition of the rights of other ethnic minorities to *their autonomy*.

But Indianonea, the site of our conversation, is not an ordinary restaurant.

Two years ago, Indianonea was owned by its chef. He died suddenly and neither his widow nor son wanted to continue the restaurant. The story goes that separately a friend approached the son and a different friend approached the widow with an idea to buy the restaurant as a collective in the model of Basque gastronomic societies more famous in Hegoalde but without the exclusion of women that is common in the origin of many of such clubs. So 40 community members came together and bought the restaurant. They each pay monthly to support the restaurant and have agreed to a pledge/commitment/charter to be a part of the association. It's a "bring-your-own-food" model and the space can be used for big parties and gathering or just Friday night hangouts. The beer on tap is 1 euro and the alcohol is sold at cost on an honor system of payment. There is a leadership board of seven to ten people who meet monthly to discuss finances and improvement projects for the restaurant though all are welcome at such meetings. The restaurant is only for associates and friends of associates, though in my experience the definition of friends of associates gets stretched pretty far depending on the event.

Indianonea's charter states the following:

Our values are based on solidarity, the preservation of the environment and heritage. These values will guide us in our chosen events and in the philosophy of the Indianonea association. The principle of solidarity: between people (to meet the needs of citizens, vulnerable people, migrants...), participating with local farmers and artisans, transmitting and sharing our knowledge and skills. Environmental protection: waste separation, consumption ... will be done in a way that protects and respects nature. Heritage care: we want to develop a breathing space for the Basque language, a tool for promoting cultural heritage. Each member commits to respecting these values in the events it organizes.

(Indianoneko bazkideen engaiatze hitzarmena EUS-FR, no date)

To call this place magical is to expose again my bias. It is hard to use the word "magic" without bias because it imbues a sense of more than what can be observed which is typically beyond the limits of academic writing. I am from New York, what a Basque friend of mine half-jokingly called the capital of capitalism. I think of cooperative ownership as stakeholders in public traded companies where shares determine standing and profit is the main collective goal. To be in this space, where collective ownership

meant something to the continuation of place-based community, was nothing short of magical for me. The goals of cooperation were to strengthen something local, to reinforce relationships that build towards resilience. And, as with any restaurant, food was at the center. To pay what you had, to take turns behind the bar, to charge for beverages at cost, to bring food to share, to clean together, to have this third space, outside of the house, outside of work, both public, private, and shared, was magical to me.

What does it take to create cooperation in a world so dominated by private ownership? Solidarity and the preservation of the environment and heritage are linked here. There is power in sharing, but that power is often invisible because it falls outside of that which is convertible into economic value. A precondition for this cooperation that strengthens the town of Itsasu is a recognition by each member of the autonomy of other community members, *their autonomy*.

But dinner clubs are far from the only example of such cooperation at the level of ownership in Itsasu. Haranea is a GAEC, a Groupement Agricole d'Exploitation en Commun; it is a shared owned entity of three people. There is a recognition in the strength of community at the level of ownership. Involving more people at the level of ownership and not at a lower position in a hierarchy strengthens the farm and flows against the fundamental capitalist assumption of the benefits of private wealth accumulation. Christian strengthened the farm by recognizing the autonomy of Gilles and Martine, *their autonomy*.

There is a philosophical framework that underpins this cooperation that runs counter to the dominant forces that organize global food systems. Tsing (2015) connects the early scalable projects of European colonial plantations to capitalist modernization. Using the example of Portuguese sugar plantations she describes their formula for smooth expansion through self-contained, interchangeable project elements: “exterminate local people and plants; prepare now-empty, unclaimed land; and bring in exotic and isolated labor and crops for production” (p. 38). The sugar canes were all clones with no local companion species and the labor of these plantations was coerced and enslaved African labor with no local social relations and thus no established routes for escape. The projects were considered a great success for Europeans. “Alienation, interchangeability, and expansion could lead to unprecedented profits” (p. 38) and most Europeans were too far away to see the effects.

“As Sidney Mintz has argued, sugarcane plantations were the model for factories during industrialization; factories built plantation-style alienation into their plans. The success of expansion through scalability shaped capitalist modernization. By envisioning more and more of the world through the lens of the plantation, investors devised all kinds of new commodities. Eventually, they posited that everything on earth—and beyond—might be scalable, and thus exchangeable at market values. This was utilitarianism, which eventually congealed as modern economics and contributed to forging more scalability—or at least its appearance” (p. 39). The premise of the plantation is a repression of autonomy outside of the autonomy of the plantation owner. The enslaved labor has no autonomy. Even the plant, the sugar cane, is simply a commodity to be turned into profit with no relations or interspecies interactions.

Contrast this with community at the level of ownership described above and they seem to stem from a difference in fundamental assumption. The opposite of the recognition of the autonomy of another is the centralization of control. In one, no autonomy exists outside the owner, and in the other, autonomous actors are everywhere.

Cooperative ownership models are everywhere in the community. The Porc Kintoa Basque association for the continuation and maintenance of the Basque breed of pig, which is so central to the identity of Haranea, is also a cooperative. Christian told me that sometimes the association makes a decision he disagrees with but compromise is foundational to perpetuating community. Compromising happens in

the restaurant, on the farm, and in the associations. Haranea shares some of their land with a beekeeper. This is another partnership of mutual benefit. The corn mill they use once a year to mill corn into meal and flower is a shared cooperative. The pepper planting tractor attachment is shared. The professional-style kitchen in the farmhouse is shared by the four neighbors. Hidden in the recognition of the right of another to autonomy is the strengthening of one's own claim to autonomy because recognizing another's autonomy creates links of solidarity.

Christian told me about the feeding schedule for the pigs. Both Idoki and the PDO Jambon du Kintoa have strict regulations on animal feed. Throughout the year, the pigs forage on acorns, chestnuts, grasses, cherries, fruits, or other forest products but their diet is supplemented with a cereal mixture. He described the cereal mix as "supplemental feed." The pigs can eat what they want and eat a different amount of cereal depending on the season and availability of forage. This philosophy runs opposite to industrial pig farming which seeks to control the diet of pigs in exact proportions of proteins, fats, and carbohydrates for maximized feed to gain ratio. To me, this idea of supplemental feeding is an implicit recognition of the autonomy of the pigs, *their autonomy*.

And what about the microorganisms? Scientific fermentation texts often differentiate between autochthonous and allochthonous fermentation starters. Autochthonous is sometimes called natural fermentation and was the only type of fermentation until Pasteur's time. It involves the diverse communities of microorganisms that are latent in the air and on the substrate that self-cultivate without the addition of single (or a few) species in a starter cultures. Allochthonous is intentionally added fermentation starters. Often one or a few specific strains of bacteria or fungi are isolated and added to a fermentable substrate such that they outcompete indigenous microorganisms and lead to more consistent and scientifically repeatable flavors. All wines without the natural label, most beers, and cheeses use allochthonous starters. All the fermentations at Haranea farm are autochthonous. Latent within autochthonous fermentation we see autonomy and place-based indigenoussness connected to the diverse communities of microorganisms that exist in the fermentation rooms.

