Breaking Bread:
Building Community and Resiliency through Sourdough Bread

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Abstract

Throughout history, bread has been a representation of food (in)security. From being a symbol of wealth to being the staple of the poor, bread has served as the centerpiece of meals all around the world. Breaking bread is an act of community that captivates culture and tradition. By documenting the narratives of sourdough bakers, we want to reconnect people with the bakers as sourdough bread provides a narrative that goes beyond a meal. Through interviews, in-person observations, and bench work, this research highlights the complexities of our food system and challenges the views of locality and sustainability. Taking on the idea of farm-to-table, we follow the journey of grain to bread. With a staple like bread, the stories told shape cultures and narratives. These narratives highlight the importance of shopping locally and preserving the rich history around food. As a vessel for learning, food education connects people back to the environment and it also symbolizes the community bakers bring together through bread.

Keywords: Sourdough Bread, Food Sovereignty, Community, Culture

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Let us first begin this journey by thinking about the land we are situated on. This thesis was written primarily on the ancestral land of the Anishinaabek, the Three Fires People: the Odawa, Ojibwe, and Bodewadami as well as Meskwahkiasahina (Fox), Peoria and Wyandot. Additional fieldwork was done on the homelands of the Ohlone tribal nation. I acknowledge the painful history of genocide and land dispossession as well as the systemic factors that still impact these communities today. Through understanding and acknowledging the scars of settler colonialism, we strive to create a more equitable future, in my case starting with food sovereignty.

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What started as a quarantine hobby has branched into research that has given me opportunities to interview and work with bakers from all over the world. My sourdough journey started thanks to community engagement opportunities in undergrad. The Legacy Garden at Saint Mary's College of California and the Farm2Market at Alameda Point Collaborative introduced me to the idea of connecting farms to communities. My community included mentors including Kelli Barram, Ryan Lamberton, and Dr. Jennifer Pigza who helped guide me through my food literacy

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I dedicate this work to the community that supported me throughout graduate school amidst a pandemic. Thank you for being a vital ingredient in this elaborate recipe. Much love!

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Chapter 1 - Introduction

As a child growing up in California, my first memories of bread revolved around peanut butter and jelly sandwiches for lunch. Uncrustables and Lunchables were commonly seen on the playground as my classmates became curious about finger foods. It evolved to dinner rolls and grilled cheese during my teenage years. As my palate matured, I craved certain umami flavors. Charcuterie boards lined with local cheese and homemade jam paired with beer and wine enticed the adult population. All these different appearances and forms of bread in my life showed the multipurpose function of bread throughout my life. Thinking about the reliance on bread, I was fascinated by how bread is so universal and yet culturally different.

Over time, bread has evolved from the centerpiece of a meal to a side dish. In response to food scarcity, bread was the sustenance for people of various classes. These loaves represent various traditions ranging from faith to customs. Throughout history, bread is often associated with sharing a meal with others. The influence of bread and specifically sourdough in our society has recently resurfaced during the COVID-19 pandemic as sourdough has represented contemporary domestication through the symbol of survival, hospitality, and abundance.[1] With a delicate food system, bread has served as a staple that continues to provide for people all around the world and yet it is still subject to food price volatility.

Different forms of bread can be found in all cultures. From chapati in Kenya to Pão de Queijo in Brazil, bread ranges from sweet to savory treats. The history of bread provides an interesting story about human migration and adaptations that is not very well documented until recently as a result of the food system movement. People are now more interested in learning about the history of their food. Bread is part of many cultures but the uses and meanings are unique to each individual. Social scientists are fascinated with the idea of preserving heritage by studying

the traditions of making bread.[2] Bread is so much more than a food; multicultural conceptions of bread craft a cultural story that highlights societal values.

Although bread takes many forms, my greatest fascination is specifically with sourdough bread. The simplicity of its ingredients paired with complex flavors provides a challenge for many bakers. With just flour, salt, and water, bakers are able to manipulate gluten structures to form beautiful loaves that have the perfect crust and crumb. This research on sourdough traditions aims to address the disconnect between food production and food consumption. Beyond the meal, this story documents voices of the bakers that we do not talk about often when thinking about the food movement. Capturing the narrative behind generations of bakers, as well as the practices of contemporary bakers, this research aims to summarize the history of bread's arrival in the "New World" from the Mediterranean, document recent history of bread arrival in the Great Lakes Region from the West Coast, and changes in practice over time. Through the examination of sourdough bakers located primarily in California, located in the West coast, and Michigan, located in the Midwest, we learn about the regional differences that play into the context of sourdough production and culture.

Through interviews and participant observations in kitchens and communities, I documented stories of the bakers in order to reconnect humans back to the origins of the food in an ethnography. To understand how bread is made requires gaining an understanding of the rhythm of sourdough bread and shadowing bakers. From residential to commercial bakery settings, the bakers take us through a day in their shoes to show us the unique timing that is associated with this specific trade. By working with sourdough bakers throughout California and Michigan, I learned about naturally leavened bread and its implications on the culture around sustainability, local economy, and circularity. Triangulating those findings with analysis of demographic data about

the communities within which bakeries were located, further enhanced our understanding of sourdough as a social and technical phenomenon.

Chapter 2 - Background

In The Beginning

"Give us today our daily bread" (Luke 11:3)

Figure 1. My Brother's Wedding Communion Loaf, SLO Town Studios

The notion of breaking bread and sharing it with the community has been around for centuries. The religious traditions associated with bread stem back to biblical times, a common phrase, such as Luke 11:3, are recited during communion. The connection between bread and religion is symbolized through the body of Christ for Christians,[3] in Jewish culture bread is "cultivated from raw ingredients gifted to the Jewish people by God",[4] and in some regional Islamic beliefs throwing away bread is "religiously wrong because bread is na'amat Allah, God's grace or blessing".[5] Another example of this bond is shown through the form of communion loaves at weddings (Figure 1) which symbolizes the covenant between the couple and God. Hot crossed buns and challah were also baked for religious purposes. More commonly in society, bread was used as a form of currency for wages and bread was even used with bartering, bread was a commodity that was traded as payment for labor.[6] Bread was highly valued, the deep cultural value of bread has been lost as it became a cheap and processed sustenance.

Leavened Bread Around the World

In the Fertile Crescent of the Middle East, wheat was utilized to create the first forms of sourdough bread. Einkorn (*Triticale monococcum*) and emmer (*Triticale dicoccum*) were the dominant agricultural crop throughout central Asian and western Europe.[7] The Egyptians developed a form of bread in 4,000 BC that utilized a variety of species of wheat. The harvesting

of these types of wheat did not require scorching which preserved gluten structures that help make bread rise. This bread was made in the shape of a disk and left outside for a few days as it developed its flavor and grew.[8] As archeologists have examined the leavened bread that is discovered in tombs, they are even to revive some of the starters that had been preserved.[9]

As the bread-making knowledge traveled to Greece, women began making bread primarily for the wealthy.[3] The recipes at this point ranged from sweet to savory breads. Shortly after, the Romans learned bread making from the Greeks and began spreading it to the rest of Europe.[10] Gauls, in France, figured out a way to make bread by skimming the foam found on top of beer.[8] Bread became associated with socio-cultural and socio-economic factors that linked people to Paris because of its proximity to wheat production. Once the Romans spread this knowledge to Italy, they began making breads with barley, millet, and emmer. There were two types of bread that were served primarily; black and white bread. Black bread was known to be cheap and made from different types of cereal grains while white bread was known to be for the rich since it utilized refined white flour which cost more to make. The views towards white and bleached flour have shifted as the current trends focus on the more natural, oftentimes whole grain approach. In Germany, rye was utilized to improve bread quality but required additional acidification to prevent the starches from breaking down during the baking process. To acidify the dough, the addition of the leavening agent is incorporated, typically it is baker's yeast. As bakers began to understand the chemistry involved and the ingredients needed to optimize their bread production, this type of bread became very popular in the European countries.[3]

Leavened Bread in America

In North America, the origins of sourdough bread can be traced back to the Gold Rush in 1848. Ellen King, one of leaders in the heritage grain baking revolution describes the story as one of "migration, agriculture, and how we eat in America – and it all starts with wheat".[11] Once gold was discovered in Sutter's Mill in Coloma, California, people began to migrate towards the West Coast. In San Francisco, the microclimate provided a place for *L. sanfranciscensis*, a lactic acid bacterium that provides the distinct taste to sourdough bread, to thrive due to its adaptation to more acidic environments.[3] As the miners traveled, they carried their starters with them since sourdough required minimal ingredients and provided nutritional sustenance. The word "sourdough" came as a result of this naturally fermented bread. Yukon prospectors would clutch their starters to keep them warm when nighttime temperatures dropped.[6] Eventually, the knowledge of sourdough traveled from California and made it all the way to Alaska.

