



Wednesday Night Virtual Demonstration Recipes

January 20, 2021

Fermentation 101



Resources:

- Please visit the National Center for Home Food Preservation at <http://nchfp.uga.edu> for detailed information about research-based methods of home food preservation.
- The UC Master Food Preserver website at <http://mfp.ucanr.edu> contains libraries of videos and publications from multiple research-based institutions.
- UC ANR Catalog (<http://anrcatalog.ucanr.edu>)

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Follow-Along Sauerkraut Recipe

Adapted from: http://nchfp.uga.edu/how/can_06/sauerkraut.html

- Cabbage: 2 pounds (about 1 average sized head)
- Canning Salt (divided): 4 tsp (by weight 24 grams or .75 ounce) - *for cabbage* plus 1-1/8 tsp - *for brine*
- Large bowl
- Scale
- Cutting board
- Chef's knife
- Wide mouth quart jar or 1/2 gallon jar
- 2 freezer bags (quart size)
- *(Optional) Kraut pounder, weights, or fermentation lids*

Quality: For the best sauerkraut, use firm heads of fresh cabbage. Shred cabbage and start kraut between 24 and 48 hours after harvest.

Procedure:

1. **Prior to Class:** Make brine by boiling 1 cup water with 1-1/8 tsp canning salt. Stir to dissolve, then cool to room temperature. Set aside.
2. **Prior to Class:** Rinse cabbage heads under cold running water and drain.
3. **Prior to Class:** Save two outer leaves.
4. Cut cabbage head into quarters and remove core.
5. Shred or slice to a thickness of a quarter inch.
6. Weigh shredded cabbage into a large bowl.
7. Weigh and/or measure canning salt; sprinkle throughout layers of cabbage.
8. Mix thoroughly, using clean hands until salt draws juices from cabbage.
9. Put cabbage into a clean quart jar. Press down to compact it either with hands, kraut pounder or wooden spoon. Be sure the container is deep enough so its rim is at least 2 inches above the cabbage.
10. Place saved outer leaves onto top of shredded cabbage.
11. If juice does not cover cabbage, add cooled brine to cover cabbage.
12. Pour cool brine into doubled bagged plastic bag. Remove air and seal bags.
13. Place double-bagged brine on top of cabbage leaves to weigh down product.
14. Put onto plate, drape with a clean paper or cloth towel.
15. Keep in a dark place, and watch the magic happen.

Do not disturb the jar until normal fermentation completes (when bubbling ceases). If you use jars as weight, check the kraut 2 - 3 times weekly and remove scum if it forms.

Sauerkraut fermentation can take place under variable temperature and time combinations. For obtaining good quality sauerkraut at home, the USDA recommendation is to store at 70° to 75°F while fermenting. At temperatures between 70°F and 75°F, kraut will fully ferment in about 3 to 4 weeks; at 60°F to 65°F, fermentation may take 5 to 6 weeks. At temperatures lower than 60°F, kraut may not ferment. Above 75°F, kraut may become soft.

Storage Containers: Use stoneware crocks, large glass jars, or food-grade plastic containers. Do not use aluminum, copper, brass, and galvanized or iron containers.

Sauerkraut Storage: Fully fermented kraut may be kept tightly covered in the refrigerator for several months. Fully fermented kraut may also be canned as follows (but you will lose the active cultures in the process):

- **Hot pack** – Bring kraut and liquid slowly to a boil in a large kettle, stirring frequently. Remove from heat and fill jars rather firmly with kraut and juices, leaving 1/2-inch headspace. Adjust lids and process according to the recommendations below:
- **Raw pack** – Fill jars firmly with kraut and cover with juices, leaving 1/2-inch headspace. Adjust lids and process according to the recommendations below:

Recommended process time for Sauerkraut in a boiling-water or atmospheric steam canner.					
		Process Time at Altitudes of			
Style of Pack	Jar Size	0 - 1,000 ft	1,001 - 3,000 ft	3,001 - 6,000 ft	Above 6,000 ft
Hot	Pints	10 min	15	15	20
	Quarts	15	20	20	25
Raw	Pints	20	25	30	35
	Quarts	25	30	35	40