I asked Christian about the economics of his fermented meat products with the goal of understanding whether fermenting the meat products lead to an increase in revenue. He concluded it does not because you must account for the loss in weight of the meat, the initial investment of the cooling rooms, the electricity, the cost of the salt, and the inevitability that you lose some of the fermented pork products to rancidity or insects. In accounting for the cost of fermentation, Christian included the risk factor of losing product to undesirable fermentation or pests. Up in the attic where the xingar matures for at least a year, each leg is covered in a cloth bag. The room is dense with spider webs. The spiders are our friends, Christian explained, they eat the mites that can burrow into the meat and ruin it. Christian lets the webs proliferate and tries not to break them.

Here is a multi-species entanglement between bacteria, yeast, mites, spiders, humans, and pigs. Each has autonomy and agency and world-making capabilities. None is exclusively dominant though our perspective is limited and partial to the human goals. There is codependence implied in recognizing the autonomy of another. The codependence of microbes and humans is not a metaphor for the codependences between humans; it is one part of the multi-dependence between humans, pigs, plants, and microorganisms. Recognizing the autonomy of another human decenters individual hubris but recognizing the autonomy of another species decenters human hubris entirely. To reimagine food systems for an ecologically sustainable and socially equitable future, we have to let go of the myth of human control that came to dominate the

world's imagination through European colonization. We have to recognize the autonomy of others, *their autonomy*.

4.5 Answering the Research Question

How does fermentation contribute to food sovereignty in the community of Haranea? The fermented pork products of Haranea increase biocultural diversity at many spatial, economic, and social levels. Fermented products help diversify market channels and social relations and contribute to complex communal networks. Fermentation therefore helps create autonomous local food systems by reducing dependence on suppliers and consumers outside the community. Biocultural diversity and autonomous local food systems are preconditions for food sovereignty and it is in these ways that fermentation contributes to food sovereignty.

4.5.1 Fermentation and Biocultural Diversity

Biocultural diversity “describes the diversity of life in all its manifestations: biological, cultural and linguistic. This concept encompasses biological diversity at all levels (genetic, species, ecosystem and landscape) as well as cultural diversity in all its forms” (Pimbert, 2018, p. 16). Fermentation supports diversities of many types and at many levels. First, fermentation supports diversity at the genetic and species levels on the farm scale by creating environments that favor the proliferation of diverse communities of bacteria and yeasts. Second, fermentation supports cultural diversity within global organizations fighting for food sovereignty by reinforcing the unique Basque gastronomic identity of Haranea. Third, fermentation supports a diversity of market channels and social relations that acts as a social and economic insurance against risk.

4.5.2 Fermentation and Biodiversity

Fermentation is human managed biodiversity in the same way that the diversity of plant species or animal breeds in an agriculture system is human managed biodiversity. The xingar, matraila, and artekia recipes are all connected to breed, diet, and climate and this is a further commitment to cultivating biodiversity at many levels. At Haranea, the fermented products are inseparable from these other aspects of biodiversity.

Fermentation practices everywhere until recently, albeit unknowingly, have always been a celebration of diverse communities. "Until Pasteur first learned to isolate and propagate yeast and other organisms 150 years ago, fermentation traditions everywhere, since the beginning of time, involved mixed cultures, meaning communities of organisms, as they are found in nature on grapes, in raw milk, on vegetables, on wheat, on rye, (on pigs), et cetera, and present in all environments" (Katz, 2020, p. 40). With the DPO of the Jambon du Kintoa (xingar), the importance of microorganisms is implicitly recognized though fermentation is never mentioned in the official documents. The DPO rules connect place, breed, feed, and specific forest products (chestnuts and oaks) to the fermented ham product without ever recognizing the importance of diversity at the level of microorganisms. The microorganisms are a corollary, a consequence, of these other factors that together constitute the importance of this local and culturally unique product but diversity at all levels, including the microscopic level, is important and increases ecosystem resiliency.

We often think of biodiversity at the level of visible species but it's well-documented that the biodiversity of microorganism in soil is essential for plant health. Similarly, our gut microbiome diversity

is essential for human health. Fermentation sits at the nexus of biodiversity and cultural diversity because fermentation is a manifestation of cultures maintaining biodiverse communities. It is microagriculture.

4.5.3 *Fermentation and Cultural Diversity at a Global Scale*

Prerequisite to diversity in any context is the distinguishability of entities. To celebrate the cultural diversity of La Vía Campesina, Slow Food Terra Madre, and other global food sovereignty movements, communities must be encouraged to express their unique cultural identities. Fermentation contributes to diversity at the global level by reinforcing specific gastronomic identities through hyper-local cuisine. Christian affirmed this in an informal interview when he said, “(xingar) is evidence of the culture” (Aguerre C., interview by the author, July 2021). Fermentation represents an important portion of the invisible biocultural landscape and of the terroir (Quave and Pieroni, 2014). “The importance of terroir is well understood as it relates to cuisine on a number of scientific and cultural levels (but) the recognition of microbial terroir is less well understood outside of cheese and wine-making” (Felder et al, 2012). Affirming a gastronomic identity that is uniquely Basque, with products microbially specific to the farm, supports the food sovereignty movement’s diversity.

Fermentation processes, unlike other food preservation techniques, reinforces the farm’s peasant identity because these pork fermentation processes are traditional Basque food that can be done on the farm without intensive capital investment. La Vía Campesina is an important social network for the farm and central to their global agenda is advancing the struggles of peasant farmers. Idoki is another important social network for the farm which also identify with peasant agriculture. The Idoki label, which is placed on all the fermented pork products before they are sold, reads, “Idoki Agriculture Paysanne Gure Laborantxa Iraunkorra Sincère et Citoyenne” (which translates to “Idoki Peasant Agriculture (in French) Our Sustainable Farming (in Basque) Sincere and Citizen (in French)”). AMAPs are an important consumer network for the farm and a core part of AMAPs is working with peasant farmers. The ways that fermented products signal the farm’s peasant identity contribute to the farm’s social connection with other peasant farmers around the world (e.g., La Vía Campesina), other local peasant farmers (e.g., Idoki), and consumers



Figure 4 Matraila with Idoki label. Photo credit Ari Moskowitz

(e.g., AMAPs). Diversification at all levels contributes to increased resilience and reduced risk. “The resilience of food systems depends on such creative use of biological diversity by local organisations of producers to minimise risk and realise new opportunities created by dynamic change” (Pimbert, 2009, p. 19).

4.5.4 *Fermentation and Autonomous Local Food Systems*

Autonomous food systems are those that are not dependent on multinational corporations and this is a key tenant for agroecology and food sovereignty. The importance of autonomy becomes most apparent during food system shocks, like the COVID-19 virus’ disruption of global supply chains. Autonomous local food systems are less affected by these shocks because there are less steps between farmers and consumers. They are not dependent on long multi-step international food chains directed by corporations that are more interested in their own profits than the continued viability of small producers within their supply chains. Fermented products contribute to more autonomous food systems because the preserved foods allow the farm to be patient with deciding where and when to sell their products. They are not pressured to sell all their pork products within the two-week window after vacuum sealed raw pork would lose freshness.