Ingredient Sourcing

All around the world, the ingredients utilized to make the sourdough starters have varied. With different minerals in the water and particles in the air, every sourdough culture is different because of the variations in the present bacteria.[12,13] To further understand these differences, we look at how flour is sourced. Since wheat is the structural foundation of sourdough bread, farming and milling practices are carefully monitored to achieve the perfect flavor and nutritional values. Slight changes in temperature, storage, and milling could be detrimental to the baking industry as protein content is critical to bread structure. Harvesting wheat by hand is no easy task as wheat grows like grass and the berries you want for flour are located in the spike, located at the tip of the grass. It takes skills to remove the beard, leaves, and stem and gather the berries. The process of harvesting wheat was mechanized in 1831 when Cyrus McCormick invented the mechanical

reaper. Six years later, John Deere's steel plow elevated the quantity of wheat produced by the farmers. As a result of the Green Revolution (1950-1960s) that increased the production of grains, steam-powered grain elevators, railroads, roller mills, and RoundUp made it possible to scale up production.[11] After being harvested, the kernels are taken through a process of "sweating" where the moisture is reduced to improve its shelf life. Once weeds and other extraneous grains are removed, the remaining wheat product is called a berry. During the "tempering" stage, chlorinated water is added to inhibit microbial growth. This process takes about six hours and makes it easier to separate the parts of the wheat kernel.

Wheat is harvested due to the nutrients that can be extracted. In a wheat kernel, the pericarp protects the germ and endosperm. Flour consists of bran, germ, and endosperm (Figure 2). The bran is made up of fiber, cellulose and minerals while the germ is made up of fats, minerals and vitamins. Vitamin A, B, C, D, E, and K are found in those parts. Starch and protein can be found in the endosperm. Typically, shelf-stable flours sold in the grocery store are made up of mostly endosperm as it is the most shelf stable part of the kernel. As a result of the milling process, certain flours will have different shelf lives depending on what the miller chooses to sift out of the flour. The bran and germ can be repurposed as animal feed. However, when using a stone mill, the whole kernel will be milled which increases the extraction percentage. Reducing waste, the 100% extraction technique can be more challenging due the variability in size of the flour and its ability to soak up water.

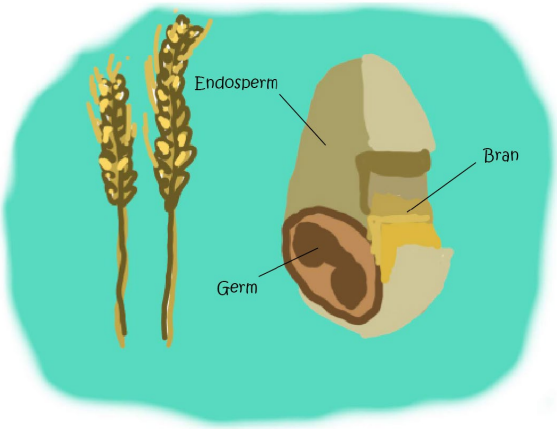


Figure 2. Wheat Kernel Anatomy

The varieties of wheat can be classified based on characteristics and germination periods. Hard red winter, hard red spring, hard white winter, durum, soft white winter, and soft white spring make up the six classes of wheat. With their unique properties, each class has different protein contents and are utilized in different ways. Soft wheat has less protein content compared to hard wheat. For bread bakers, hard wheat is favored while the soft wheat is preferred for pastries. The main difference between winter and spring crops are how long it takes to sow and harvest the crop. With the winter varieties of wheat in the Western world, they are sown in the fall and spend a duration of time dormant under snow. It will be harvested in the spring. The protein quality in winter wheats is better than its spring counterpart despite the lower levels of protein. For sourdough baking purposes, the higher protein content of winter wheat is preferred.[14]

The domestication of yeast impacted the way bread was made. The specific strain of commercial baker's yeast, *Saccharomyces cerevisiae*, shifted the microbiology of the sourdough as the process change as it was more spontaneous than traditional sourdough.[9] Commercial yeast was a catalyst for bakers as it sped up the fermentation process. With yeast, the learning curve for bread making was reduced. This made breads more affordable as bakeries were able to produce more in less time. Reducing the overhead cost, commercialized yeast allowed the bread market to expand and help fill a nutritional need for many.

United States Food System

As a result of wheat being readily accessible and an inexpensive food staple, it has become a popular ingredient worldwide as our population continues to grow. Finding creative ways to feed the population, wheat can be found in many different forms. In the United States, wheat is ranked third for most planted, produced, and grossed crop. For the 2021/2022 season, the U.S. Department

of Agriculture (USDA) estimated over 1.697 billion bushels of wheat to be produced. The three primary types of wheat grown in the US are winter, spring, and durum wheat.[15] The production of wheat is on the decline but the US is still able to export it to the European Union and Russia.

How It's Made: Sourdough Edition

Taking the milled flour and turning it into a loaf of bread requires a series of timed tasks to properly manipulate the dough. The main steps for making sourdough involve scaling, mixing, bulk fermentation, folding, dividing, pre-shaping, bench rest, shaping, final fermentation, scoring, baking, and cooling.[16] To develop crumb flavor, there is an emphasis on dough fermentation since the temperature, time, and pH all play a role in the taste, smell, flavor, and quality of the bread that is produced.[10] Handling this dough requires experience and intuition as the live bacteria culture provides variability from day to day. The baker must be cognizant of the ways that gluten structures develop through this long process that can take anywhere from eight to twenty-four hours. With each additional set of folds, the gluten structures are formed as the gliadin and glutenin structures combine (Figure 3). Being careful to not overmix the dough, bakers utilize visual cues such as "windowpane tests" to see if the ingredients have been incorporated. In the windowpane test, the dough is stretched thin and bakers are able to see different amounts of light through the dough. This test shows if the successful formation of gluten structures has been achieved.

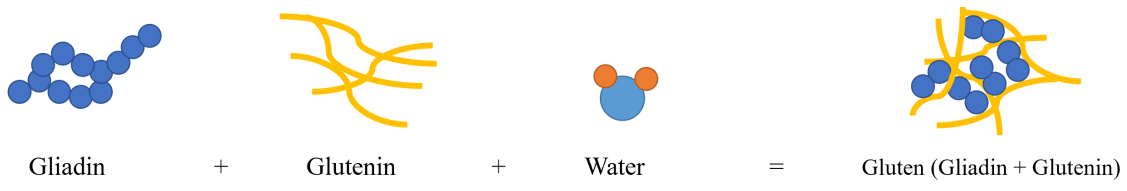


Figure 3. Gluten Formation

Ingredient wise, white flours contain more gluten and will require longer mixing times to develop the gluten whereas pastry flours will break down when accidentally overmixed.