Yogurt

Source: *Cornell Wellness 2016*

Prep time: 30-45 minutes Total time: 9 to 13 hours Yield: 4 1-cup servings

Ingredients:

1 quart milk (whole, 2%, 1%, or nonfat)

¼ cup plain yogurt (containing 1 or more strains of live active cultures)

Directions:

1. Heat milk in a heavy-bottom pot over medium-high heat until it reaches 180°F. Stir frequently to prevent scorching.
2. Once milk reaches 180°F, remove from the burner and allow to cool to about 110°F. Stir occasionally to prevent a skin layer from forming on top of the milk.
3. Once milk reaches 110°F, in a small bowl, whisk the yogurt and 1 cup of warm milk together to thin the yogurt. Add the thinned yogurt to the pot of warm milk and whisk to combine.
4. Pour mixture into jars (1 quart, 2 pints, or 4 half pints) and cover with lids. Use your method of choice to maintain yogurt at 110°F while setting: yogurt maker, dehydrator set to 110°F, programmable slow cooker with water in bottom set to 110°F, slow cooker with water in bottom on “warm”, put in a cooler chest surrounded by jars of hot water, wrap jars in towels in oven with light on, etc.
5. Allow yogurt to set for 8-12 hours. Setting time will depend on your taste preferences, the cultures used, and the type of milk used. Feel free to check at 6 to 8 hours and refrigerate when you’re happy with the flavor and consistency of the yogurt.
6. Yogurt will stay fresh in the fridge for about 2 weeks.

Notes:

- Whole milk makes the thickest, creamiest yogurt, but low-fat or nonfat milk can also be used to make homemade yogurt.
- Recipe makes about 1 quart of yogurt. Recipe can easily be doubled or multiplied to make desired quantity.
- Don’t forget to save ¼ cup of each batch of yogurt for your next batch.

Nutrition Information:

Per 1 cup serving of whole milk yogurt: 157 calories, 8g total fat, 5g saturated fat, 25mg cholesterol, 108mg sodium, 385mg potassium, 12g total carbohydrates, 14g sugars, 9g protein, 30% DV calcium.

Per 1 cup serving of 2% milk yogurt: 133 calories, 5g total fat, 3g saturated fat, 21mg cholesterol, 126mg sodium, 176mg potassium, 13g total carbohydrates, 12g sugars, 9g protein, 32% DV calcium.

Whey Caramel

Source: Food52, MIA, 2017

2 quarts whey (*Strain whey in a colander lined with cheesecloth.*)

2 cups sugar

4 ounces butter

1 tablespoon vanilla extract

1 hefty pinch of salt - I used kosher salt

1. Simmer the whey in a heavy bottom pot on medium until it reduces by about half. Skim the foam off the top if needed. You could probably do this part at a higher temperature while keeping a close eye on it and stirring frequently so it doesn't scorch. I like the hands off factor of this recipe, so once I got it to a slow simmer I walked away from it for an hour.
2. After about 1 to 1-1/2 hours your whey should be reduced by half and you can add the cane sugar. Stir it until the sugar is melted and it comes back to a simmer.
3. Leave it again to simmer and caramelize. Check on it periodically to stir and assess the progress. Once you add the sugar, the caramelization process will take just over an hour.
4. As it cooks down and caramelizes, it will start to bubble and foam, keep it going on low and keep an eye on the color. Once the color is a medium-dark amber (your preference) and the viscosity looks like syrup add the cold butter and stir as it melts, continue to stir until the butter is completely mixed in.
5. Add salt and vanilla extract.
6. Store in the refrigerator.

NOTE: After the sugar is added, you can transfer the whey mixture to a crockpot so you don't have to tend to it. It will take about 8 hours to cook down in the crockpot.

Basic Sourdough Bread

For the starter: Feed the starter equal amounts of water and flour and starter by weight. For example, 50g of flour and 50g of water and 50g of starter. Feed it each day for 2-3 days if it is new or just out of the refrigerator. One day will do if it has been going on the counter for a while. You can use the extra for pancakes, crackers, or other sourdough treats.

