

Got Gluten? The Scrumptious Taste of Gluten Intolerance

Sydney O'Melia, SUNY Potsdam Anthropology Department

omeliasm205@potdam.edu

Introduction

World-wide 3 million people suffer from Celiac Disease and another 18 million suffer from gluten intolerance. Those with Celiac have an auto immune response to gluten, which causes their bodies to attack the gluten proteins in food. However, for those with gluten intolerance, researchers have not determined one specific cause for this. Some suggest that gluten is not easily digestible and cannot be broken down thoroughly (Cleveland Clinic 2021). This causes the gluten to decay inside one's intestines and produces gas and indigestion. For this research, I have chosen to make three varieties of sourdough bread to help accommodate those with a gluten allergy or intolerance. The first is wheat/all-purpose flour sourdough, which contains the most gluten. Second is an ancient wheat variety known as einkorn, which has a low amount of gluten. Third, is the gluten free sourdough, which contains no gluten. Ancient wheat varieties like einkorn have less gluten proteins because they have not been modified and hybridized like modern common wheat. This research explores different bread options for those with gluten intolerance or Celiac Disease.

Methods

Three different breads were made: wheat (control with high gluten), einkorn (with low gluten), and gluten free sourdough. Each recipe was decided using the least possible ingredients. All materials needed include multiple mixing bowls, a Dutch oven, scrapers, measuring cups, scale, towel, sourdough starters that are at least two weeks old, flour, water, an oven, and salt. For the wheat and einkorn sourdough loaves, half of the loaves were baked in the hearth oven and the others were baked in a Dutch oven as a control. The gluten-free sourdough was baked only in the Dutch oven and the recipes listed below are the refined methodologies.

The recipe for the wheat/all-purpose flour sourdough and einkorn sourdough is as follows: 250g wheat/einkorn starter, 1000g all-purpose flour/einkorn flour, 700g warm water, and 1-1/2 teaspoons salt. Step 1: incorporate the flour, starter, and water. Leave out at room temperature with a damp cloth over top (Fig. 1 and Fig. 3). Step 2: after 30 minutes of proofing, add salt with a small amount of water to help incorporate it into the dough. Step 3: in 4 30-minute intervals, stretch and fold the dough over itself. Step 4: after the final folding wait another 30 minutes and shape the dough into two loaves. Step 5: Refrigerate for at least 6 hours. Step 6: Preheat a Dutch oven for 30 minutes at 475 degrees Fahrenheit. Step 7: Flour the loaves on a piece of parchment and score with an X for wheat dough and a small square for the einkorn dough. Bake in the Dutch oven for 20 minutes with the lid on and 20 minutes with the lid off. Wait at least 6-24 hours before cutting the bread for optimal flavor. Repeat this method for the einkorn dough, but for Step 3 only do eight folds in a cross-like manner.

The recipe for the gluten-free bread is as follows: 200g gluten-free starter, 420g King Arthur's 1:1 Gluten-Free Measure for Measure Flour, 300g water, and 12g salt. Step 1: incorporate all ingredients. Step 2: lightly flour and oil the bowl and let the dough rest with a damp cloth covering the dough for 6-10 hours unrefrigerated (Fig. 2). Step 3: transfer the bowl of dough into the refrigerator and let it sit for 12 hours. Step 4: preheat a Dutch oven at 500 degrees Fahrenheit for 30 minutes. Step 5: while the Dutch oven is preheating, lightly flour parchment paper and place the dough on the paper and gently flower and shape the dough into a ball and score the top with an X. Step 6: bake in the Dutch oven at 450 degrees Fahrenheit for 40 minutes with the lid on, and then bake at 425 degrees Fahrenheit for 40 minutes. The internal temperature of the bread should be 210 degrees Fahrenheit when fully cooked. Step 7: let rest for 6+ hours for cooling and flavor development (Shay 20). This gluten free recipe is the second recipe followed, the first was less successful and will be mentioned in results and discussion.