Understanding the protein content and hydration is important to ensuring an open crumb is achieved. Additionally, the addition of sugars and fats require longer mixing time as they tend to damage the gluten that is formed in the dough. Inclusions such as nuts and grains into the dough are not generally advised as they have the potential to damage the gluten structures due to its sharp edges. Many bakers instead suggest folding in those ingredients to maintain the integrity of the gluten structures. With all the variabilities associated with sourdough bread, bakers are able to adjust at various stages to obtain the structure they would like to see. Controlling all these variables can be challenging which is why bakers believe that you get a successful bake once every one hundred batches. The low success rate draws the bakers to fine tune their craft and aim for the perfect loaf.

When making sourdough, a common term used by bakers is the "baker's percentage", which is the ratio between the key ingredients and the total amount of flour by mass. Percent hydration is a term that accounts for the water to flour ratio and allows for easy scaling. The more a flour is able to soak up water, the higher the hydration can be. Contrary to your intuition, handling wet doughs requires wet hands. The water acts as a lubricant that prevents the dough from sticking. As you work the dough, the folding helps degas the dough, equalize the dough temperature, and increase dough strength. The majority of recipes range from 60-85% hydration. Typically, lower hydrations are easier for novice bakers to handle. With the addition of freshly milled flour, the hydration percentage can be increased. A highly hydrated dough can result in a pancake if not tamed well by the baker. For beginning bakers, developing strong gluten structures is challenging when the hydration levels are high as it becomes more difficult to handle a stickier dough.

Chapter 3 - Research Design and Methodology

Research Design

A mixed methods approach was utilized to combine qualitative and quantitative methods. This study used a mixture of interviews and in-person observations to gather qualitative data. The interviews were conducted in person, over Zoom or via phone and lasted for an hour. They were recorded, transcribed, and coded using Zoom and NVivo. Additionally, the in-person visits lasted 2-8 hours at each bakery. In consideration of the availability of bakers, we offered interviews and in-person visits. Depending on the staffing and bakery infrastructure, this provided the most accommodations to the participants. It also allowed for different opportunities to engage with the bakeries through formal and informal settings. An additional geospatial component included utilizing public data obtained from the US Census to better understand the locations of these bakeries. The quantitative methods analyzed socio-demographic data from the US Census. These multifaceted approaches aim to help us understand the culture and community around sourdough bakeries.

Methodology

We initially identified a list of sourdough bakeries that focused on local grains and the community in California and Michigan. We emailed over fifty sourdough bakeries asking if they would like to participate in interviews and/or in person activities. Some provided opportunities for us to work the dough while others allowed us to simply observe. We also received production tours and got to see the behind-the-scenes action for the bakeries I was able to visit. Additional participants were added from the initial list as many of the sourdough bakers were connected with other bakers. Based on the responses, we interviewed a total of 32 bakers from 22 bakeries. Data were collected from a variety of bakeries based on prior research and word of mouth from locals.

Through the interview process, we were able to focus on the leading questions and dive deeper into the baker's background (Table 1). The bakers interviewed included owners and employees to showcase the different narratives and the power dynamics present in many bakeries. Some bakers opted out of the research due to limited staffing as a result of a shortage of food workers due to the ongoing COVID-19 pandemic. However, many of these bakers were willing to forward the information to their colleagues in the field.

Table 1. Leading Questions for Interviews

Category	Question
Personal	• Describe your first memory of sourdough bread • How did you learn about sourdough bread?
Business	• What is the history of your bakery? • What characteristics are important to your business? (e.g., locality, organic, community-driven, etc.) • How do you develop recipes? • How do you decide on what ingredients to incorporate? • What changes do you anticipate to see with your bakery?
Community	• Who makes up the community your bakery is in? • How are you involved in the community?

During the in-person observations, we were able to learn more through small talk while working the bench full of dough. This opportunity also allowed us to take note of worker and customer interactions that may not have been mentioned during a phone interview. The conversations while working the bench were more informal but allowed us the opportunity to understand the work dynamic and community of bakers. These visits provided hands-on insight of the various techniques utilized. Additionally, samples of the products were examined and offered to show the process of refining dough handling technique. Skilled bakers talked through the multiple check points in their production timeline to show how important each step can be for the

final product. Foot traffic and location played a role too in the observation part as bakeries have different atmospheres that they serve in.

For the geospatial component, data including income, number of White identified individuals, number in poverty, and total population for each census block provided information about the neighborhoods in the vicinity. The percentages were calculated to see the overall sourdough bakery distribution in relationship to these socio demographics. The sourdough bakery densities of participants from this study were plotted in the Bay Area and Metro Detroit to see if there were similar characteristics of the sourdough bakery neighborhood demographics. This provided a generalization of the neighborhoods.

Chapter 4 - Findings

#Sourdough (COVID-19 Pandemic Trend)

At the start of the COVID-19 pandemic, sourdough began trending online. As I and many other college students moved back home, I became interested in taking on sourdough as a hobby since I now had the time to work on it and missed the chemistry lab setting I became accustomed to. Since traveling and commuting were no longer essential, people spent more time at home, opening up opportunities to develop new hobbies and adopt new pets. From plants to sourdough starters, the daily feedings helped people gain a sense of routine during times of uncertainty. Flour became highly sought after in addition to toilet paper and household cleaning supplies and since yeast was also hard to find during these times, people were drawn to sourdough because of its simple ingredients and constant production. Through shared experiences navigating their starters, they joined in community with bakers all over the world. Facebook and Instagram were a place where crowdsourcing occurred. In a time where people felt distant, sourdough bread once again brought people together through a shared experience.

Because of the increase in demand for flour, many grocery stores began rationing their supply. As people raced to stock up, people were gathering ingredients to ensure they were self-reliant. One of the draws to sourdough bread is the never-ending culture that is easily replenished for a future meal. With every bake, a little amount of sourdough starter is reserved and replenished for another bake in the future. The ability to replenish itself ensures people have sustenance in the future. Sourdough starters aged and were passed down generations. Some bakers recalled watching a parent making sourdough when they were younger. The sociocultural implications of sourdough continue to craft the narrative of going back to our roots and producing our own food.

When the stores were sold out of flour, people discovered that the supply chain had a funnel effect where the flour shortage was due to a commercial packaging holdup. Additionally,

restaurants had a surplus of bulk flour due to the shutdown of indoor dining. Figuring out ways to reduce the demand on the supply chain, bakeries and restaurants became creative in distributing flour to the home bakers to ensure that people were able to stock up on essentials. From repackaging flour to giving sourdough starters away, the bakers were quick to take care of their growing community in the United States. Sourdough bakers found that the demand for their bread increased as well, which meant they had to shift their production schedules to accommodate the demand that caused a shortage in bakers. To reduce the demand, bakers began trading their sourdough starters with community members. This created opportunities for exchanges of stories, recipes, and goods which brought people together in a time where we felt distant. Through these exchanges, a new community formed and restored some of the historical sociocultural understandings onto many beginning bakers.

Flour, Water, Salt: The Love Triangle

From pandemic trends to a hobbies, the mystery of sourdough bread captures the heart of many. The bakers all believed that sourdough is an ongoing learning process that you never truly master. Since culinary school only provides a brief introduction to sourdough bread, many of the bakers immerse themselves in hands-on learning and readings to understand sourdough better. The challenge of taming a sourdough starter allows for exploration that other culinary programs lack. Since sourdough is temperamental, its well-being can affect the overall flavor of the bread. Bakers fall into a rhythm with regular feedings which helps them develop a routine that revolves around their starter. The repetition with high variability keeps bakers on their toes as they never know what challenges will occur during their baking schedule. This rhythm attracted many individuals when lockdowns were instated during the pandemic as people had time at home to start this new routine. For home bakers, starter schedules can be adjusted through different feeding ratios and

temperatures and once a routine is established, the maintenance of the sourdough starter becomes easier.