Keeping food from abundance to scarcity is at the heart of many fermentation practices including xingar, matraila, and artekia. When one to two pigs were killed per year per household in the Basque country, it was necessary to preserve parts of the meat to be eaten for the future. Even now, when the farm kills pigs throughout the year, preserving meat offers resilience to shocks or unexpected fluctuations in demand. Christian explained this concept to me when discussing his rationale for making apple cider vinegar. He explained that apple harvests vary year to year. If he can make a product that he likes, that local customers like, and that he can sell year round, he will be able to consistently sell a product from his apples and that will in turn benefit the community and him. Though there is more control over the quantity of pigs killed than the quantity of apples harvested, pigs are not killed every week at the farm, and the fermented products can be sold when there are no more fresh pork products available. If the number of pigs available suddenly changed from an unforeseen event like a disease, there would still be pork products to sell from the farm.

The main goal of Haranea is to sell food to local consumers. If the local demand for food were to drop, Haranea would not have to seek out external consumers to quickly sell their products because they are preserved. The farm would not have to sell their meat products at a lower than desirable price out of fear that they would spoil. They would not have to immediately adjust their farming practice or number of pigs they kill per year because of these methods of pork preservation. Christian explained his economic resilience strategy to me through an example. He said, if you have 300 customers and you lose two, you will be fine but if you have two customers and lose one, you’re screwed. He was referring to the industrial agriculture model where often a single company sells the feed, fertilizer, and seeds to a farm and then is the sole buyer for the farm’s produce. This dependence is risk and powerlessness in the event of price fluctuations, food system disruptions, or changes in corporate agendas. Diversifying market channels diversify social relations allowing for more complex social networks, forming an insurance against risk.

Fermented products also contribute to more local food systems because they connect to the local traditional palate. Christian says his number one test for any food product that the farm sells is does he like it. Xingar, matraila, and artekia are part of his food memories. He likes them and that’s why they produce them at the farm. Fermented foods contribute to a shared local identity because they are from this area. They are traditional foods. They are needed for traditional recipes like the *taloa*, which is a Basque corn flat bread that needs artekia. Fermentation increases the sensory quality of foods, preserves the meat,

continues local traditions, and maintains traditional ecological knowledge all without the addition of other ingredients except salt. The odalkia (blood sausage) contains onions and the meat is cooked with many vegetables. The pâte has a variety of local and non-local spices, the xinchon and the confit sausages also have spices. There's nothing negative about adding additional ingredients to preserve products and the odolkia is a traditional processing method with strong connection to cultural identity but it can only be stored for a long time if it is preserved with the non-traditional pressure canning method. The fermented products are the longest lasting traditionally processed product.

4.5.5 Fermentation is not the only Food Processing Technology

Many of the ways fermented products contribute to biocultural diversity and autonomous local food systems are not exclusive to only fermented products. Other preserved pork products on the farm like pressure canned blood sausage and pressured canned pâte also help Haranea diversify their market channels and buoy the farm from shocks and disruptions to global food systems. However, the fermented products contribute to food sovereignty in three unique ways. First, by contributing to biodiversity. Pressure canned preserved foods are devoid of microbial life and do not foster biodiverse communities. Second, by being a hyper-local product, fermented foods go beyond replicable recipes and connect breed, climate, landscape, and microbial terroir to the community's gastronomic identity. Finally, fermentation processes are traditional processes that predate modern industrial inventions. Therefore, the continuation of these food processing methods is a way to maintain traditional knowledge and maintain connections to traditional cultural ways. In the same way that maintaining Basque dances and the Basque language are important cultural preservation practices that form the foundation for communal identity that informs the Basque sovereignty struggles, Basque fermentation practices are cultural preservation practices.

Farmers as fermenters become master cultural preservers. It is not just the fermentation that contributes to the preservation of identity. The breed, cooperatives of farmers, AMAPs with producers, the packaging in Basque, the management of the forests, the accepting of Basque currency at the market, and the social relations forged with restaurants, consumers, and other farmers all contribute to this cultural preservation. A diversity of food processing methods, some of which are not fermentation, is another part of the farm's resilience. Diversity is a very practical resilience strategy. Christian told me, that some industrial producers in other regions are famous for one product, like sausage, so they can transform the whole pig into sausage and sell everything. Here, at Haranea, they are not, so they need to diversify. With smaller quantities of many products the impact is lessened. However, diversifying with just any method or processing technique is not a strategy for success. The surrounding culture is important. Christian explained that they could make a famous Italian pork product (e.g., Nduja) but if the product is not a part of local people's culture, then they may buy it once and taste it but they will not continue to buy it.

4.5.6 Biocultural Diversity, Autonomous Local Food Systems, and Food Sovereignty

Pimbert (2018) describes biocultural diversity as intimately linked with agroecology and food sovereignty. Biocultural diversity helps build resilience in both ecosystems and social systems. In this case study, a large part of building resiliency is lessening external dependencies and, therefore, building more autonomy within the community. This all creates more food sovereignty and helps the community both maintain equilibrium and define what that equilibrium means to them. By being independent of the unlimited growth demands of industrial farming, Haranea can define, on its own terms, what their goal of equilibrium will look like. The resilience to shocks and disturbances that fermented foods provides is one way they maintain equilibrium. Resilience is dynamic equilibrium. Equilibrium isn't a pause in time, it is

the ability for a system to return to homeostasis after a jolt. To say the community is food sovereign does not mean it holds a static form. It is necessarily evolving to maintain this equilibrium as ecological, social, and political factors surrounding the community constantly evolve. “The autonomy, economic viability and resilience of family farms are enhanced when farmers control their resource base, including land, water, seeds and labour as well as knowledge, skills, social networks, local organizations and institutions” (Pimbert, 2018, p. 6). Fermentation is knowledge and skills. Fermented products support resilient social networks and local organizations and keep the local multi-species community together.

Microbes cannot profess their own identity, yet they are agents and world makers. Through the processes of these fermentation, we go from not being able to see the bacteria and yeasts floating in the air, on the panels of the wall, and on the meat, to being able to smell, taste, and identify them, not as individual cells but as diverse (heterogenous) collectives. Fermentation is the process of cultivating diversity within a collective identity towards the goal not of infinite growth but of equilibrium. Fermentation supports equilibrium, resilience over time, and resilience to shocks. Fermented foods are revenue preserved and power in market fluctuations. Fermentation itself is also an equilibrium. The many yeasts, bacteria, and meat are called xingar only once they are all stable together.

