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University of California
Agriculture and Natural Resources

UCCE Master Food Preserver Program
Sacramento County

*Sacramento County Master Food Preservers
Monthly Wednesday Night Demonstration
April 20, 2022
A Night of Fermenting*



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.
- UC ANR Catalog (<http://anrcatalog.ucanr.edu>)

Should you need assistance or require special accommodations for any of our educational programs, please contact us at 916-875-6913.

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SAUERKRAUT

Source: nchfp.uga.edu/how/can_06/sauerkraut.html

25 lbs cabbage

3/4 cup canning or pickling salt

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

Yield: About 9 quarts

Procedure: Work with about 5 pounds of cabbage at a time. Discard outer leaves. Rinse heads under cold running water and drain. Cut heads in quarters and remove cores. Shred or slice to a thickness of a quarter. Put cabbage in a suitable fermentation container, see "[Suitable Containers, Covers, and Weights for Fermenting Food](#)", and add 3 tablespoons of salt. Mix thoroughly, using clean hands. Pack firmly until salt draws juices from cabbage. Repeat shredding, salting, and packing until all cabbage is in the container. Be sure it is deep enough so that its rim is at least 4 or 5 inches above the cabbage. If juice does not cover cabbage, add boiled and cooled brine (1-1/2 tablespoons of salt per quart of water). Add plate and weights; cover container with a clean bath towel.

Sauerkraut fermentation can take place under variable temperature and time combinations. For obtaining a good quality sauerkraut at home, the USDA recommendation is to store at 70° to 75°F while fermenting. At temperatures between 70° and 75°F, kraut will be fully fermented in about 3 to 4 weeks; at 60° 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.

If you weigh the cabbage down with a brine-filled bag, do not disturb the crock until normal fermentation is completed (when bubbling ceases). If you use jars as weight, you will have to check the kraut 2 to 3 times each week and remove scum if it forms. Fully fermented kraut may be kept tightly covered in the refrigerator for several months or it may be canned as follows:

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.

Raw pack – Fill jars firmly with kraut and cover with juices, leaving 1/2-inch headspace.

Adjust lids and process according to the recommendations in [Table 1](#).

Table 1. Recommended process time for **Sauerkraut** in a boiling-water 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

This document was adapted from the "Complete Guide to Home Canning," Agriculture Information Bulletin No. 539, USDA, revised 2015.

Reviewed March 2016.

SAUERKRAUT CHOCOLATE CAKE

Source: Taste of Home

TOTAL TIME: Prep: 20 min. Bake: 35 min. + cooling

YIELD: 16 servings

Ingredients:

½ cup butter, softened
1 ½ cups sugar
3 large eggs, room temperature
1 teaspoon vanilla extract
2 cups all purpose flour
½ cup baking cocoa
1 teaspoon baking powder
1 teaspoon baking soda
½ teaspoon salt
1 cup water
¾ cup sauerkraut, drained, squeezed dry and chopped

SILK CHOCOLATE FROSTING:

1-1/3 cups butter, softened
4 ounces unsweetened chocolate, melted
1-1/2 teaspoons vanilla extract
4 cups confectioners' sugar
1/4 cup whole milk

Directions

1. Preheat oven to 350°. In a bowl, cream the butter and sugar. Add 1 egg at a time, beating well after each. Add vanilla. Combine flour, cocoa, baking powder, baking soda and salt; add to the creamed mixture alternately with water. Stir in sauerkraut. Pour into 2 greased and floured 8-in. round baking pans.
2. Bake for 35-40 minutes or until a toothpick inserted in the center comes out clean. Cool in pans for 10 minutes before removing to wire racks to cool completely.
3. For frosting, beat butter, chocolate and vanilla in a bowl; add sugar and beat well. Add milk; beat until smooth and fluffy. Spread between layers and over top and sides of cake.

SOURDOUGH STARTER

Source: www.kingarthurbaking.com/recipes/sourdough-starter-recipe (use for visuals)

Prep: 50 minutes

Total: 5 days 50 minutes

Yield: sufficient sourdough for ongoing baking

Our [Sourdough Baking Guide](#) offers all the tips and advice you new (as well as veteran) sourdough bakers need for your guaranteed sourdough success.

Ingredients:

To begin your starter

- 1 cup (113g) King Arthur Organic Pumpernickel Flour or King Arthur Whole Wheat Flour*
- 1/2 cup (113g) water, cool*

*See “tips” below.

*Also known as whole rye flour.