Sourdough is often romanticized because of its regularity. From the ability to feed a living organism with flour, water, and salt to the different derivatives of sourdough, there are more questions than answers around how sourdough bread is made. However, its temperament required bakers to utilize their senses and judgment to decide when to shape, score, and bake. Every baker interviewed had tricks for each step of the sourdough baking process. The styles between bakers varied depending on comfort, production scale, and handling techniques. The total time of production for a sourdough loaf ranged from eight to forty-eight hours. Differences in styles included different fermentation temperatures and percentages which allowed for greater flexibility in the scheduling. Since the infrastructure of bakeries varied, it was important for bakers to understand how to adjust their production timeline to fit their schedules best. Sourdough does not adhere to regimented recipe expectations. Adjustments were constantly made in response to the external environment's impact on moisture and temperature impacts on the bacterial culture.

From mixing the sourdough starter by hand or using a wooden spoon, the superstitions around the sourdough showed how ingrained routines were. The various techniques learned through the field research were a valuable insight for many bakers as each person handled the dough differently. When asked about why the bakers decided to utilize certain tools or techniques, many of them were quick to reply that this way just worked. There was no scientific evidence to support these claims but based on their experiences, some workers understood that the starter preferred a certain baker's hand over another for mixing while other bakers could tell who fed the starter previously based on the odor. These findings were interesting at the small-scaled bakeries as they were more in tune with small changes in their starter. At the larger scale, attention was

brought to the milling and fermentation process as that was easier to monitor based on production size. Synchronization between the baker and the dough shows a connection that yielded a beautiful loaf in the end, no matter the differing method.

Many of the participants that interviewed had their partners working with them. It was interesting to see how couples were able to manage a bakery while also having time for families and other hobbies. Some of them met at the bakeries while others decided to open a bakery together. With various training, these couples together were able to make an assortment of baked goods ranging from pastries to sourdough bread. Not all bakers can work with all the different types of dough but depending on the size of the bakery, they have had to adapt and learn different methods of baking. Many couples involved in these bakeries catered their weekly recipes to satisfy the cravings within their own families. These bakers also tended to connect their family very directly with the bakery and its community, as these bakers would bring their kids to work or develop recipes geared toward their children.

Local Neighborhood Bakery

Outside the doors of these bakeries, the people that enter these spaces on a daily basis represent the neighborhood and its community. Bakers often describe themselves as the local neighborhood bakery. Based on the neighborhoods around them, bakers are interested in investing in the local economy. From sourcing locally grown grains to developing relationships with farmers in the vicinity, they actively want to support the local community. In alignment with these beliefs, the bakers cater menus in relation to the seasons. To reduce the processing that occurs with many foods, some bakers mill their own flour to increase the freshness of the bread. Fresh bread required a high demand in the neighborhood for this artisan bread. Because of the criteria of the customers,

the locations of bakeries are strategic. Bakers reflected on other nearby bakeries and how they affect business. Taking into account the demand, they are cognizant of the best way to supply the neighborhood with freshly baked bread. Additionally, since they are rooted in the community, the locations of these bakeries incorporate hiring local individuals that are representative of the community. Being known as the local bakery includes being seen around town as some of the participants shared that it was common to be recognized around town snacking on baguettes.

In both states, community kitchens were often a spot where these bakers started. The idea of sharing overhead costs has lowered the barrier to entry as bakers do not need to have the means to rent a space dedicated to them. Additionally, in cities like San Francisco where real estate is expensive, community kitchens provide a space where chefs and bakers are able to share equipment. Working in these community kitchens showed the coordination between bakers as each shift at this kitchen utilized the same equipment. The majority of the food made in these spaces are then sold at local farmers markets. Recently there have been movements to begin selling the products on-site at the community kitchen to bring the community into the space. The community aspect of these spaces included sharing ingredients and goods with each other. In this setting, the businesses were supportive of one another and celebrated successes as many of the individuals in these incubator kitchens were later able to expand to a retail shop.

In order to gain a greater understanding of the areas that these bakeries reside in, we looked at the American Community Survey data obtained from the US Census, specifically the demographics at the census block level. The income distribution between the Bay Area and Detroit shows that the maximum monthly income in California was almost double compared to Detroit (Figure 4). Thinking about the cost of living in the context of income, the locations of the bakeries appeared random as they were dispersed in areas of various incomes. Compared to Michigan, the

bakeries in California tended to be in areas that had a higher income. Another observation included the variability in price points as well as the size of the product. Traditionally, a standard loaf ranged from $5-10 with the specialty loaves that are oftentimes larger, therefore costing more. Freshly baked bread is more affordable for those that have a disposable income. Since not everyone can afford this expensive lifestyle, the locations of the bakeries must reflect the income that can support these purchases.

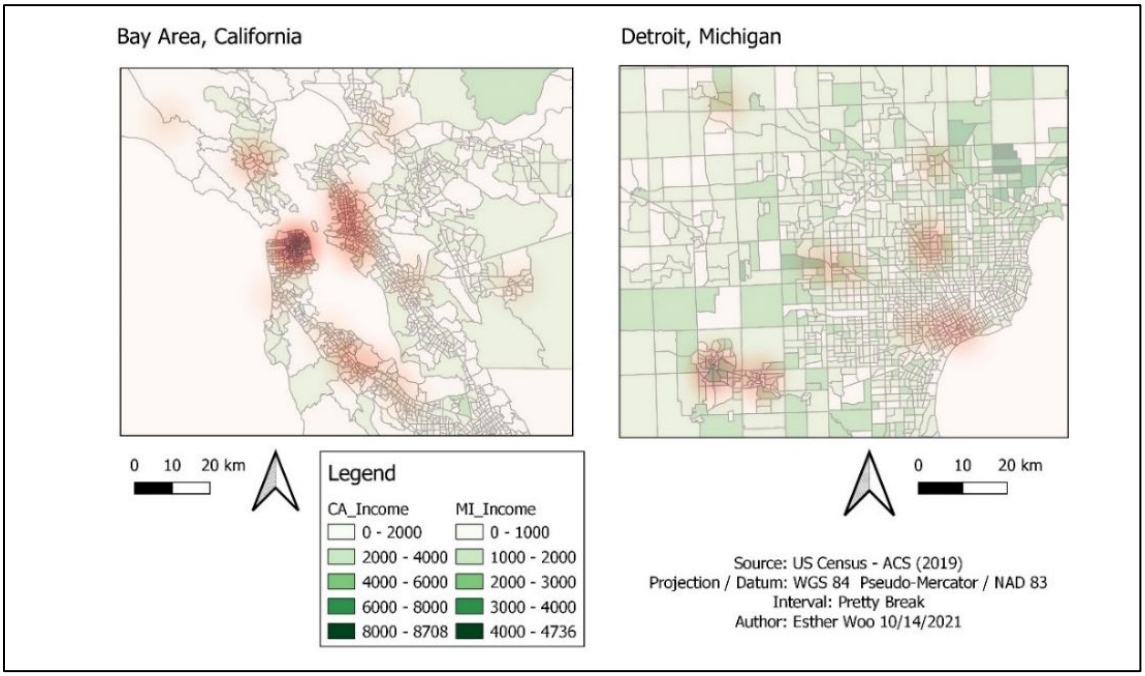


Figure 4. Sourdough Bakery Density Comparison by Income

Besides income, another interesting demographic that we examined was the percentage of White identified individuals in proximity to these bakeries. Taking into account the historical context of sourdough, the population of consumers was predicted to be predominantly White. However, based on the geovisualization, sourdough bakeries appear to be in areas that have more diversity (Figure 5). The neighborhood has an influence on the price points as well as the types of bread served. For example, bakeries with large Jewish populations often served challah on Fridays

while other bakeries served pan de Muertos near Día de Los Muertos (Day of the Dead). The bakeries offered a variety of offerings that targeted the community in which they served. This strategic business plan allows for customer input regarding recipe development as well as incorporating culture into the menu. Creating a more culturally diverse menu including various vegetarian, vegan, and gluten-free options ensured that these bakeries were able to cater to their specific communities.