Fig. 1 Einkorn Dough Step 1



Fig. 2 Gluten Free Dough Step 2

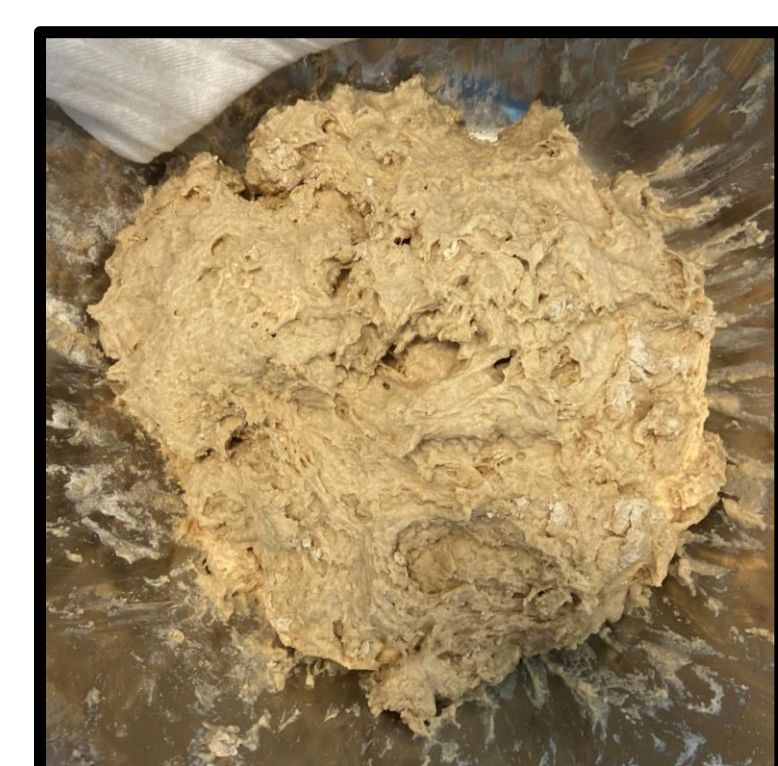


Fig. 3 Wheat Dough Step 1

Results

After baking, each loaf was scored on its flavor, oven spring, chewiness, crust, appearance, and overall texture. The wheat sourdough averaged an overall score of 8.5/10 on a qualitative scale. The einkorn and second gluten free sourdough loaves each scored an average of 7.17/10. The first gluten free sourdough scored an average of 4.3/10.