To feed your starter

- Scant 1 cup (113g) King Arthur Unbleached All-Purpose Flour
- 1/2 cup (113g) water, cool (if your house is warm), or lukewarm water (if your house is cool)

Instructions

1. **Day 1:** Combine the pumpernickel or whole wheat flour with the cool water in a non-reactive container. Glass, crockery, stainless steel, or food-grade plastic all work fine for this. Make sure the container is large enough to hold your starter as it grows; we recommend at least 1-quart capacity.
2. Stir everything together thoroughly; make sure there's no dry flour anywhere. Cover the container loosely and let the mixture sit at warm room temperature (about 70°F) for 24 hours. See "tips," below, for advice about growing starters in a cold house.
3. **Day 2:** You may see no activity at all in the first 24 hours, or you may see a bit of growth or bubbling. Either way, discard half the starter (113 grams, about 1/2 cup), and add to the remainder a scant 1 cup (113 grams) King Arthur Unbleached All-Purpose Flour, and 1/2 cup (113 grams) cool water (if your house is warm); or lukewarm water (if it's cold).
4. Mix well, cover, and let the mixture rest at room temperature for 24 hours.
5. **Day 3:** By the third day, you'll likely see some activity — bubbling; a fresh, fruity

aroma, and some evidence of expansion. It's now time to begin two feedings daily, as evenly spaced as your schedule allows. For each feeding, weigh out 113 grams starter; this will be a generous 1/2 cup, once it's thoroughly stirred down. Discard any remaining starter.

6. Add a scant 1 cup (113 grams) King Arthur Unbleached All-Purpose Flour, and 1/2 cup (113 grams) water to the 113 grams starter. Mix the starter, flour, and water, cover, and let the mixture rest at room temperature for approximately 12 hours before repeating.
7. **Day 4:** Weigh out 113 grams starter, and discard any remaining starter. Repeat step #6.
8. **Day 5:** Weigh out 113 grams starter, and discard any remaining starter. Repeat step #6. By the end of day #5, the starter should have at least doubled in volume. You'll see lots of bubbles; there may be some little "rivulets" on the surface, full of finer bubbles. Also, the starter should have a tangy aroma — pleasingly acidic, but not overpowering. If your starter hasn't risen much and isn't showing lots of bubbles, repeat discarding and feeding every 12 hours on day 6, and day 7, if necessary — as long as it takes to create a vigorous (risen, bubbly) starter. *Note: see "tips," below.*
9. Once the starter is ready, give it one last feeding. Discard all but 113 grams (a generous 1/2 cup). Feed as usual. Let the starter rest at room temperature for 6 to 8 hours; it should be active, with bubbles breaking the surface. *Hate discarding so much starter? See "tips," below.*
10. Remove however much starter you need for your recipe — typically no more than 227 grams, about 1 cup. If your recipe calls for more than 1 cup of starter, give it a couple of feedings without discarding, until you've made enough for your recipe plus 113 grams to keep and feed again.
11. Transfer the remaining 113 grams of starter to its permanent home: a crock, jar, or whatever you'd like to store it in long-term. Feed this reserved starter with 1 scant cup (113 grams) of flour and 1/2 cup (113 grams) water, and let it rest at room temperature for several hours, to get going, before covering it. If you're storing starter in a screw-top jar, screw the top on loosely rather than airtight.
12. Store this starter in the refrigerator and feed it regularly, using your normal process: Discard all but 113g starter; feed that remaining 113g starter with a scant 1 cup (113 grams) flour and 1/2 cup (113 grams) water. We recommend feeding once a week, if possible. The more frequently you feed it, the less time and effort it takes to get your starter ripe and ready for baking.

Tips from our Bakers

- Why do you need to discard half the starter? It seems so wasteful... But unless you discard starter at some point, eventually you'll end up with a very large container of starter. Also, keeping the volume down offers the yeast more food to eat each time you feed it; it's not fighting with quite so many other little yeast cells to get enough

to eat. You don't have to actually discard it if you don't want to, either; you can give it to a friend, or use it to bake. There are quite a few [recipes on our site using "discard" starter](#), including pizza crust, pretzels, and waffles, and even chocolate cake. If you're still uncomfortable dealing with discard, though, try [maintaining a smaller starter](#): the smaller the starter, the smaller the amount of discard.

- Why does this starter begin with whole-grain flour? Because the wild yeast that gives sourdough starter its life is more likely to be found in the flora- and fauna-rich environment of a whole-grain flour than in all-purpose flour. What if all you have is all-purpose flour, no whole wheat? Go ahead and use all-purpose; you may find the starter simply takes a little longer to get going. Also, if you feed your starter on a long-term basis with anything other than the all-purpose flour called for here, it will probably look different (thicker or thinner, a different color) and act differently as well. Not to say you can't feed your starter with alternate flours; just that the results may not be what you expect.
- Want to put your starter on hold for the summer, or as you go on vacation? Here's how: [Drying your sourdough starter](#).
- Should you use bottled water? Unless your tap water is so heavily treated that you can smell the chemicals, there's no need to use bottled water; tap water is fine.
- A note about room temperature: the colder the environment, the more slowly your starter will grow. If the normal temperature in your home is below 68°F, we suggest finding a smaller, warmer spot to develop your starter. For instance, try setting the starter atop your water heater, refrigerator, or another appliance that might generate ambient heat. Your turned-off oven — with the light turned on — is also a good choice.
- Bake it better! Watch King Arthur baker/blogger Kye Ameden demonstrate one of the techniques from this recipe: [Maintaining Sourdough Starter Without the Mess](#)
- One of our readers offers the following thoughts about the duration of everyday feeding, which we think is great advice: "Conditions vary so widely that 7 days can be far too little. I've learned the key is to watch for a dramatic and consistent rise in the jar — at least doubling between 1 and 4 hours after feeding. This could be 7 days or less after you begin, or it could be three weeks (for me it was 12 to 14 days). I would encourage you to consider tweaking your wording a bit to guide bakers to watch for this phenomenon, rather than watch the calendar." Thanks, Ken!