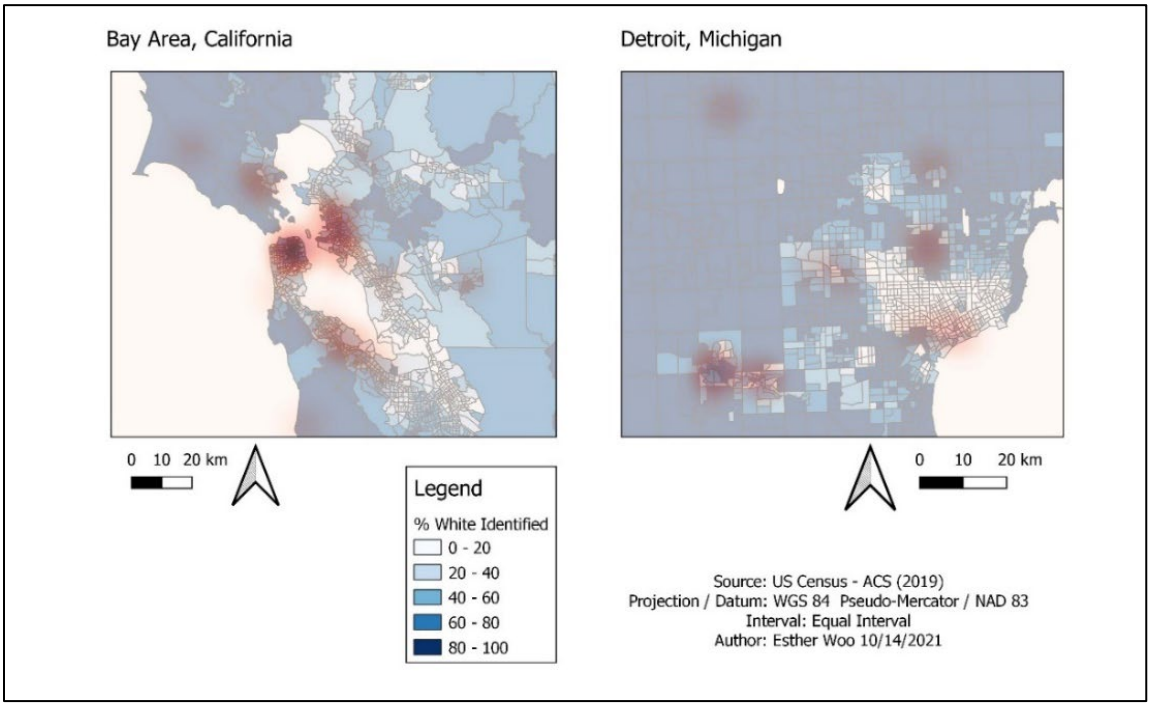


Figure 5. Sourdough Bakery Density Comparison by % White Identified

In comparison to income, we also examined the percentage of the surrounding population in poverty. According to the U.S. Federal Poverty Guidelines in 2019, the federal poverty line for a single person was $12,490 annually. We wanted to identify if sourdough bakeries exist in more affluent areas with a lower percentage of the community in poverty. It appears that the bakeries in California are in areas with less than 20% in poverty whereas the ones in Michigan were in areas

with less than 30% (Figure 6). In Michigan, there were more bakeries located in areas that were more in poverty compared to California. Connecting the socio-demographic data, bakery owners reflected on their intentionality to feed specific communities. Some bakers sought out to feed the more vulnerable populations while others targeted their businesses towards individuals with more disposable income and then gave back monetary gains to disadvantaged community members. These approaches tended to coincide with the percent of the surrounding community in poverty. In Michigan more bakeries sought out to feed those experiencing food insecurity, whereas those in San Francisco tended to donate charitable donations from their business' monetary gains. The various approaches that addressed poverty in the area were reflected in the commitment to give back to the community and to some extent expressed how these bakeries catered to their surrounding populations.

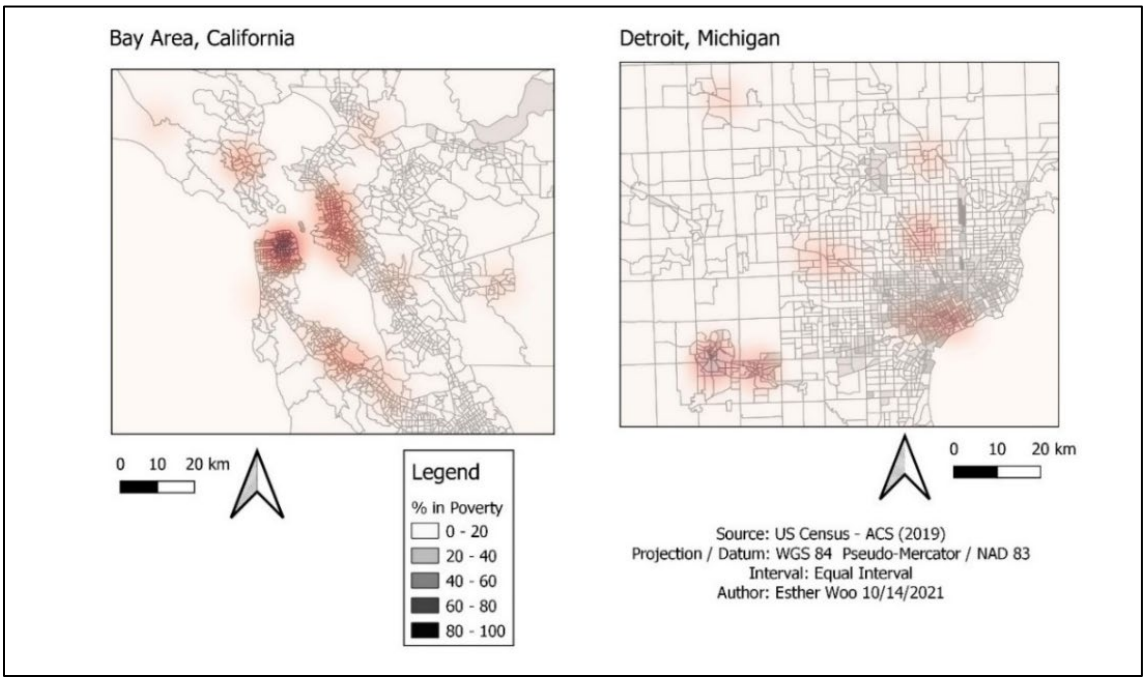


Figure 6. Sourdough Bakery Density Comparison by % living in Poverty

Through geovisualizations we were able to gain a greater understanding of demographics of the areas which the bakeries serve. It was interesting to examine average monthly income, % white identified inhabitants and % living in poverty to see how that overlayed with a sourdough bakery density heat map, and in some ways contradicted our initial assumptions about race, residential communities, and the practice of sourdough baking. The distribution of income and White identified people in both California and Michigan were very different. Since California and Michigan vary greatly, the demographics displayed may not fully represent the population due to surveying issues around citizenship and residency. Combining the quantitative data with qualitative data obtained from these interviews helped remind us that the communities that are served can be different than what is represented in the census data. Since many of the bakeries are focused on the neighborhood culture, it is important to account for the demographic data that is available to see how selective the sourdough bakery industry is. Based on these maps, we were unable to identify a specific demographic that hosts more sourdough bakeries. Relating the data to the interviews, we will continue to examine the greater culture of sourdough bakeries.