1. For the Pre-ferment: Mix together 100 g flour, 75g water and 1 Tbsp. starter. Use a stand mixer or mix it by hand. Let it sit overnight, 12-24 hours.
2. For the Ferment: Add to the mixture 1 kg flour and 700 g water. Mix. Let it sit 20 minutes. A stand mixer works fine.
3. Add 20g salt and 50g water. Mix in gently. Let the dough sit for half an hour.
4. The dough will be a sticky mess. Reach into the bowl and stretch and fold, turn the bowl 90° and stretch and fold. Do this 4 times (4 compass directions). Let the dough sit for 30-45 minutes.

Alternatively use a stand mixer with a bread dough attachment. Mix for 2-3 minutes instead of stretching and folding then let it rest for the same amount of time. The goal is to have the dough get less sticky.

5. Repeat step four 3 more times with 30-45 minutes in between. The dough will become less sticky.
6. Divide the dough in half and put it in the refrigerator overnight (12-24 hours). It will continue to rise.

Baking:

1. Heat the oven to 500°F.
2. Use a loaf pan (oiled), a cookie sheet (lined with parchment), or a cast iron pot w/lid (use cast iron pot as is; a cast iron pot is already oiled if it well seasoned) to bake the bread. If you are using a cast iron pot, put the pot in the heating oven.
3. Remove one or both pieces of ferment from the refrigerator. The loaf pan will give it shape. The cast iron pot, or the cookie sheet will make a nice boule.
4. Slice the top.

If you are using a cast iron pot you can pull the pot out of the oven when the oven is hot and just put the loaf right in, slice it, cover it and put it back in the oven.

5. Turn the heat down to 450°F and bake for 20 minutes.
6. If the bread is covered, remove the cover and bake 20 minutes more; 40-50 minutes total. If the bread makes a hollow knocking sound when you tap it, it's done.

Whole Wheat Sourdough Bread

Source: Washington State University

Get Ready to Bake

The first step in baking (and also in conducting scientific experiments) is getting your tools and ingredients together. Then, create a rough timeline for your recipe. This careful planning helps you prepare- both physically and mentally-for what's ahead! Sourdough bread takes about 24 hours to make, from start to finish. Most of those hours are resting time for the dough-and for you while the microbes do their work to make bubbles and build flavor.

What You Need

large bowl	dish towels or plastic wrap
measuring cups	8" x 4" loaf pan
measuring spoons	nonstick spray or oil
dough scraper	

Ingredients

starter
whole wheat flour
water
salt

Timeline For Baking

- Sourdough Mix: 12-15 hours, mostly resting time
- Bread Dough: 8-10 hours for mixing, kneading, folding, shaping, resting and baking

Sourdough Mix

1 cup whole wheat flour
½ cup water, warm to the touch
1 Tbsp active whole wheat sourdough starter

Mix all ingredients until there are no lumps or dry flour in the bowl. Cover with a clean, damp dish towel or plastic wrap and leave in a draft-free place at room temperature for 12-15 hours. When it is ready, the mix will have expanded to 2-2½ times its original size.

Bread Dough

3 cups whole wheat flour
1¾ cups water, warm to the touch
2 tsp salt
Sourdough mix (recipe above)

Mixing: Place the flour, water, salt and sourdough mix in a large bowl. Mix together just enough to combine the ingredients. Cover with a clean, damp dish towel or plastic wrap to prevent the surface from drying out and let rest for 20 minutes.