SOURDOUGH CRACKERS

Source: www.kingarthurbaking.com/recipes/sourdough-crackers-recipe

Prep: 25 minutes

Bake: 20-25 minutes

Total: 1 hr 25 minutes

Yield: about 100 crackers

Ingredients:

1 cup (227g) sourdough starter, unfed/discard

1 cup (113g) King Arthur White Whole Wheat Flour

1/2 teaspoon flaky sea salt

4 tablespoons (57g) unsalted butter, room temperature

2 tablespoons dried herbs, your choice, optional

oil, for brushing

coarse Salt, (such as kosher or sea salt) for sprinkling on top

Instructions:

1. Mix together the sourdough starter, flour, salt, butter, and herbs to make a smooth (not sticky), cohesive dough.
2. Divide the dough in half, and shape each half into a small rectangular slab. Cover with plastic wrap, and refrigerate for 30 minutes, or up to a couple of hours, until the dough is firm.
3. Preheat the oven to 350°F.
4. Working with one piece of dough at a time, very lightly flour a piece of parchment, your rolling pin, and the top of the dough.
5. Place the dough onto the floured parchment and roll it about 1/16" thick. It'll have ragged, uneven edges; that's OK. Just try to make it as even as possible.
6. Transfer the dough and parchment together onto a baking sheet. Lightly brush with oil and then sprinkle the salt over the top of the crackers.
7. Cut the dough into 1 1/4" squares; a [rolling pizza wheel](#) works well here.
8. Prick (dock) each cracker a couple of times with a fork; this will help keep them from puffing up like little pitas as they bake.
9. Roll and cut the second piece of dough following the directions above.
10. Bake the crackers for 20 to 25 minutes, until they're starting to brown around the edges. Midway through, rotate the baking sheets both top to bottom and front to back; this will help the crackers brown evenly.
11. When fully browned, remove the crackers from the oven and place the pans on a rack to cool.
12. Store crackers, well wrapped, at room temperature for up to a week; freeze for longer storage.

Tips from our Bakers

- Don't have any starter? Here's a recipe for [homemade sourdough starter](#). If you're making it from scratch, you'll need to feed it for 5 to 7 days before it's ready for baking. Want a head start? Purchase our [classic fresh sourdough starter](#) – it'll be ready for baking soon after it arrives at your door. Looking for tips, techniques, and all kinds of great information about sourdough baking? Find what you need in our [sourdough baking guide](#).
- Join King Arthur baker Martin Philip and his family as they bake Sourdough Crackers together, start to finish. Watch [Martin Bakes at Home - Sourdough Crackers](#) now.
- For additional tips and flavor variations, see our blog post, [Sourdough Crackers: All they're cracked up to be](#).

KOMBUCHA AND KEFIR

Source: Colorado State University Extension, Farm to Table, “Understanding and Making Kombucha”

Symbiotic Fermentation: Kombucha is a fermented, slightly sweetened and slightly tangy tea that has been around for centuries. It is thought to have a variety of health benefits and contains high levels of antioxidants, b-vitamins, and probiotics. SCOBY (Symbiotic Colony of Bacteria and Yeast) is a mix of cultures of bacteria and yeast present when making kombucha, kefir and other foods made through symbiotic fermentation. Kefir is a fermented milk beverage. As the milk ferments, it thickens slightly, and depending upon how long it is fermented, the flavor ranges from milk to extremely tart, somewhere between the taste of buttermilk and sour cream. Unlike yogurt and other dairy ferments which are made from a bit of the previous batch as a starter, kefir is started from a SCOBY, rubbery blobs known as kefir grains, which are strained out after fermentation and then used to start the next batch.

KOMBUCHA

Source: Colorado State University Extension, Farm to Table, “Understanding and Making Kombucha”

Ingredients: (Makes about 1 gallon)

- 1/4 cup green and/or black tea (in mesh bag), or 4-8 tea bags
- 1 gallon of filtered water
- 1 cup cane sugar
- 1-2 cups Kombucha Starter Liquid (from a previous batch)
- 1 SCOBY

Directions:

1. Heat water. In brewing vessel, make tea. Steep tea for 10 minutes.
2. Remove tea leaves or bags. While water is still hot, stir in sugar and completely dissolve.
3. Allow sweetened tea to completely cool to room temperature. Note: Alternative method to cool faster: heat only half the water in step #1, to make a strong sweet tea, then add the remaining water as cold water.
4. Once cooled to room temperature, add SCOBY and Kombucha Starter Liquid to sweetened tea.
5. Cover with clean cloth or coffee filter. Secure with a rubber band or bungee cord to keep insects and contaminants out but allow air flow. Record start date.
6. Allow kombucha to ferment at room temperature (ideally 64-79°F/18-26°C) for 7-14 days. A new SCOBY will develop on the surface of the liquid, starting as a light haze that gradually turns whitish, then opaque and thicker as time progresses. Taste after a week. Stop fermenting when you like the flavor.
7. To “stop” fermenting: pour kombucha into clean jars or bottles sanitized by rinsing with boiling water or vinegar, retaining SCOBY and at least 1-2 cups for your next batch. Save more, at least 20%, if following continuous brew technique (see below).
8. Flavor finished kombucha as desired with 10-20% juice or clean fruit, and experiment with clean herbs and spices based on preference. Cap tightly. Leave at room temperature 1-3 days for potential carbonation or refrigerate immediately.
9. CAUTION: Longer time capped at room temperature could result in carbon dioxide accumulation and even explosion of the contents.
10. Note: An alternative to adding juice or fruit after the first ferment (see step 8, above) is to use a flavored tea, such as Chai Black tea, in step 1, above. Included below is a recipe for Chai Spice Blend.

Repeat batches using continuous brew technique:

To minimize handling the SCOBY and reduce introduction of contaminants, it is better to leave the SCOBY and starter liquid in the vessel and not wash the vessel between uses, but only if it becomes built up with yeast. Gently pour in new sweetened, cooled tea along the inside of the jar to limit disturbing the SCOBY. SCOBY growth can be peeled and shared with others or stored for several weeks in a similar cloth covered vessel, covered by kombucha.

CHAI SPICE BLEND

Source: The Big Book of Kombucha, 2004

(Yield: 2 tablespoons pre-ground, 1/3 cup hand-ground)

When flavoring kombucha, use less of the pre-ground spices, as they will impart more intense flavor than the coarser powder produced by handgrinding. A good rule of thumb is 1 teaspoon of pre-ground blend = 1 tablespoon of hand-ground.

Ingredients:

- 2 teaspoons ground allspice or 7 allspice berries
- 2 teaspoons ground cardamom or 1 tablespoon cardamom pods
- 2 teaspoons ground cinnamon or 1 cinnamon stick, broken
- 1 teaspoon ground cloves or 4 whole cloves
- 1 teaspoon ground coriander or 1 tablespoon coriander seeds
- 2 teaspoons ground ginger or 1/4-inch piece diced ginger
- 1/2 teaspoon ground pepper or 1 teaspoon whole peppercorns
- 1 teaspoon ground star anise or 3 whole star anise pods

Note: If using powdered spices, combine them in an airtight container, cap tightly, and shake well. If using whole spices, place them all in a spice grinder and pulse until finely ground, and then transfer to an airtight container. Store at room temperature for up to a year.

MILK KEFIR

Sources: National Center for Home Food Preservation website; Wild Fermentation, 2016

Ingredients:

- 1 quart pasteurized milk
- 1 tablespoons kefir grains

Process:

- Fill a 1-quart jar with milk. Add the kefir grains and loosely cap.
- Ferment at room temperature for about 24 hours, tightening the cap and agitating the jar periodically. The agitation is important, as it brings more of the milk into contact with the grains and distributes fermentation activity. Loosen the cap after agitation.
- Strain out the grains with any straining implement. You may need to use a spoon or clean finger to stir and coax the thickened milk through the strainer.
- Seal the strained kefir in a jar and leave it at room temperature for another 12 to 24 hours to carbonate (if desired). The fermentation continues even without the grains because all the organisms in them are now part of the kefir. (With so much more limited sugar content in milk, there is no need with kefir to worry about the jar exploding, as with kombucha.
- Meanwhile, cover the kefir grains with fresh milk and start the next batch. Kefir works best as a continuous rhythm. Keep your batches small so you do not get overwhelmed.
- Curdling. If you leave your kefir to ferment for a few days, it will curdle and separate. You can remix it by shaking, and enjoy sour kefir. Or, when the thick creamy kefir floats above the whey, you can gently scoop it out and enjoy it like sour cream. Use the whey for other fermentation adventures or in other cooking or baking.
- Kefir grains grow and multiply in number over time. If you keep the scale of your production constant, it will ferment faster as the ratio of grains to milk increases. Eventually you will need to cull the extras. You only need a tablespoon or so of grains per quart of milk. Share the extras, eat them, feed them to your pet, or toss them into the compost.
- Hiatus. The best way to store kefir grains if you need to suspend production is to pat them dry, seal them in something airtight, and freeze them.
- Note: The National Center for Home Food Preservation recommends that only pasteurized milk be used. Because of the small risk of pathogen growth in home fermented kefir, it is NOT recommended for those with weakened immune systems, e.g. pregnant women, the elderly, the very young and the chronically ill.