The Bread Culture

Since these local neighborhoods have the power to influence the neighborhoods, the mission statements of these bakeries were strategically focused on the people. Treating employees well was apparent at all the bakeries. From living wages to employee perks, the bakeries were dedicated to ensuring that their employees were happy at work. Communal meals and birthday celebrations highlighted the tight-knit community at each bakery. It was apparent that the employees took pride in their work and enjoyed their work. Through conversation, the bakers were invested in each other and the work that they were doing. Since the size of the crew was typically

on the smaller end, the bakers relied heavily on their crew. If one individual was not at work, the schedules would be shifted as tasks were often shift dependent. To ensure the size of the crew was steady through the holidays, many owners were eager to step in when needed. Bakeries were also known to close for an extended duration of time to accommodate for vacations and time off. Bakers appreciated how understanding their customers were when they took time off which once again showed that these relationships were more than transactional.

Beyond the employees, the bakers had a relationship with their customers. From knowing the regulars by their first names to knowing about key milestones like birthdays and anniversaries, these bakers know the people they are serving. It was impressive to watch the bakers interact with customers and carry-on conversations while working the bench. Through the small talk, it was apparent that the interactions were more than just about bread. As the bakers juggled mixing all the bins of dough while maintaining conversations, they were invested in getting to know their customers and their needs.

Additionally, conversations from one baker were connected with another baker. There was a network of bakers through The Bread Bakers Guild of America and other networking spaces. The relationships that bakers had were interesting since it was never a competition. Many of the bakers are friends with one another and help troubleshoot problems. The hospitality of bakers was mentioned as many bakers go on a bread pilgrimage where they scope out other bakers to understand what business models they would like to replicate. The hospitality extends to virtual settings as they text and email about different challenges and crowdsource possible solutions. An example of their hospitality included sending bread baskets to new neighborhood businesses to build those connections. During the flour shortage caused by the pandemic, bakers were able to connect with one another and ensure that everyone had enough flour for their production. One of

the bakers shared about how if the sourdough baker was not willing to participate in the shared knowledge, they were in the wrong field of work. The wealth of knowledge shared by the bakers was inspirational since many other industries believe their knowledge and expertise are proprietary. The openness of these bakers made it easier for this research to occur as every baker recommended other bakers that were just as welcoming. Recipe sharing was rather common as sourdough relied heavily on a technique that is not easily recordable in the documentation. Having the blueprint for making sourdough bread requires that you have an experienced baker interpreting it. This open knowledge is readily shared as the dough handling technique will affect the outcome of the sourdough bread more than the recipe.

From the business standpoint, owners determined their market price based on their target customers and the economy. Keeping lower prices allowed bakers to be able to feed more vulnerable populations. There was a combination of strategies to optimize their business for the needs of the customers. From serving a more expensive whole wheat loaf to the more affordable country sourdough, each item on the menu was crafted with thought. The bakery owners that were interviewed also mentioned various trends and techniques they utilized to optimize profits and reduce food waste. Documentation of trends from previous years and spreadsheet formulas informed bakers about the estimated amount of dough that would be needed for each daily bake. The typical target for the food industry is to make just enough for the customers. However, many of these bakers were willing to produce more than the demand as they felt it was important to donate all the extras.

As much as bakers would like to make a living from their profession, they are committed to feeding the community they are part of. Bakers generously gave to the community. From sharing profits to bake sales, bakers wanted to do their part to help organizers. There were options for

customers to pay it forward for a loaf to be donated to a food bank. Bakers felt that it was important for their sourdough bread to be accessible and affordable. With the bread having a shorter shelf life due to the lack of preservatives, leftover bread was often donated to homeless shelters and community food banks. These initiatives by the bakers helped reduce waste and increase community awareness. Building this into the greater bread culture, customers were eager to participate in these programs and practice shopping with their forks.

The Baker's Image – Masculinity in the Ovens

Another aspect of culture includes the reinforcement of gender norms and stereotypes. Through the interviews, the dynamics of the bakers showed various work relationships. Working in a bakery required a physical aspect as lifting the fifty-pound flour sacks and hand mixing large tubs of dough were harder for smaller individuals. Baking at early hours when the sun is often not up to ensure that customers get a fresh loaf in the morning, the schedule influences the personality of the baker. They enjoyed watching the sunrise from the bakery setting and talked about how they were in bed before many people got off of work. From being a predominantly male-identified field, the image of the baker appeared to be skewed. In conversation, some bakers described sourdough bakers as hipster men with tattoos, piercings, and beanies baking bread for the community. This generalization of sourdough bakers was not consistent through my research as I was able to work with a few female-powered bakehouses. With a range of experience, these bakers integrated various backgrounds and interests in these spaces to create their own image.

Entering the space as someone that doesn't identify as male, the ways in which gender was displayed was challenged by my presence. The bakers were eager to put me to work and see if I could keep up with them. It often felt like a challenge because the bakers wanted to show me how

physical their work was. Although I was younger than the majority of the bakers I worked with, I was very impressed with the fitness of these bakers. Shadowing one shift left my body aching so seeing these bakers work five days a week was impressive. The flirtatious and playful behaviors experienced while working brought on more personal conversations. From talking about the research to dreams for the future, we learned a lot from one another. As the dynamics shifted, I noticed how eager the bakers were to engage with someone outside of the regular crew. They shared more stories and talked about their families because of my presence. As I and the other bakers learned more about each other, it was interesting to see how an outside observer was able to shift the power dynamics and the conversations. Although the conversations were dominated by the more experienced bakers, there were a few young bakers that provided insight into the generational knowledge that is being passed down at many of the bakeries.

Another baker reflected on her experiences navigating these male-dominated spaces. She talked about the sexism that occurs between sourdough bakers and pastry chefs. Since pastry chefs are dominated by female-identified individuals, the bakeries that also served pastries and other baked goods had different shifts to ensure they did not get in each other's way. In smaller spaces where the pastry chefs and bakers worked the same shifts, the gendered roles were more prevalent. The timing and temperature of pastries were different than sourdough bread so they needed to be differentiated. The difference in identities in these different spaces was a consistent trend in the bakeries examined in California and Michigan.

One of the challenges I had through this research was finding more diverse spaces. The majority of the bakers that participated in this study were male identified and had cultural roots that lead back to European descendants. Broadening my cast, I reached out to several BIPOC bakers again in the middle of summer but was unsuccessful in scheduling interviews. I speculate

that due to industry demands, they were unable to spare time to participate in the study. Another one of the challenges that many of the bakers experienced were scheduling. With a shortage of bakers and challenging work hours, getting a hold of bakers proved to be challenging. Since participation was voluntary, there are many reasons why individuals opted out of this research project. When shadowing at the bakeries, several of them offered jobs as they were struggling to keep up with the growing demands.

The Baker's Stance

It was interesting to hear about the perceptions of sourdough bakers as it related to political views as well. Through protests and pandemics, businesses have taken stances around political agendas. From simple gestures like Black Lives Matter signs and Pride flags, bakers believe in showing their values to their customers. They strive to create a culture that embeds their personal and political beliefs. While visiting the bakeries, I noticed signage that pushed for positive social change. It stood out to me as we typically do not see political agendas in restaurants but these bakers felt that it was important for them to display. The bakers mentioned that the signage was to remind their customers and employees about their shared interests. They were proud of their values and were not afraid to have tough discussions with customers about their stance. Ensuring their values were upheld in the community, bakers strengthened their relationship with their customers. The bakers wanted to influence the community positively and ensure their values aligned with their customers.

To further support their beliefs, many of the bakers dedicated their profits to various community-based organizations. The funds help support those in need through food kitchen donations, supplying baked goods for bake sales, and promoting causes that are personally

important to the bakers. All these gestures help create a culture that is more than just bread. The bakers showed that they were invested in supporting the community. It also provided opportunities for the bakers to be more involved in the community as they are integrated into the culture. Raising awareness to important causes, customers were able to participate in political engagement by voting with their forks.