4.6 The Radical Nature of Equilibrium

Equilibrium is a radical notion against the unlimited growth that so defines global economic systems. The goal of equilibrium comes from a tradition of radical thought.⁴ Ideas of progress, development, and growth have come to define not only economic goals, but also political, social and personal goals. “Progress is embedded in widely accepted assumptions about what it means to be human. Even when disguised through other terms, such as ‘agency,’ ‘consciousness,’ and ‘intention,’ we learn over and over that humans are different from the rest of the living world because we look forward – while other species, which live day to day, are thus dependent on us. As long as we imagine that humans are *made* through progress, nonhumans are stuck within this imaginative framework too” (Tsing, 2015, pgs. 20-21). Ideas of progress suppress the autonomy of non-humans and dampen our abilities to notice activities and livelihood strategies that fall outside of unidirectional progress. “We are surrounded by many world-making projects, human and non-human...many preindustrial livelihoods...persist today, and new ones...emerge but we neglect them because they are not a part of progress. These livelihoods make worlds too – and they show us how to look around rather than ahead” (Tsing, 2015). By setting equilibrium as a goal, the pitfalls of progress are implicitly recognized and by recognizing the autonomy of others, human individual dominance is decentered in favor of a collaborative vision of how we, all life, can survive the imminent and current precarity.

Progress and development are always trying to grow and scale despite the finiteness of the planet’s resources. “Progress itself has often been defined by its ability to make projects expand without changing their framing assumptions. This quality is ‘scalability.’...scalability banishes meaningful diversity, that is, diversity that might change things” (Tsing, 2015, p. 37). Contrarily, equilibrium embraces diversity as essential for resilient systems. We can observe the microorganisms in their world-making projects and wonder how they achieve equilibrium under varied environmental settings. The porousness of membranes

⁴ Peasant studies, post-development theory, buen vivir, degrowth and ecological Swaraj are all alternatives to “sustainable development” (Pimbert, 2018, pg 7; Kothari et al, 2014). Degrowth, first written about in France in 1972, “is the reduction of energy and material throughput, needed in order to face the existing biophysical constraints... (and) is an attempt to challenge the omnipresence of market-based relations in society and the growth-based roots of the social imaginary replacing them by the idea of frugal abundance” (Demaria et al, 2013).

is essential for equilibrium in context of salt, osmosis, and fermentation. Porousness, adaptability, and receptiveness to new ideas are essential for achieving and maintaining equilibrium with shifting contexts.

4.7 Agroecology Needs Fermentation

The term agroecology can refer to either a scientific discipline, agricultural practice, or political or social movement. Agroecology, like all the terms discussed in this paper, has a variety of context specific definitions. As an academic discipline, it can be understood as “the integrative study of the ecology of the entire food systems, encompassing ecological, economic and social dimensions, or more simply the ecology of food systems” (Francis et al, 2003) but agroecology also encompasses a social movement that calls for a paradigm shift in global food systems that re-centers small-scale, peasant, and indigenous food producers. Food sovereignty is often seen as the goal of agroecology and organizations mentioned above (La Vía Campesina, Slow Food Terra Madre, and others) use agroecology as a toolkit to achieving food sovereignty around the world. Agroecology isn’t just a set of practices or optimizable science; it is also a theoretical frame and a social movement centered around heterogeneous local knowledge systems. With the goals of food sovereignty, centering peasant struggles for autonomy, and defining a new science of sustainability for food systems, agroecology should include fermentation as an agroecological practice.

4.7.1 Agroecology is More Than Agronomy

Agroecology claims to address food systems (Francis, 2013 as cited in Anderson, 2021) but little attention is given to agroecological practices beyond agronomy. Circular economies and short supply chains are discussed within agroecology but few practices that can empower farmers in the time between when food is harvested to when food is consumed are discussed in agroecology. Wezel et al (2014) lists agroecological practices for sustainable agriculture but only mention cropping practices as part of their review (e.g., tillage, irrigation, and weed, pest, and disease management). The practices of agroecology should extend beyond the moment of harvest.

Fermentation is directly supportive of food sovereignty, principally by contributing to food resiliency at the community and household level by preserving food through seasons of shortage, making food easier to digest, and making foods quicker to cook. Fermentation also creates shelf-stable salable products that, in conjunction with adequate access to markets, can be sold (in many cases) year-round and can thereby be held in times when supply is greater than demand and prices are low. Fermentation prolongs this often-fleeting window between harvest and consumption in ways that are more ecologically sound than energy intensive preservation or transformation methods. Fermentation practices are also rooted in traditional ecological knowledge and are a key part of understanding how certain communities have maintained biocultural diversity for thousands of years. Fermentation sits in the moment when agricultural products go from plant or animal or fungi to food. It preserves agricultural products for later consumption and thereby empowers growers and producers. In *AgroecologyNow!*, Pimbert et al (2021) define the multifunctional benefits of agroecology as: improving biodiversity, addressing climate change, contributing to good nutrition, and strengthening social relations (p. 18). Fermentation also contributes to all these benefits of agroecology.

Fermentation is never the action of one microorganism or even one species of microorganism but rather it is the action of a succession of communities of microorganisms that change their environments. As communities of microorganism change their environment (e.g., decrease pH, increase surface humidity),

the population sizes of different microbial species change and new communities become primary actors. So too does the movement of agroecology and food sovereignty recognize the power and necessity of succession in creating sustainability at the social and ecological levels.

Pimbert (2018) discusses the need to “transform and construct knowledge for diversity, decentralization, dynamic adaptation and democracy” as central to achieving agroecology and food sovereignty. Fermented products made by peasant farmers are knowledge artifacts representing diversity, decentralization, and dynamic adaptation over centuries or millennia of small-scale production. “Microbes (are) at the nexus of local agroecological management, food practices, and human wellbeing” (Flachs and Orkin, 2017, p. 37).

4.7.2 *Fermentation is Not a Panacea*

We cannot recommend similar fermentation practices for all communities or all places. “Narrow-lens, universal and reductionist explanatory models have generated a crisis in agriculture and natural resource management through their inability to come to terms with the dynamic complexity and variation within and among ecosystems” (Pimbert, 2018 p. 1). Fermentation is not a silver bullet fix to local agroecosystems. Agroecology is based on a set of principles, not strict recommendations. Though certain agroecological practices are recommended, a community or farm can be agroecological without implementing all recommended agroecological practices because the sustainability of agriculture practices must be embedded in local social and ecological contexts. A farm can have agroecology without crop rotation, agroforestry, or integrated pest management but many farms would benefit from these practices. Fermentation can be thought of in a similar way: important to the goal but not essential in all contexts.

I asked Christian, what would happen if he could no longer ferment on the farm, and he said, he’d never thought of that but that the farm would survive. He said they would sell pasteurized apple juice instead of cider and make more pâte and blood sausage. He said they would get by. To be resilient is to not be dependent on any single factor: not one buyer, one product, nor one technique. I must resist the urge to universalize the prominent role of fermented foods to all cultures but where fermentation locally exists, fermentation practices can contribute to the radical protest against hegemonic neoliberal capitalist systems and towards the paradigm shift embedded in food sovereignty’s goal.