KIMCHI

Source: Colorado State University Extension, Farm to Table, “Understanding and Making Kimchi”

Lacto (Lactic Acid) Fermentation: Lactic acid bacteria (LAB) are present in the soil and, therefore, on the things that grow in the earth. Lacto (lactic acid) fermentation is the craft of preserving foods by methods that attract this naturally occurring good bacteria. These probiotics transform the sugar in foods into lactic acid keeping food safe from bad bacteria and other food spoilers and creating tangy-tasting ferments. There are three methods used to ferment vegetables and fruits: dry salted (sauerkraut method), brined, and kimchi (which uses a combination of dry salt and brine methods). All of these methods draw the moisture from vegetables and fruits and create brine in which the food remains submerged throughout the ferment. It is this brine that attracts good bacteria and produces the acids that create an environment inhospitable to bad bacteria. The key to a successful ferment is to keep the vegetables and fruit completely submerged in the brine.

Mold: Occasionally, mold will appear on the surface of the ferment. It can be round and fuzzy, blue, black or pink. Don't get mold confused with Kham yeast, which looks like a white milky film. Mold forms when the ferment is exposed to air, if the salt ratio is wrong, if the vegetables and tools aren't clean, if you used chlorinated water, and other things. If there are small amounts of mold forming on pieces of vegetables that are above the brine, throw those pieces away. If there is a thin layer of mold on top of the brine, either skim it off or throw the entire ferment away and start over. In theory, everything below the brine should be fine. Some people are sensitive to mold and should avoid it completely, while it doesn't affect others. If mold forms inside the fermentation jar, don't eat it! Something is wrong with it.

Making Baechu (Bet-schu) Kimchi: Mack Chopped Cabbage) Style

(Makes about 2 quarts)

Ingredients:

- 2 medium heads Napa cabbage (about 6-8 pounds total)
- 1-1/2 cups coarse salt, non-iodized, divided (baked or sea salt recommended)
- 1 gallon + 1/2 cup cold water, divided
- 2 tablespoon sweet rice flour
- 1-10 cloves garlic, depending on taste preference
- About 3 slices fresh ginger root (about 0.2-0.4 oz.)
- 1 cup Korean red pepper powder – specific “for kimchi”
- 1/2 Korean radish (about 1-1.5 pounds), or daikon radish
- 1 Asian pear (optional)
- 10 green onions
- 1 teaspoon fish sauce (optional)
- 2 teaspoon finely ground salt (optional, as needed)

Directions:

1. Prepare Napa cabbage:
 - a. Rinse heads under cold water and drain.
 - b. Cut away and discard any spoiled or damaged spots.
 - c. Cut Napa cabbage into four quarters and remove core from each. Chop quarters into 2-inch pieces.

2. Salt cabbage:
 - a. Prepare saltwater solution of 1/2 cup coarse, non-iodized salt and 1 gallon cold water in large mixing bowl.
 - b. Dip cabbage pieces briefly in the saltwater solution, to facilitate penetration of salt into the cabbage pieces. Discard saltwater solution.
 - c. Drain and place cabbage pieces in a bowl. Sprinkle 1 cup of coarse, non-iodized salt over the cut cabbage and massage it into the cabbage well. Allow cabbage to sit covered at room temperature for 3 to 6 hours (a longer time will make it saltier).
 - d. Rinse cabbage pieces 3 to 4 times with cold water to rinse away the salt, then place in a colander to drain out excess water from the cabbage for at least 30 minutes.
3. Prepare seasonings:
 - a. Add sweet rice flour to 1/2 cup water in small saucepan. Bring to a boil and set aside to cool.
 - b. Clean, peel, and finely mince (or use blender with small amount of water) garlic and ginger. Mix the cooled sweet rice flour paste and add Korean red pepper powder.
 - c. Clean and peel radish, clean and trim green onions, and if desired, clean and peel Asian pear. Slice all Julienne style, or into match sticks about 1 inch in length.
 - d. Using clean hands and disposable food handler gloves, mix above seasoning paste and Julienned vegetables together in large mixing bowl. Then mix in fish sauce to create a spicy veggie paste. Add salt only as needed.
 - e. Combine cabbage with the spicy veggie paste, rub together and mix thoroughly.
4. Pack container:
 - a. Pack kimchi tightly into container, minimizing air exposure and encouraging brine formation. Fill container 2/3rd full, as fermenting microorganisms will release carbon dioxide and create bubbling and fizzing.
 - b. Cover tightly. If using jars, seal to finger-tip tight. If using bags, squeeze out excess air. Place on plate or in bowl to catch potential overflow.
5. Ferment:
 - a. Option 1: Kimchi may be placed in refrigerator so it ferments slowly over 3 to 4 days. This may be preferred, especially during hot weather.
 - b. Option 2: Place sealed container in a well-ventilated location (may become pungent), with a relatively constant room temperature, around 68°F is ideal. Ferment only 1 to 2 days at room temperature, tasting it daily until it reaches preferred tangy taste and desired texture.
6. Store and enjoy:
 - a. Store fermented kimchi covered tightly in the refrigerator. Keep it pressed down to minimize air exposure. Kimchi may become more sour over time. Discard if you observe indications of surface mold.
 - b. Kimchi can be enjoyed in countless recipes! Try it with eggs, rice, noodles, potatoes, in stir fry, fried rice, soup, pancakes, or on a sandwich or hot dog. Happy kimchi making!