Health Implications

Sourdough bread is being studied for its cultural and health implications in an attempt to return to the slow eating mindset. Alice Waters started the farm-to-table movement and lives by the motto, "how we eat is how we live".[17] Through the manifesto of the slow food movement, we learn about the health implications of fermentation. To regulate metabolism, research around Type 2 diabetes has looked into the energy it takes to break down fatty acids found in chains.[18] Since sourdough does not use additional sugars or additives, it is known to be a healthier form of bread compared to the mass-produced, preservative pumped bread that can be found for $2. The bacteria from sourdough, like yogurt, is good for your intestinal tract since it serves as a probiotic. Adding in whole grain makes bread not only healthier but more nutritious for the consumers. Ancient grains have higher concentrations of antioxidants, minerals, and vitamins which have been proven to reduce cardiovascular disease and cancer.[19] With gastrointestinal distress becoming more common as a result of genetically modified wheat, wheat has been genetically sequenced in various locations to gain a greater understanding as to why certain bread is easier to digest than others. Since sourdough is known as a sink that soaks in flour, air, water, and inclusions, the microbial community is diverse.[9] Bakers shared about gluten intolerance and how customers are still able to consume sourdough bread. Although not all of them understood the science behind sourdough

bread, many of them talked about slow foods and the importance of fermentation for gut health. The long fermentation time allows for the breakdown of carbohydrates and proteins, making sourdough bread easier to digest compared to processed bread.

Future Research

To expand this research, I would have liked to interview a more diverse group of bakers beyond the scope of sourdough. With sourdough specifically, the demographics of the community are not representative of the general population within the state of Michigan yet alone the United States. It would have been an interesting addition to interview bakers from the Middle East due to the history and origins of sourdough bread. Also, I would have liked to visit a farm to see how wheat is harvested to document the complete narrative. Although we were able to see the process from grain selection to the end product, the beginning steps of wheat production would have added to this narrative.

Chapter 5 - Conclusion

The rich stories of sourdough bread have resurfaced as a result of the ongoing pandemic. As home bakers began exploring cookbooks and reading about these histories, people began having conversations about where their food is coming from. Food education reconnects people with their own food system. Throughout the history of sourdough, tales of bakers and millers brought the community together specifically centered on their neighborhood bakery. These exchanges of ingredients, stories and tips create a food culture that people have largely become separated from. The wealth of knowledge shared from religions, literature, cookbooks, and academic journals show how this space focuses on the community aspect as there is no secret to sourdough baking. Access to all of this knowledge can be overwhelming but it creates a community as bakers troubleshoot their techniques to refine their craft.

Documenting the journeys of these bakers provided a story about resilience and innovation. The bakers that participated in this research demonstrated the importance of local and connective simplicity, contrary to traditional capitalist business models. From the ways they treat their workers to the care put towards their ingredients, it was apparent that bakers prioritized people over their monetary gains which reflected on the greater culture they fostered in the community. The bakers focused on baking for good as their business was never solely for profit. The welcoming attitudes created a space where knowledge was openly shared between the bakers themselves and also with the researcher. This commitment to supporting local farmers and reducing waste defined their business models. As they found ways to utilize day-old bread for food kitchens or milled it back into the next day's dough, they fine-tuned their production scale to optimize efficiency and maximize community benefit. Innovation also led to recipe development as bakers played with various ingredients to create different flavors. The creativity and variety of

flavors draw customers in regularly which creates more of a connective experience compared to the grocery store. Sourdough bakeries are more than a retail shop, they bring together a community that fosters and actively creates shared values.

Chapter 6 - Getting Started

To make our findings more approaching and accessible, a series of learning materials will be developed on sourdough within the food systems curriculum. From a children's book to a LearnGala platform, the lessons will be curated for a diverse audience range to ensure that this research is accessible to all. The visuals in this helps broaden the reach of this research. Ultimately, I hope to reconnect people to their food starting with the narrative of sourdough bread.

Recipes

Making a Starter

Day(s)	*Ingredient*
1	□ 100 g water □ 100 g flour
3	□ 20 g of starter from Day 1 □ 50 g water □ 50 g flour
4-10	□ 20 g of starter from Day 3 □ 50 g water □ 50 g flour

Sourdough Pizza Recipe

500 g total (two 12-inch personal sized pizzas), 63% hydration

Time	*Step*	*Ingredients/Task*
9 PM 0:00	Feed Starter	□ 15 g Starter □ 30 g All-Purpose Flour □ 30 g Water
9 AM 12:00	Mix	□ 55 g Starter (save remaining 20 g & feed) □ 270 g Flour □ 170 g Water □ 5 g Sea Salt
9:30 AM 12:30	Stretch & Folds	□ 2 rounds of stretch & folds; 30 min intervals
10:30 AM 13:30	Bulk Fermentation	Let rise for 2-4 hours
2:30 PM 17:30	Shape	Divide dough in half (~250 g each). Shape into a circle.
3:00 PM 18:00	Overnight Retard	Place dough in floured container in the fridge for 24-48 hours.
3:00 PM 42:00	Bench Rest	Place container of dough on countertop to get dough to room temperature.
6:00 PM 45:00	Bake	Preheat oven & baking stone as hot as possible. Stretch dough into a circle and place onto a peel with corn meal sprinkled on it. Place dough pizza sauce + toppings. Bake in oven until crust & cheese has color.

Sourdough Recipe

850 g loaf, 63% hydration

Time	*Step*	*Ingredients/Task*
9 PM 0:00	Levain	☐ 15 g Starter ☐ 30 g Bread Flour ☐ 30 g Water
9 AM 12:00	Autolyse	☐ 435 g Bread Flour ☐ 35 g Whole Wheat Flour ☐ 280 g Water
10 AM 13:00	Mix	☐ All of the levain (75 g) ☐ All of the autolyse (750 g) -- REST FOR 30 MINUTES – ☐ 10 g Sea Salt ☐ 15 g Water
11 AM 14:00	Stretch & Folds	☐ 5 rounds of stretch & folds; 30 min intervals
1 PM 16:00	Bulk Fermentation	Sit for 4-6 hours until top forms a dome and you see bubbles at the surface
~5 PM 20:00	Shape	☐ Pre-shape -- REST FOR 30 MINUTES -- ☐ Final shape
~6 PM 21:00	Overnight Retard	☐ Place in fridge overnight for 12-14 hours
~10 AM 37:00	Bake	☐ Preheat oven and Dutch oven for 1 hour at 450°F ☐ Bake 25 min steamed in Dutch oven with lid on ☐ Remove lid to vent, bake for ~20 minutes

Sample Lesson

Lesson Plan

<table>
<tr><td colspan="2">Learning Segment Focus or “Big Idea”:
How does temperature affect growth rate in sourdough culture?</td></tr>
<tr><td>Grade:
9-12</td><td>Content Area:
Food Chemistry</td></tr>
<tr><td>Time Allotted:
3 hours</td><td>Classroom Organization:
In Person</td></tr>
<tr><td colspan="2">Resources and materials:
Sourdough Starter
Flour
Water (at various temperatures)
Uniform test tubes (or mason jars)
Ruler
Scale</td></tr>
<tr><td colspan="2">Next Generation Science Content Standards:
Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. (HS-PS1-5)
Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules. (HS-LS1-6)
Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy. (HS-LS1-7)
Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem. (HS-LS2-6)
Evaluate or refine a technological solution that reduces impacts of human activities on natural systems (HS-ESS3-4)</td></tr>
<tr><td colspan="2">Specific Academic Learning Objectives:
Students will learn:
Food chemistry & fermentation
What should students be able to do after the lesson? Students will be able to:
Graph rates</td></tr>
</table>

Prerequisites:

- What skills, knowledge and prior experience do students need for this lesson?
    - Scientific method
- How will you connect to students' interests, backgrounds, strengths and needs, including their cultural, ethnic, and socio-economic differences?
    - Discuss the history and forms of sourdough bread

Key WIDA ELD Standards:

- Compare changing variables, factors, and circumstances (ELD-SI.4-12.Explain)
- Refine claims and reasoning based on new information or evidence (ELD-SI.4-12.Argue)
- Describe data and/or approach used to solve a problem (ELD-MA 9-12.Explain.Expressive)
- Develop reasoning to illustrate and/or predict the relationships between variables in a system or between components of a system (ELD-SC.9-12.Explain.Expressive)
- Comparing reasoning and claims based on evidence from competing arguments or design solutions (ELD.SC.9-12.Argue.Interpretive)

Academic language demands:

- What academic language is used in the lesson? (vocabulary, language structure and conventions, genres, symbols, etc.)
    - Subject-specific vocabulary
    - Historical discourse
- What are the language demands of the task?
    - Analyze, Examine, Interpret results
    - Describe histories of sourdough bread

Accommodations (to ensure all students have access to the curriculum):

- How will you make the academic language accessible to all students?
    - Prompts & instructions will be presented in a slide show
- How will you address the specific needs of your English learners?
    - Guidance/feedback from the instructor
- How will you address the specific needs of your students with special needs?
    - Figure out their communication/learning styles beforehand. Make modifications accordingly

Assessment:

- What evidence of student learning will you collect?
    - Submission of handout
- How will you use this evidence?
    - Check for understanding

Instructional Sequence	
Time	*Section*
5 minutes	**Introduction** Introduction
10 minutes 15 minutes 25 minutes 5 minutes 25 minutes 5 minutes 25 minutes 5 minutes 25 minutes 15 minutes	**Developing Content/Body of Lesson** Scientific Methods Develop hypothesis (predict how temperature will affect the rate of reaction) Set Up Experiment Science Lesson Check Experiment Sourdough Bread History Part 1 Check Experiment Sourdough Bread History Part 2 Check Experiment Science Lesson - Food Chemistry Application Check Experiment & Clean Up
15 minutes	**Checks for Understanding/On-going informal assessment** Rate Calculations & Graphing
5 minutes 5 minutes	**Closure** Assignment Details Much Loves
	Extending the Lesson/Homework (optional):
	Reflection, Next Steps

Handout

Sourdough Buddy

Name: _____ Date: _____

Hypothesis *How does temperature affect the rate of growth?*

_____

_____

_____

Instructions

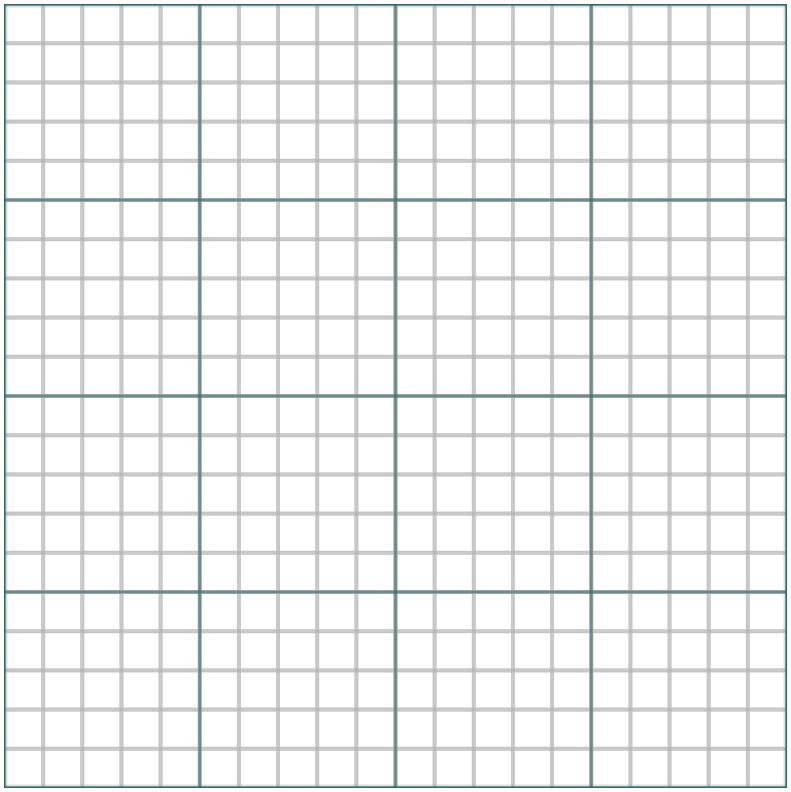
1. Place 2 g of water in 4 test tube at 4 different temperatures (ie. hot, cold, room temperature)
2. Measure temperature and record in the Data Table below
3. Add 4 g of starter to each test tube. Dissolve starter into the water.
4. Add 2 g of flour to each test tube. Mix well.
5. Record height of the solution every 30 minutes

Data Table

	Tube #1	Tube #2	Tube #3	Tube #4
Mass of Flour (g)				
Mass of Water (g)				
Mass of Starter (g)				
Temperature (°F)				
Height (0 min, cm)				
Height (30 min, cm)				
Height (60 min, cm)				
Height (90 min, cm)				
Height (120 min, cm)				
Observations				

Calculations & Graph

$$Rate = \frac{Height_{final} - Height_{initial}}{Time_{final} - Time_{initial}}$$



Reflection

How did your hypothesis relate to the results you obtained?

_____

_____

_____

Based on your results, how would other environmental factors affect the growth rate?

_____

_____

_____

_____

_____

Appendices

Appendix A. Interview Guide

Theme	*Question*
Bread	Describe your first memory of sourdough bread.
	What is your favorite thing to make?
Role at Bakery	What is your position? How long have you been working there? Any prior experiences?
	Walk me through a day at the bakery in your shoes.
Training Background	What kind of training did you have?
	How did this training help prepare you for your role?
	How does your role support the bakery overall?
Bakery Background	What's the history of your bakery? Why did it start? What are its goals?
	How has this bakery evolved over the years?
	Describe the origins of the recipes you use.
	How do your recipes incorporate native/local grains?
Grains	What kinds of grains do you use?
	Why do you use these specific grains?
	Where are the grains grown?
	To your knowledge, what are the historical/cultural origins of this grain?
Sourcing	How did you find the ingredients you use?
	How do you decide on what grains to purchase?
Culture	Describe your bakery's work culture.
	Who makes up the community that you serve?
	How do you incorporate culture in your products?
Changes	What changes do you anticipate to see with your bakery in the future?
	How do you imagine your bakery to evolve in the next 5-10 years?

Appendix B. Participant List

Bakery Name	*Location*	*Participant Name(s)*
Acme	Berkeley, CA	Steven Sullivan
Avalon	Detroit, MI	Jackie Victor
Backhaus	San Mateo, CA	Anne Moser
Base Camp Bakery	Oakland, CA	*Undisclosed*
Bird Dog Bakery	Ypsilanti, MI	Mark Bogard Jenny Haglund
Common Good Bakery	Traverse City, MI	Jason Gollan Amy Gil
CRUST a baking co.	*Undisclosed*	*Undisclosed*
Dev's Bread	Michigan	Devan Anderson Kate Anderson
Field & Fire	Grand Rapids, MI	Shelby Kibler
Give Thanks	Rochester, MI	Chris Housholder Clare Sherman Terez Glenn
Josey Baker Bread	San Francisco, CA	Josey Baker
Noe Valley Bakery	San Francisco, CA	Michael Gassen
Raterman	Ann Arbor, MI	Nick Raterman
Rosalind Bakery	Pacifica, CA	Matthew Kosoy
Saltwater Bakeshop	San Francisco, CA	Brittany Dunn
Tecumseh Bread & Pastry	Tecumseh, MI	Alisyn Brandl Arlo Brandl
The Midwife and The Baker	Mountain View, CA	Thomas McConnell
Ypsilanti Food Co-Op	Ypsilanti, MI	Corinne Sikorski Connor Harlow
Zingerman's Bakehouse	*Undisclosed*	*Undisclosed*
Undisclosed	California	Kristen Johnson

Note: Two bakeries opted out of being listed as participants

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