Kneading: Place the dough on a clean work surface, no flour needed. Gently pull the edge of the dough that is closest to your body toward yourself until it won't go any farther without tearing. Fold the dough in half, and then turn it 90 degrees clockwise. Use a dough scraper to loosen the dough if it sticks to your work surface. Continue to stretch, fold and turn the dough for 8-10 minutes. The dough will change over this time, getting stronger and sticking to the work surface less and less. Form the dough into a ball, and place it into a bowl that is lightly dusted with flour. Cover with a clean, damp dish towel or plastic wrap and leave in a draft-free place at room temperature for 45 minutes

Folding: Scrape the dough onto a very lightly floured surface without tearing it. Gently stretch the edges from the center in four directions, as far as you can without tearing it. Starting with the edge closest to you, fold the stretched dough back to the center. Next, do this with the edge opposite you. Then, fold in the left edge, and finally, the one on the right. Dust the bowl with a little more flour and return the dough to the bowl with the smooth side up. Cover it with a clean, damp dish towel or plastic wrap, and let it rest for 45 minutes. Repeat the folding process two more times, resting the dough for 45 minutes between each folding. After the third time, let the dough rest, covered, for one hour.

Shaping: Lightly coat the inside of your loaf pan (8" x 4") with oil or a nonstick spray. Sprinkle your work surface lightly with flour. Put your dough on the floured surface with the smooth side down, being careful not to tear it. Lightly pat the dough down into a rectangle no wider than your loaf pan. Starting at one end, roll the dough into a log, pinching the end to seal it. Place the dough log in the pan with the pinched side down. Cover the pan with a clean, damp dish towel or plastic wrap and let the dough rise in a draft-free place for three hours.

Baking: Place your oven rack in the lower third of the oven. Preheat the oven to 450°F for 20-30 minutes before you are ready to bake. Uncover the loaf pan and place it in the oven. Close the oven door and lower the temperature to 425°F. Bake for 40-45 minutes or until the loaf is nicely browned on top. Remove the loaf from the oven, turn it out of the pan, and place on a wire rack to cool.

Make Your Own Sourdough Starter:

Washington State University Bread Lab, <http://thebreadlab.wsu.edu/unsifted/>

1. Measure out equal parts flour and water in a small bowl. Stir until well mixed.
2. Leave the mixture out at room temperature, covered with a loose-fitting lid or towel.
3. Feed the starter with 1-2 Tbsp. each of flour and water every day in the morning and at night and stir until mixed.
4. You should start to see bubbles in the starter in about 3-5 days depending on the environment where you live. After 5 days your starter is probably active and ready to use.
5. If you don't think you'll be baking for a few days, you can store your starter in the refrigerator and feed weekly or continue to store at room temperature and feed daily.

Sourdough Maintenance

There are many ways of keeping a sourdough starter alive. The most important criteria in choosing one is that it fits your schedule, not the opposite. Sourdough starters are a community of microorganisms that, thanks to its diversity, thrive with minimum inputs such as water and flour. Thus, doing harm to your starter will be more difficult than you might imagine.

Starter Feeding:

$\frac{3}{4}$ cup / 100 g whole wheat flour

$\frac{1}{4}$ cup / 70 g water

1 tsp / 5 g starter (seed)

- Mix water and starter until the starter is dissolved. Add flour and mix until you get a homogeneous dough. Let it rest for 10 hours at room temperature or put it in the refrigerator.
- Such a starter can be kept in the refrigerator for up to two weeks before requiring some attention (repeat the above-mentioned steps). In case you forgot to feed your starter, discard the dark, watery substance on top, take a teaspoon of what is left and add flour and water as written above.
- When you intend to bake with your starter, it is a good practice to feed it instead of using it straight from the refrigerator. Suppose you will be making an Approachable Loaf: 10 hours before you plan on mixing the dough take a tablespoon of starter, dissolve it in $\frac{1}{2}$ cup lukewarm water and add $1\frac{1}{4}$ cup whole wheat flour. Mix and let it rest. You will be able to tell when the starter is ready to be used by its characteristic sour flavor and scent and by the presence of many air bubbles.

Approachable Loaf

Washington State University Bread Lab, <http://thebreadlab.wsu.edu/unsifted/>

This recipe is quite forgiving. Don't fret about measuring everything out "perfectly". Refer to the previous "Sourdough Maintenance" for information on feeding your sourdough starter.