FRIED KIMCHI RICE

Source: Amador/Calaveras Master Food Preserver

(Serves 2 as entre; 4 as side dish)

Ingredients:

2 cups cooked white rice
1 tablespoon sesame oil
1 cup kimchi, coarsely chopped
1/4 cup kimchi juice
2 green onions, finely chopped
1/2 cup fresh or frozen green peas (thawed)
1 tablespoon sesame seeds, toasted

Process:

- Heat wok and add sesame oil.
- When oil is hot, add rice and stir-fry until hot and lightly browned in spots.
- Add kimchi, kimchi juice and green peas. Stir-fry for 2 or 3 minutes, until mixture is warm.
- Serve topped with green onions and sesame seeds.

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.

FERMENTED EASY BRINED CUCUMBER PICKLES

Source: freshpreserving.com/blog?cid=fermented-easy-brined-cucumber-pickles

Makes About: 1 Quart Jar (32 oz | 946 ml)

You will need

- 3 cups (710 ml) non-chlorinated water, such as spring or filtered
- 1 ½ Tbsp (22 ml) Ball® Salt for Pickling and Preserving
- 1 lb (0.5 kg) fresh medium-sized Kirby pickling or small Persian cucumbers, enough to fill a quart jar (6-7)
- Optional: 2 cloves crushed garlic, 1 cup (240 ml) fresh dill sprigs or one dill head, 2 tsp (10 ml) mustard seeds, 1 tsp (5 ml) black peppercorns, 1 tsp (5 ml) hot pepper flakes
- To make additional brine: dissolve 1 tsp (5 ml) Ball® Salt for Pickling and Preserving in ½ cup (120 ml) non-chlorinated water

Directions

Please read Safety Instructions inside the Fermentation FAQs before beginning.

1. To make brine, combine 3 cups (710 ml) water and 1 ½ Tbsp (22 ml) salt to dissolve, set aside.
2. Wash the cucumbers and slice 1/16 in. (0.2 cm) off the blossom end. Slice cucumbers lengthwise into halves or quarters.
3. Pack cucumbers, and any optional seasonings, into clean jar. Make sure there is at least 2 in. (5 cm) of headspace. If necessary, slice off the top ends of the pickles to ensure proper headspace. Pour salt water brine over to cover by 1 in. (2.5 cm), you may have extra.
4. Place spring on top of cucumbers, then twist lid on.
5. Wipe jar down and cover with a cloth. Store in a cool (68°F-72°F/20°C-22°C) place.
6. Check daily to make sure vegetables remain submerged in brine. After 24 hours there will be visible bubbles on the top of the brine.
7. Let pickles ferment for 1 week then remove lid and spring. Remove 1 pickle to taste. If the flavor is to your liking, proceed to step 8. If you prefer a stronger flavor, ferment until flavor has developed for up to 2 additional weeks, tasting every 3 days. Wipe jar rim before replacing spring and lid.
8. Once desired flavor is reached remove spring and add more fresh brine if necessary to cover by 1 in (2.5 cm). Wipe jar rim before replacing lid or use a traditional Ball® canning lid or Ball® Leak-Proof Storage Lid. Store in refrigerator up to 6 months.

DILL PICKLES

Source: https://nchfp.uga.edu/how/can_06/dill_pickles.html

Use the following quantities for each gallon capacity of your container.

- 4 lbs of 4-inch pickling cucumbers
- 2 tbsp dill seed or 4 to 5 heads fresh or dry dill weed
- 1/2 cup salt
- 1/4 cup vinegar (5 percent)
- 8 cups water and one or more of the following ingredients:
 - 2 cloves garlic (optional)
 - 2 dried red peppers (optional)
 - 2 tsp whole mixed pickling spices (optional)

Procedure: Wash cucumbers. Cut 1/16-inch slice off blossom end and discard. Leave 1/4-inch of stem attached. Place half of dill and spices on bottom of a clean, suitable container. For more information on containers see "Suitable Containers, Covers, and Weights for Fermenting Food," . Add cucumbers, remaining dill, and spices. Dissolve salt in vinegar and water and pour over cucumbers. Add suitable cover and weight. Store where temperature is between 70°F and 75°F for about 3 to 4 weeks while fermenting. Temperatures of 55° to 65°F are acceptable, but the fermentation will take 5 to 6 weeks. Avoid temperatures above 80°F, or pickles will become too soft during fermentation. Fermenting pickles cure slowly. Check the container several times a week and promptly remove surface scum or mold. **Caution: If the pickles become soft, slimy, or develop a disagreeable odor, discard them.** Fully fermented pickles may be stored in the original container for about 4 to 6 months, provided they are refrigerated and surface scum and molds are removed regularly. Canning fully fermented pickles is a better way to store them. To can them, pour the brine into a pan, heat slowly to a boil, and simmer 5 minutes. Filter brine through paper coffee filters to reduce cloudiness, if desired. Fill jar with pickles and hot brine, leaving 1/2-inch headspace. Adjust lids and process as recommended in Table 1 , or use the low-temperature pasteurization treatment described below.