4.8 **Fermentation Needs Agroecology**

The only thing that makes do-it-yourself fermentation radical is context: our contemporary system of food mass production, which is unsustainable in so many ways. Our dominant food system is polluting, resource depleting, and wasteful, and what it produces is nutritionally diminished, causing widespread disease. Perhaps even more profoundly, it deskills and disempowers people, distancing us from the natural world and making us completely dependent on systems of mass production and distribution -- which are fine as long as they function but are vulnerable to many potential disruptions, from viral pandemics to fuel shortages or price spikes to war and natural disasters. Expanding local and regional food production, and in the process transforming the economy that goes along with it is the only real food security.

(Katz, 2020, p. 18)

Fermentation is trending towards a tool for molecular gastronomes and food science enthusiasts: equations that calculate the ratio of salt and water activity level needed for any substrate that are devoid of cultural, historical, and agronomic contexts. That is why fermentation needs agroecology. An industrial farm can spray pesticides and chemical fertilizers and still practice crop rotation and an organic farm can still cultivate environmentally destructive monocultures. Fermentation practices' role in the fight for food sovereignty is only sensible if it is coupled with the agronomic practices of agroecology.

Fermentation needs agroecology to avoid becoming what Pimbert et al (2021) call “high-tech, profit-centered ‘solutions’ (peddled by corporate actors) that preserve an unjust and unsustainable food system” (p. 2). They continue and describe the potential pitfalls of agroecology being co-opted by those who do not center the political dimension of agroecology and the importance of issues of knowledge and control. “If agroecology is not based on a shift in power away from elite actors and towards the agency of food producers and strengthening of democracy, it can easily devolve into a technical fix with little potential for wider transformation” (Pimbert et al, 2021, p. 15). This articulates exactly the threat to fermentation. If knowledge and agency are not centered in the distribution and practice of fermentation, the power of fermentation as a transformative set of processes will be lost.

This threat looms imminent. In the past ten years, “multinational food corporations, weakened by growing disdain for their obesity-inducing sugary drinks in the West, began swallowing up artisanal fermentation businesses. In the last few years, companies making low-alcohol, low-sugar kombucha and water kefir have attracted investment from the likes of Coca-Cola and Pepsi, while General Mills has put its substantial dollars into Farmhouse Culture’s sauerkraut and other probiotic products” (Chan, 2021). Fermentation projects can be terrible or benign. The agronomic practices used to cultivate the ingredients, the places where power reside, and the sociohistorical context all play large roles in whether fermentation will be transformative or destructive to the environment and society.

To eat fermented foods is radical in the days of industrialized-prepackaged and mass-manufactured foods. Practicing fermentation is hyper-local as it involves microbial terroir completely unique to place. Fermentation is the living embodiment of a global-local movement because it constitutes a set of practices that are globally similar and universally replicable yet microscopically local, specific, unique, and irreplicable. Fermentation is a microcosm for the creation of environments suitable for diverse actors to thrive, as it is quite literally the diversity of species that contribute to the long-term stability of fermented foods. Agroecology also seeks to create environments where diverse actors can each drive towards the goal of sustainability. Agroecology is about cultivating diversity within a collective identity towards the goal not of infinite growth but of equilibrium.

Fermentation and agroecology each have large but barely intersecting bodies of work that articulate scientific processes, give specific guidance on favorable practices based on local cultural idiosyncrasies, and inspire global social movements yet they currently do not leverage each other’s contributions towards addressing global crises like climate change and social inequity. Both fields can exist without the other but they are both improved when together. You can ferment non-seasonal products and be wasteful in the process of preservation but it’s antithetical to the origins and traditional ecological knowledge that fermentation is built on. You can create agroecological systems without fermentation but it is suboptimal to exclude the opportunities that preserving seasonal abundances, transforming toxic food products, and maintaining traditional knowledge that fermentation provides.

4.9 Fermentation as a Co-Evolutionary Force: The Holobiont Theory

Brumberg-Kraus and Dyer (2011) describe three biological and evolutionary ways in which fermented foods could have come to be shapers of ethnic identity:

1. The original fermenting communities of microbes were no more than the indigenous microbes of a particular region and of its human population...The indigenous microbiota dwelling in and on humans produce not only familiar body odors and flavors but also those same nuances in fermented cuisines.
2. Our sense of taste, smell, touch, sight, and hearing vary according (to) the genes that code for the functions. The normal, ancestral situation was for a continuous lineage of humans to dwell in a small, inbred settlement with a limited travel radius...When these groups become less socially and geographically isolated from one another, 'culture' enables them to adapt their genetically inherited preferences in order to negotiate their new experiences of familiarity with the Other as friend or foe.
3. Humans seem to be genetically predisposed to find causalities and explanations. No matter how serendipitously a particular regional fermented cuisine might have evolved...humans characteristically would be ready with a full explanation: 'This is our cuisine, as our ancestors always made it, and part of our culture

(Brumberg-Kraus and Dyer, 2011).

In these ways, the inevitability of fermentation influenced human culture and identity. Fermented beverages have shaped humans for longer than there has been human civilizations and sedentary communities (Katz, 2011). Fermentation has been an externalized (exogenous) co-evolutionary force on forming culture. But our relationship with microorganisms is both external to ourselves and internal to our bodies. There are 10 to 100 bacterial cells per human body cell that comprise several hundred species of bacteria and the number of genes of the bacteria in our body is about 100- to 150-fold the number of genes in our own genome (Matyssek and Lüttge 2013). Human individuals are enmeshed in a web of co-dependencies. "Successful coexistence with microbes is a biological imperative. The fermentation arts are human cultural manifestations of this essential fact" (Katz, 2011, p. 165).

These co-dependences inside and outside of ourselves blur the borders of our individuality. Griffith (2015) challenges the notion of all species' individuality beyond just humans': "while the traditional view of organisms (including humans) is that they are self-contained, discrete, and autonomous individuals, scientific research is increasingly suggesting that this is misleading; the view of organisms as individuals is perhaps no longer viable...Eating, digesting and living are impossible without our symbiotic relationships...if life and nature are to be found anywhere, it is not autonomous individuals but the constitutive comminglings, involvements, and interconnected relationships that make up the ecological mesh" (Griffith, 2015, p. 42). The host and its associated microorganisms are referred to as the hologenome of the holobiont. The hologenome can refer to organism cooperation at any scale: from interpreting eukaryotic cells (cells with a membrane-bound nucleus) as the host and formerly prokaryotic cells (cells lacking a nucleus) like mitochondria or chloroplasts as micro-symbiotic partners (Margulis and Sagan, 1986; Katz, 2011) to interpreting the entire planet as the host and all animals, plants, fungi, and bacteria as the micro-symbiotic hosts (Matyssek and Lüttge 2013). A hologenome is any collection of organisms that

strongly interact between each other, externally and internally, and therefore mutually exert co-evolutionary forces. The implications of this theory are vast. It is imperative we pay attention to and cultivate our interspecies relationships at all scales whether human-pig, human-microbe, or other because “nature may be selecting ‘relationships’ rather than individuals or genomes” (Gilbert et al cited in Tsing 2015, pg 142).