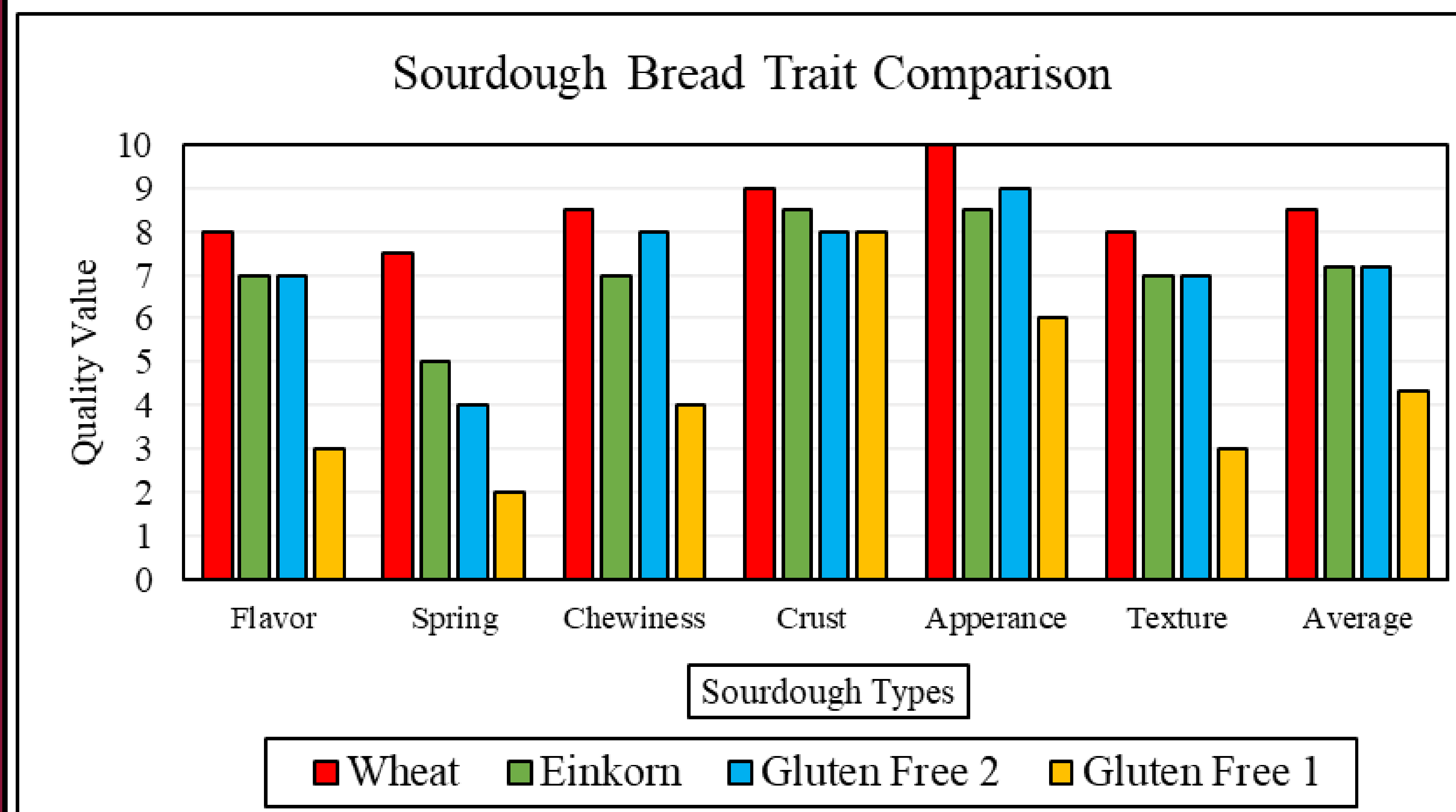


Fig. 12 Qualitative Value of Wheat, Einkorn, and Gluten Free Sourdough



Fig. 4 Baked Wheat Sourdough



Fig. 5 Baked Einkorn Sourdough



Fig. 6 Baked Gluten Free Sourdough 2



Fig. 7 Baked Gluten Free Sourdough 1



Fig. 8 Interior View of Fig. 4



Fig. 9 Interior View of Fig. 5



Fig. 10 Interior View of Fig. 6



Fig. 11 Interior View of Fig. 7

Conclusion & Discussion

As shown in the results, the first gluten free sourdough loaves were poorly constructed. There was an extra 200g of starter, and 4 additional tsp of xanthan gum (a binding and leavening agent). This produced an overly proofed, dry, and hardly edible loaves of bread. After re-doing the first recipe, the second one turned out much better and was comparable to the einkorn bread. So why did the wheat/all-purpose flour loaves turn out the best? The high gluten content of the dough gave stretch, air pockets, and an elastic spring to the dough. The einkorn did not stretch as much as the wheat loaves because it had a lower gluten content. Similarly, the gluten free loaves did not have gluten, so the loaves had to rely on the yeast from the starter and xanthan gum to give the dough rise. Both the einkorn and gluten free loaves were slightly dense because of this. Furthermore, this emphasizes the need of dough to have rise and oven spring to have a nicely formed loaf.

Food is a cultural item that has bonded and brought together peoples of all kinds. Bread specifically, has been a main source of sustenance for thousands of years. Gluten free foods are stigmatized for being undesirable and flavorless. This research is one step closer to helping those with Celiac Disease feel like they are eating a gluten version of bread, instead of cardboard-flavored gluten free bread. This would bring together those with a gluten allergy closer to those who do not have one.

Further research aims to perfect each recipe so that they are up to par with the wheat/all-purpose flour sourdough loaves. Gluten free recipes try to imitate gluten products, but why are those with a gluten allergy eager to get a taste of gluten-containing products, if they are not good for them? Is this because of societal and cultural norms of eating pasta and bread or is it an inherited biological desire to want gluten? Bread has many essential carbohydrates needed to survive, which is part of the added appeal, but there are other food types that have carbohydrates that do not have gluten. So why do people with Celiac Disease want gluten bread?

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Figures 4-11 are the results of the bake. The wheat/all-purpose flour loaves had the best overall flavor. The Einkorn sourdough had a nutty sour flavor. The first gluten free loaves were powdery and unappetizing to taste, while the second loaves were slightly sour with a nice texture. The exterior of the loaves shows differences in appearance. The most difference between the loaves was the oven spring. The loaves with the highest gluten had the most rise and the loaves with minimal or low gluten rose poorly. Each performed well in crust quality. Different factors impacted the overall appeal of each sourdough type.