Yield: 2 loaves

Ingredients:

5 $\frac{3}{4}$ cup / 773 g 100% unsifted (whole wheat) flour 3 cups / 710 g water

2 TBSP / 45 g honey

$\frac{1}{4}$ cup + 2 tsp / 45 g oil 2 tsp / 7 g instant yeast

1 cup / 273 g sourdough starter (~70% hydration; 70 parts water for every 100 parts flour)

1 TBSP / 20 g fine-grind salt

1. In a medium-sized bowl, gently hand mix flour, water, honey and oil. (You may find it easier to whisk together water, honey and oil before adding liquids to the flour.) Cover and let sit for 30- 40 minutes.
2. Add instant yeast and starter to the flour mixture.
3. Now, use your hands to work the mixture until yeast and starter are well incorporated into the dough.*
4. Add salt. Continue to hand work the dough until it is formed into a smooth and cohesive mass. This can be done in the bowl or by removing the dough from the bowl and working on a flat surface or countertop.
5. Place dough back into the bowl, cover, and let sit for 45 minutes.
6. Fold the dough. Cover and let sit for another 45 minutes.
7. Now divide the dough in half and use a dough knife to pre-shape on a flat surface.
8. Oil two loaf pans. Let sit for 30-40 minutes. Shape and place in loaf pan.
9. Now, proof at room temperature until the dough rises to the edge of the loaf pan (usually about 1 $\frac{1}{2}$ to 2 $\frac{1}{2}$ hours).
10. Preheat oven to 425°F. Load oven and turn temperature down to 375°F. Bake for 45 minutes.

*Alternatively, dough can be mixed using a stand mixer, however we have found hand mixing to be quite doable with less cleanup.

Unsifted Sourdough Crackers

Washington State University Bread Lab, <http://thebreadlab.wsu.edu/unsifted/>

Ingredients:

For the dough:

1½ cups / 300 g sourdough starter (~70% hydration; 70 parts water for every 100 parts flour)

¼ cup / 80 g water

1½ cups / 200 g whole wheat flour

3 TBSP / 30 g olive oil

2 tsp / 5g salt

1 tsp / 5g honey

For brushing:

3 TBSP / 20 g olive oil

3 TBSP / 20 g water

1. Mix all the ingredients in a medium-sized bowl until a homogeneous dough forms and all flour is incorporated. If dough remains on the dry side, you can add 1 TBSP water at a time until all of the flour is incorporated.
2. Cover and let the dough rest for about 30 minutes.
3. On a floured surface, use a rolling pin to roll the dough to a thickness of a 1/10 of an inch. Use a dough docker or a fork to poke the rolled dough.
4. Prepare a mixture of 3 TBSP (20 g) water and 3 TBSP (20 g) olive oil. Use a pastry brush to distribute the mixture on the rolled dough.
5. Now, use a pizza wheel to cut 1½ inch-wide squares.
6. Sprinkle with coarse salt and let the dough proof for about an hour.
7. Bake on a cookie sheet at 350°F for 10-14 minutes until crackers are golden brown.

Reference Material

- NCHFP: <https://nchfp.uga.edu/>
- Sauerkraut, National Center for Home Food Preservation, https://nchfp.uga.edu/how/can_06/sauerkraut.html
- Sauerkraut, Penn State Extension, Publication UK133, <https://ucanr.edu/sites/camasterfoodpreservers/files/337943.pdf>
- How to Make Yogurt - Fermented Foods Cooking Demo: <https://www.cornell.edu/video/how-to-make-yogurt-fermented-foods-cooking-demo>
- Yogurt Made Simple, Washington State University, Publication #FS173E, <https://ucanr.edu/sites/camasterfoodpreservers/files/341129.pdf>
- Troubleshooting Yogurt, North Carolina State Extension, <https://ucanr.edu/sites/camasterfoodpreservers/files/340875.pdf>
- Sourdough Starter Best Practices, Colorado State University Extension, <https://foodsmartcolorado.colostate.edu/food-safety/safe-preparation-handling-and-storage/sourdough-starter-best-practices/>
- Unsifted, Washington State University Bread Lab, <http://thebreadlab.wsu.edu/unsifted/>
- Sourdough Bread Making, North Carolina State Extension, <https://homegrown.extension.ncsu.edu/2020/04/sourdough-bread-making/>

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