The following treatment results in a better product texture but must be carefully managed to avoid possible spoilage. Place jars in a canner filled half way with warm (120° to 140°F) water. Then, add hot water to a level 1 inch above jars. Heat the water enough to maintain 180° to 185° F water temperature for 30 minutes. Check with a candy or jelly thermometer to be certain that the water temperature is at least 180°F during the entire 30 minutes. Temperatures higher than 185°F may cause unnecessary softening of pickles.

Table 1. Recommended process time for **Dill Pickles** in a boiling-water canner.

		Process Time at Altitudes of		
Style of Pack	Jar Size	0 - 1,000 ft	1,001 - 6,000 ft	Above 6,000 ft
Raw	Pints	10 min	15	20
	Quarts	15	20	25

This document was adapted from the "Complete Guide to Home Canning," Agriculture Information Bulletin No. 539, USDA, revised 2015.

Reviewed February 2018.

BOILING WATER CANNING PROCESS

1. Before you start preparing your food, fill the canner halfway with clean water. This is approximately the level needed for a canner load of pint jars. For other sizes and numbers of jars, adjust the amount of water in the canner so it will be 1 to 2 inches over the top of the filled jars.
2. Preheat water to 140°F for raw-packed foods and to 180°F for hot-packed foods. Food preparation can begin while this water is preheating. Do not have the water boiling when you add the jars.
3. Fill, fit with lids, load onto the canner rack and use the handles to lower the rack into the water; or fill the canner with the rack in the bottom, one jar at a time, using a jar lifter. When using a jar lifter, make sure it is securely positioned below the neck of the jar (below the screw band of the lid). Keep the jar upright at all times. Tilting the jar could cause food to spill into the sealing area of the lid.
4. Add boiling water, if needed, so the water level is at least 1 inch above jar tops. Pour the water around the jars, not on them. For process times over 30 minutes, the water level should be at least 2 inches above the tops of the jars.
5. Turn heat to its highest position, cover the canner with its lid, and heat until the water in the canner boils vigorously.
6. Set the timer for the total minutes required for processing the food, adjusting for altitude.
7. Keep the canner covered and maintain a boil throughout the process schedule. The heat setting may be lowered a little as long as a complete boil is maintained for the entire process time. If the water stops boiling at any time during the process, bring the water back to a vigorous boil and begin the timing of the process over, from the beginning.
8. Add more boiling water, if needed, to keep the water level above the jars.
9. When the jars have boiled for the recommended time, turn off the heat and remove the canner lid. Wait no more than 5 minutes before removing jars.
10. Using a jar lifter, remove the jars without tipping and place them on a towel, leaving at least 1-inch spaces between the jars during cooling. Let jars sit undisturbed to cool at room temperature for 12 to 24 hours.



ATMOSPHERIC STEAM CANNING PROCESS

1. Use research tested recipe and processing time developed for a boiling water canner when using an atmospheric steam canner. An atmospheric steam canner may be used with recipes approved for half-pint, pint, or quart jars.
2. Add enough water to the base of the canner to cover the rack. (Follow manufacturer recommendations.)
3. Preheat water to 140°F for raw-packed foods and to 180°F for hot-packed foods. Food preparation can begin while this water is preheating. Do not have the water boiling when you add the jars.
4. Heat jars prior to filling with hot liquid (raw or hot pack). Do not allow the jars to cool before filling.
5. Load filled jars, fitted with lids, onto the canner rack and place the lid on the canner base.
6. Turn heat to its highest position to boil the water until a steady column of steam (6-8 inches) appears from the vent hole(s) in the canner lid. Jars must be processed in pure steam environment.
7. If using a canner with a temperature sensor, begin processing time when the temperature marker is in the green zone for your altitude. If using a canner without a temperature sensor, begin processing time when a steady stream of steam is visible from the vent hole(s).
8. Set the timer for the total minutes required for processing the food, adjusting for altitude. Processing time must be limited to 45 minutes or less, including any modification for elevation. The processing time is limited by the amount of water in the canner base. When processing food, do not open the canner to add water.
9. Monitor the temperature sensor and/or steady stream of steam throughout the entire timed process. Regulate heat so that the canner maintains a temperature of 212°F. A canner that is boiling too vigorously can boil dry within 20 minutes. If a canner boils dry, the food is considered under-processed and therefore potentially unsafe.
10. At the end of the processing time, turn off the heat and wait 2 to 3 minutes. Carefully remove the lid, lifting the lid away from you.
11. Using a jar lifter, remove the jars without tipping and place them on a towel, leaving at least 1-inch spaces between the jars during cooling. Let jars sit undisturbed to cool at room temperature for 12 to 24 hours.