The repercussions of this theory are not solely biological. “Biological classification and biological individuality are not just relevant to biology but are always connected to various social and political question” (Griffith, 2015). Thus too, the idea of man as an individual supports dominant notions of a meritocracy, that an individual can and will succeed or fail solely based on his merits. This view fails to recognize our dependence on others for survival and the effects of social and historical contexts on individuals’ ability to advance or even just sustain their desired lifestyles. This view has also historically centered white men as masters of their own destiny and masters of nature. “Normativity masquerading as nature necessarily supports the conservative status quo and is hostile to non-normativity” (Griffith, 2015, p. 44).

4.9.1 What are the political ramifications of including fermentation in the holobiont theory?

Fermentation reminds us of the lessons of queer ecology. That we are all queer. That none of us fall within the neatly constructed boundaries and binaries we have been taught were immutable. We have never been just individuals and we have never been solely dependent on heterosexual reproduction or vertical genetic inheritance. Our “us-ness” is entangled in all that we call “not us.” All borders, whether political, cultural, biological, ethical, or even individual can be better thought of as semi-porous membranes. As Griffith (2015) shows, introducing a queer idea of individuality can serve to destabilize normative gender relations. This idea can be constructive towards food sovereignty’s precondition of reformulating gender relations as fundamental to food sovereignty (Pimbert, 2019).

Adding fermentation to the holobiont theory can also reshape common approaches to ecological conservation. Tsing (2015) writes, “Ever since the enlightenment, Western philosophers have shown us a Nature that is grand and universal but also passive and mechanical. Nature was a backdrop and resource for the moral intentionality of Man, which could tame and master Nature.” Viewing individuals as ecosystems dissolves the boundaries between “Man” and “Nature.” When thinking about conservation strategies we must consider the microorganisms that exist everywhere in non-sterilized spaces and inside our bodies. These microorganisms are unique to places and the cultivation of these microorganisms can be found in the communal knowledge of specific places. Adding fermentation to the holobiont theory has political implications for food sovereignty because it makes the conservation of ecological knowledge tangible through fermented food products. The holobiont theory is an unsolicited confirmation of what many indigenous communities already know to be true: that life doesn’t follow human constructed borders and humans have always been interconnected and dependent on non-humans.

Ethnobiologists and environmental humanities scholars can call attention to the insights of indigenous cosmologies through the holobiont theory. “By stressing local social and global political conditions under which these microbial relationships can exist, ethnobiologists can describe the complex feedback loops that shape microbial landscapes...An ethnobiological approach to fermentation and the microbiome can contribute to in situ conservation at various scales by celebrating taste, knowledge, health, and place as daily practices opposed to the homogenization of foods and ecologies through modernist industrialization” (Flachs and Orkin 2019, p. 39). By viewing fermentation processes as hyper-local and context dependent, we can fight against notions of scalability embedded in industrialization processes and

add to the argument of why power must remain in local producers producing unique and irreplicable artisanal foods.

The holobiont theory turns our attention to local inter-species interactions. Feeding our gut microbiome impacts health and nutrition in the context of food sovereignty. Preserving these local fermented products and not removing a product from its dietary but rather understanding fermented products within the matrices of nutrition in which they were locally developed could lead to insights in how fermentation contributes to deficiencies of nutrients not widely available in certain climates or in certain cuisines (tempe and sauerkraut are examples of products supplying vitamin B12 in the context of traditionally vegetarian or low-animal product diets and not as a health food panacea for a new vegan movement where many nutrients are supplemented with vitamins which are extracted unethically or rely on patents of traditional knowledge by outside corporate medicine companies.) This can change how we view nutrition, not as single species of bacteria that are most “healthy” but as feeding a complex diverse community of gut bacteria with complex diverse communities of microorganisms from fermented foods which supports complex diverse human communities.

Heightening us to the entanglements of the social, economic, biological, ecological, gastronomic, and cultural realms, fermentation allows us not only to see but to interact with, cultivate, taste, and smell our codependence on a multitude of life forms. Fermentation is the nexus of agriculture and food consumption. We cultivate microbial life to preserve what we have grown, raised, or foraged. It is an added cycle of cultivation and harvest. We cultivate animals and plants and then harvest, then we cultivate bacteria and yeasts, and then harvest again. Perhaps fermentation can make tangible, make visible, and make olfactible, our dependence on the microbial world.

5 Conclusion

Fermentation plays a multi-faceted role in contributing to food sovereignty and equilibrium at Haranea. The ability to preserve pork products using traditional methods serves to both increase the community resilience by diversifying social and economic relations and to maintain the local gastronomic identity. This contributes to biocultural diversity and supports more autonomous local food systems which are preconditions for community food sovereignty. Fermentation contributes to biodiverse ecologies, culturally diverse communities, autonomous food systems, local food systems, resilience, and equilibrium. In these myriad ways fermentation contributes to food sovereignty.

5.1 Future studies

In future studies regarding food sovereignty and ecological conservation, the role of fermentation practices should be highlighted. To counteract the commodification of food and the loss of traditional knowledge and values, which goes hand in hand with a decline in cultural diversity and the dilution of a true sense of community, it is fundamental to foster research trajectories aimed at documenting and promoting tangible and intangible forms of traditional heritage. Fermentation is a part of the food heritage that can empower local communities in their dynamic understanding and use of this heritage (Pieron, 2016).

In the context of the changing climate, fermentation practices ancient to one place could be useful transferred to another place. Fermentation, as with all agriculture or food-based practices that predate the industrial revolution, evolved with human migratory patterns and climate variations and limitations. Thus, the effects of climate change on average temperatures, desertification, humidity, and rainfall also affect the

practicality of historically location-specific fermented products. In some cases, it would be further environmentally detrimental, using external energy sources, to try and maintain ancient fermentation practices in specific locations. Further research could be done on understanding the climactic and social contexts of certain fermented foods and matching those with fermentation practices that now have similar climates but did not years ago. Sharing fermentation practices could also be useful in transforming plant species that have been newly introduced or are newly abundant to an area. Documenting these fermentation practices and their related social contexts could help farmers adapt to climate changes in the years to come.

The past 25 years have seen a boom in home fermentation, fermentation as food technology for top restaurants, and fermentation as a biotechnology tool in microbiology. Fermentation has been revived as a healthy food alternative. Fermentation is getting swept into the tech-dominant mindset where the ownership, distribution, and profit from fermented foods is being wrested from the hands of peasant farmers. There is a growing movement of citizens and academic researchers who are calling attention to the importance of recognizing the cultural origins of fermented foods and connecting foraging and ecosystem management to fermentation. Further studies could analyze the role of home fermentation (not farm) in contributing to food sovereignty struggles. In many parts of the world, there are pushes to standardize and patent fermentation processes and specific fermentation strains or starter cultures. These patents would have negative impacts on small scale farmers and home fermenters.

5.2 Action Planning

At the beginning of this thesis, I acknowledged that this community of Haranea has a high degree of food sovereignty. They exercise a great deal of autonomy over their food systems and have been tweaking and refining their processes bit by bit over the past 20 years. They have deep relationships with their consumers, local restaurants, local community organizations, and associations of other farmers. When discussing the farms short term and long-term vision, Christian told me that the development of a mustard recipe and refinement of an apple cider vinegar were goals of his in the short term and that getting more local restaurants to prioritize offering more local products was his long-term vision. He and I worked together to develop and test mustard recipes and his first batch of mustard will be harvested around the time of this thesis' publishing.

It is hard to recommend developing more products because their current pace of new product development is aligned with their risk tolerance. Their membership in Idoki limits them in only being able to sell products if close to all the ingredients are grown on the farm (hence the need to develop a vinegar before developing a mustard). The vinegar is a new fermented product and further reinforces the resilience, identity, and food sovereignty detailed above.

As the farm knows well, the encouragement of other farmers, especially young farmers, to practice this style of peasant farming further strengthens the community. Encouraging young farmers to incorporate local fermentation techniques into their farming would further community food sovereignty efforts. The spaces that have already been built to house these pork ferments will enable the next generation of Haranea farmers to continue capturing the flavor of these unique products. However, Haranea is the only on-farm xingar transformers in the porc kintoa Basque association. The others use shared curing rooms with four to six producers together. Supporting the creation of more on-farm transformation spaces would further strengthen the association.

At an international level, seed saving has become an important sub-track of the La Vía Campesina and Terra Madre networks. Fermentation could be a cross-cultural connection point towards peasant farmer

solidarity. The ways that fermentation practices contribute to community resilience and identity here, could be replicated (albeit under different conditions, with different production methods, and foods) and serve to support the resilience and strengthening of collective peasant identity at the global level. Traditional fermentation techniques can be saved and shared like seeds! This is more an action plan for slow food but this would also be an initiative to which Haranea, with their wealth of experience, could contribute. Fundamental to the autonomy of local food systems is the support and recognition of the autonomy of others. Framing fermentation as a sub-track of food sovereignty or peasant agriculture could serve to strengthen both fermentation and the food sovereignty movements.

5.3 Inner Reflection

In the end, it is the pig at the center of this story but not just the pig. It is the pig in relation to the people and in relation to the microbes. This story begins with agricultural practices. The fermentation of these meats is not radical nor transformative without the associated agroecological food production practices that maintain ecological diversity, empower local actors, and preserve cultural knowledge. I hope this thesis serves as a gift to the community of GAEC Haranea and affirms their fight for sovereignty.



Figure 5 Young Porc Kintoa Basque pigs in a field at Haranea farm. Photo credit Ari Moskowitz

Bibliography

- Akerreta, S., Cavero, R. Y., López, V. and Calvo, M. I. (2007) 'Analyzing factors that influence the folk use and phytonomy of 18 medicinal plants in Navarra', *Journal of Ethnobiology and Ethnomedicine* 3:16.
- Anderson, C. R., Bruil, J., Chappell, M. J., Kiss, C., and Pimbert, M. P. (2021) *Agroecology now! transformations towards more just and sustainable food system*. Switzerland: Palgrave Macmillan.
- Baudar, P. (2020) *Wildcrafted fermentation exploring, transforming, and preserving the wild flavors of your local terroir*. White River Junction, VT: Chelsea Green Publishing.
- Berger, N. and Monterescu, D. (2020) 'Bad Virus, Good Microbes: The Global Domestication of Yeast Cultures and the COVID-19 Pandemic', *Gastronomica* Fall, pp 8-10.
- Boyer, J. (2010) 'Food security, food sovereignty, and local challenges for transnational agrarian movements: the Honduras case', *Journal of Peasant Studies*, 37(2), pp 319–351.
- Brumber-Kraus, J. and Dyer, B.D. (2011) *Cultures and cultures: fermented foods as culinary 'shibboleths'* in Saberi, H. *Cured, fermented and smoked foods proceedings of the Oxford symposium on food and cookery 2010*. Oxford: Prospect Books, pp. 56-65.
- Calvário, R. and Kallis, G. (2016) 'Alternative Food Economies and Transformative Politics in Times of Crisis: Insights from the Basque Country and Greece', *Antipode* 49(3), pp.597-616 DOI: 10.1111/anti.12298
- Calvário, R., (2017) 'Food sovereignty and new peasantries: on re-peasantization and counter-hegemonic contestations in the Basque territory', *The Journal of Peasant Studies* [online]. DOI: 10.1080/03066150.2016.125921
- Calvário, R., Desmarais, A.A. and Azkarraga, J. (2020) 'Solidarities from Below in the Making of Emancipatory Rural Politics: Insights from Food Sovereignty Struggles in the Basque Country', *Sociologia Ruralis*, 60(4), pp.857-79 [online]. DOI: 10.1111/soru.12264
- Cantabrana, I., Perise, R. and Hernández, I., (2015) 'Uses of *Rhizopus oryzae* in the kitchen', *International Journal of Gastronomy and Food Science* 2, pp 103–111.
- Comi, G. and Iacumin, L. (2013) 'Ecology of moulds during the pre-ripening and ripening of San Daniele dry cured ham', *Food Research International* 54, pp 1113-1119.
- Davis, H. (2017) *Ferment: A guide to the ancient art of making cultured foods*. Chronicle Books.
- Demaria, F., Schneider, F., Sekulova, F. and Martinez-Alier, J. (2013) 'What is Degrowth? From an Activist Slogan to a Social Movement', *Environmental Values* 22, pp 191–215.
- Diego, P. (2017) 'BCulinaryLAB symposium: fermentation', *Bculinary Lab*, 2 February [online]. Available at: www.bculinarylab.com/2017/02/02/bculinarylab-symposium-fermentation/
- Essig, M. (2014) *Lesser beasts: a snout-to-tail history of the humble pig*. New York: Basic Books
- Felder, D., Burns, D. and Chang, D. (2012) 'Defining microbial terroir: The use of native fungi for the study of traditional fermentative processes', *International Journal of Gastronomy and Food Science* 1, pp 64-69.
- Flachs, A. and Orkin, J. D., (2019) 'Fermentation and the Ethnobiology of Microbial Entanglement', *Ethnobiology Letters*, 10(1), pp 35–39.
- Gilbert, S. F., McDonald, E., Boyle, N., Buttino, N., Gyi, L., Mai, M., Prakash, N. and Robinson, J. (2010) 'Symbiosis as a source of selectable epigenetic variation: taking the heat for the big guy', *Philosophical Transactions of the Royal Society B* 365(1540), [online]. Available at: <https://doi.org/10.1098/rstb.2009.0245>