PICKLES and RELISHES PROBLEMS and SOLUTIONS

Problem	Cause	Prevention
Pickles not crisp enough. Once a pickle becomes soft, it cannot be made firm again.	1. Over-heating	1. Use low-temperature pasteurization to process pickles if permitted for the recipe used.
	2. Blossom ends not removed from cucumber before fermentation. Blossoms may contain fungi or yeasts responsible for enzymatic softening.	2. Slice at least 1/16 th inch off blossom end of cucumber and discard.
	3. “Crisping” procedures not followed.	3. Soak vegetable in saltwater, hydrate with ice, use lime water or calcium chloride as directed in recipe.
Soft and slippery pickles. Most likely due to enzyme activity from yeasts, molds, or remnants of cucumber blossom. If due to microbial spoilage, destroy the food. If softening not caused by microorganisms, pickles are safe to eat.	1. Too little salt in fermentation brine.	1. Maintain salt concentration specified in recipe.
	2. Vinegar too weak.	2. Use vinegar of at least 5% acidity.
	3. Cucumbers stored too high a temperature during fermentation.	3. Conduct fermentation at 70°F to 75°F to facilitate growth of desired lactic acid bacteria.
	4. Cucumbers not covered with brine during fermentation.	4. Keep cucumbers covered.
	5. Scum not removed from brin during fermentation.	5. Remove scum to prevent undesirable yeasts and mold from dominating the fermentation. Use an airlock system for fermentation.
	6. Insufficient heat treatment during processing to destroy microorganisms.	6. Process pickles after filling jars.
	7. Moldy garlic or spices.	7. Use fresh, high-quality spices and garlic.
Hollow pickles. Pickles are safe to eat.	1. Cucumber developed air pockets during growth or are over-ripe.	1. Since hollow cucumbers usually float, remove them when washing before use. Use floating cucumbers for relishes or chunk pickles.
	2. Holding cucumbers too long before brining.	2. Use cucumbers within 24 hours of harvesting.
	3. Fermentation too rapid.	3. Too high temperature during fermentation.

Shriveled pickles. Pickles are safe to eat.	1. Too strong a salt, sugar or vinegar solution at the beginning of the pickling process.	1. Use a weak solution at the beginning of the pickling process in preparing very sweet or sour pickles, then gradually increase the concentration.
	2. Long time between harvest and brining.	2. Use cucumbers within 24 hours of harvest.
	3. Overcooking or over-processing.	3. Carefully time processes.
	4. Dry weather around harvest.	4. None.
Dark pickles. Pickles are safe to eat, unless brass, copper or zinc utensils and brining equipment were used, in which case, do not use pickles.	1. Use of ground spices, too much spice, or leaving whole spices in jars.	1. Use whole spices and use them only to flavor the covering liquid, do not pack spices in the jar.
	2. Minerals from hard water.	2. Use softened water.
	3. Utensils leached metals, such as iron, copper, or zinc.	3. Use food-grade unchipped enamelware, glass, stainless steel or stoneware utensils.
	4. Iodized salt used.	4. Use canning or pickling salt..
	5. Overcooking or over-processing.	5. Carefully time processes.
Light and blotchy pickles. Pickles are safe to eat.	1. Sun-scaled, poorly colored cucumbers, or over-ripe cucumbers.	1. Select high-quality cucumbers.
Small brown spots on pickles. Pickles are safe to eat.	1. Holding cucumbers too long before brining.	1. Use cucumbers with 24 hours of harvest.
Abnormally bright green pickles. Pickles may not be safe, depending on the cause of color.	1. Prepared in copper utensil.	1. Consumption of excess copper is toxic. If abnormal green color is caused by copper, the pickles should be discarded.
	2. Green food coloring added.	2. Green food coloring is not recommended.

Strong, bitter taste.	1. Spices cooked too long in vinegar, or too many spices used.	1. Follow instructions for amount of spices to use and the boiling time.
	2. Dry weather may induce bitter flavor in cucumbers.	2. Taste cucumbers before processing to ensure bitterness is not present.
	3. Use of salt substitute.	3. Potassium chloride, present in most salt substitutes, cause bitterness.
Off-Flavor in fermented pickles. If no mold is present, and pickles have fermented to proper acidity, they are probably safe to eat.	1. “Wrong” microorganisms growing in brine.	1. Follow direction carefully, especially regarding fermentation temperature and salt levels.
White sediment. Generally, not harmful, but if accompanied by soft and slippery texture and spoiled appearance or odor, discard pickles.	1. Sediment is normal product of bacterial fermentation. Also due to yeast growth on surface of pickles brine, and settling to bottom of jar.	1. To reduce yeast growth, use an airtight cover on fermentation container. Strain brine before using as covering liquid. Heat-process pickles to prevent yeast growth in jar.
	2. Salt that contains an anti-caking agent.	2. Use canning or pickling salt.
Blue or purple garlic. Use the pickles, discard the garlic.	1. Immature garlic.	1. Garlic contains anthocyanins, water-soluble pigments. With acid conditions they may turn blue or purple.
	2. Copper in the water.	2. Garlic contains sulfur compounds, which may react with copper to form copper sulfate, a blue compound.
Yellow crystals on pickled asparagus. Safe to eat.	1. The yellow crystals are rutin, a compound naturally present in asparagus that is insoluble in vinegar. During the pickling it is drawn out and crystalizes on the stem.	1. None.