- Gliessman, S. R. (2003) *Agroecology the ecology of sustainable food systems*. CRC Press.
- Green Economy', *Society for International Development*, 57(3–4), pp 362–375
- Griffiths, D. (2015) 'Queer Theory for Lichen', *UnderCurrents*, 19, pp 36-45.
- Hesseltine, C. W., and Wang, H.L. (1967) 'Traditional Fermented Foods', *Biotechnology and Bioengineering*, vol. 9, no. 3, pp. 275–288 [online]. doi:10.1002/bit.260090302.
- High Level of Panel of Experts on Food Security and Nutrition (2019) 'Agroecological and other innovative approaches for sustainable agriculture and food systems that enhance food security and nutrition' *Committee on World Food Security*.
- Hogan, P., 2019. Commission Implementing Decision of 23 January 2019 on the publication in the Official Journal of the European Union of the application for registration of a name referred to in Article 49 of Regulation (EU) No 1151/2012 of the European Parliament and of the Council 'Jambon du Kintoa' (PDO). Official Journal of the European Union. Available at: [https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32019D0129\(02\)&from=EN](https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32019D0129(02)&from=EN) [Accessed 2021].
- International Society of Ethnobiology (2006). ISE Code of Ethics (with 2008 additions). Online: <http://ethnobiology.net/code-of-ethics/>
- Katz, S.E. (2004) *Wild fermentation*. White River Junction, VT: Chelsea Green Publishing.
- Katz, S.E. (2011) *Fermentation as a co-evolutionary force* in Saberi, H. *Cured, fermented and smoked foods proceedings of the Oxford symposium on food and cookery 2010*. Oxford: Prospect Books, pp. 165-174.
- Katz, S.E. (2012) *The Art of fermentation an in-depth exploration of essential concepts and processes from around the world*. White River Junction, VT: Chelsea Green Publishing.
- Katz, S.E. (2020) *Fermentation as metaphor*. White River Junction, VT: Chelsea Green Publishing.
- Kothari, A., Demaria, F. and Acosta, A. (2014) 'Buen Vivir, Degrowth and Ecological Swaraj: alternatives to sustainable development and the
- Kurlansky, M. (2001) *The Basque history of the world*. Penguin Books.
- Kyung Koo, O., Lee, S. J., Chung, K. R., Jang, D. J., Yang, H. Y. and Kwon, D. Y. (2016) 'Korean traditional fermented fish products: jeotgal', *Journal of Ethnic Foods* 3, pp 107-116.
- La Vía Campesina (1996) *Food sovereignty: a a future without hunger*, Declaration at the World Food Summit hosted in 1006 by the UN Food and Agriculture Organization, Rome, www.acordinternational.org/silo/files/decfoodsov1996.pdf
- La Vía Campesina (2007) 'Nyeleni Declaration on Food Sovereignty: 27 February 2007, Nyeleni village, Selingue, Mali', *The Journal of Peasant Studies* 36(3), July 2009: 676-763.
- Marco, M. L., Sanders, M. E., Gänzle, M., Arrieta, M. C., Cotter, P. D., Vuyst, L. D., Hill, C., Holzapfel, W., Lebeer, S., Merenstein, D., Reid, G., Wolfe B. E. and Hutkins, R. (2021) 'The International Scientific Association for Probiotics and Prebiotics (ISAPP) consensus statement on fermented foods', *Nature*, 18, pp 196-208.
- Margulis, L. and Sagan, D. (1986) *Microcosmos*. New York: Summit Books, pp. 131-2.
- Matyssek, R. and Lüttge, U. (2013) 'Gaia: The Planet Holobiont' *Nova Acta Leopoldina NF*, 114(391), pp 325 –344.
- Mendez, V.E., Bacon, C.M., Cohen, R. and Gliessman, S. R. (2016) *Agroecology: a transdisciplinary, participatory and action-oriented approach*. Boca Raton, FL: CRC Press.

- Menendez-Baceta, G., Pardo-de-Santayana, M., Aceituno-Mata, L., Tardío, J. and Reyes-García, V. (2017) 'Trends in wild food plants uses in Gorbeialdea (Basque Country)', *Appetite* 112, pp 9-16.
- Migliorini, P. and Wezel, A. (2017) 'Converging and diverging principles and practices of organic agriculture regulations and agroecology. A review', *Agron. Sustain. Dev.*, 37:63.
- Miin, C. (2021) 'Lost in the Brine', *Eater*, 1 March [online]. Available at: www.eater.com/2021/3/1/22214044/fermented-foods-industry-whiteness-kimchi-miso-kombucha
- Paxson, H. (2013) *The life of cheese: crafting food and value in America*. University of California Press.
- Pieroni, A., Pawera, L. and Shah, G. M (2016) *Gastronomic Ethnobiology* in U.P. Albuquerque, R. Alves (eds.), *Introduction to Ethnobiology*, Switzerland: Springer International Publishing.
- Pimbert, M. P. (2018) *Food Sovereignty, agroecology, and biocultural diversity*. Oxon: Routledge.
- Pimbert, M.P. (2019) *Food Sovereignty* in Ferranti, P., Berry, E.M., Anderson, J.R. (Eds.), *Encyclopedia of Food Security and Sustainability*, vol. 3, Elsevier, pp 181–189.
- Quave, C. and Pieroni, A. (2014) 'Fermented foods for food security and food sovereignty in the Balkans: a case study of the Gorani people of northeastern Albania', *Journal of Ethnobiology* 34(1), pp 28-43.
- Snelgrove, C. H. (1998) 'Relation and responsibility: drawing the boundaries of the ethical self', *Twentieth World Congress of Philosophy* Boston, MA. 10-15 August [online]. Available at: <https://www.bu.edu/wcp/Papers/Envi/EnviSnel.htm>
- Steinkraus, K. H. (1985) 'Indigenous fermented-food technologies for small-scale industries', *Food and Nutritious Bulletin*, 7(2).
- Steinkraus, K. H. (2002) 'Fermentations in World Food Processing', *Comprehensive Review in Food Science and Food Safety*, 1, pp 23-32
- Stienkraus, K. (1996) *Handbook of Indigenous Fermented Foods, Revised and Expanded*. 2nd edn. New York: Marcel Dekker, Inc.
- Trask, R. L. (2008) *Etymological Dictionary of Basque*. Sussex: University of Sussex.
- Tsing, A.L. (2015) *The mushroom at the end of the world: on the possibility of life in capitalist ruins*. Princeton, NJ: Princeton University Press.
- Welch-Devine, M. and Murry, S. (2011) 'We're European farmers now', *Anthropological Journal of European Cultures* [online]. DOI: <https://doi.org/10.3167/ajec.2011.200105>
- Wezel, A., Bellon, S., Dore, T., Francis, C., Vallod, D. and David, C. (2009) 'Agroecology as a science, a movement and a practice. A review', *Agron. Sustain. Dev.* 29, pp 503-515 [online]. DOI: 10.1051/agro/2009004
- Wezel, A., Casagrande, M., Celette, F., Vian, J., Ferrer, A. and Peigne J. (2014) 'Agroecological practices for sustainable agriculture. A review' *Agron. Sustain. Dev.* 34, pp 1-20 [online]. DOI: 10.1007/s13593-013-0180-7
- Wittman, H. (2011) 'Food sovereignty a new rights framework for food and nature?' *Environment and Society: Advances in Research* 2, pp 87-105.
- Zilber, D. and Redzepi, R. (2018) *The noma guide to fermentation: including koji, kombuchas, shoyus, misos, Vvnegars, garums, lacto-ferments, and black Fruits and vegetables*. Artisan Books.