

# Fermented Foods at Home



Lunch & Learn  
12 noon to 1 pm  
August 18, 2014



**LW**  
**Extension**  
Cooperative Extension

# Resources



- **Homemade Pickles and Relishes (UWEX)**  
<http://fyi.uwex.edu/safepreserving/> (see the Recipes tab)  
Step by step instructions for making genuine fermented dill pickles.  
Also **Make Your Own Sauerkraut (UWEX)**
- **How Do I...Ferment** [www.uga.edu/nchfp](http://www.uga.edu/nchfp)  
Tips on making fermented dill pickles, sauerkraut and yogurt.
- **NEW – Making Table Wine at Home (Univ of California)**
  - **Making Homemade Cheese (New Mexico State Univ)**

# Vegetable Fermentation

Cabbage + Salt  $\xrightarrow[68-72^{\circ}\text{F}]{\text{Bacteria}}$  Sauerkraut  
Cucumbers Dill pickles



- Salt selects for the right kind of bacteria & keeps the spoilage bacteria at bay
- Good bacteria convert sugar to **lactic acid**
- Over time, enough acid is produced to ensure safety & a tangy flavor
- Fermentation traditionally took place in a ceramic crock. Now, many people use a food-grade glass or plastic pail, or you can even ferment in the jar. Do not use a metal container.
- A brine-filled bag is the best way to seal the crock or pail and keep the product from spoiling.





# Making Sauerkraut at Home

- Sauerkraut is manufactured via a **natural fermentation**. The bacteria required for fermentation are already present on the cabbage at harvest.
  - Use large, firm, freshly harvested heads for the best kraut (red or green). Napa cabbage or other loose-leafed varieties are not recommended.
- **Shredding** cabbage allows salt to draw out the juice (and sugar!) for successful fermentation.
- **Salt** is the only added ingredient (other than cabbage).
  - The right **amount** and type of salt is **key (2.25%)**.
  - **Salt** selects the right kind of bacteria for fermentation, keeps pathogens from growing, and helps to draw out the sugars.

# Salt is Key!

- Add the right amount, and type, of salt

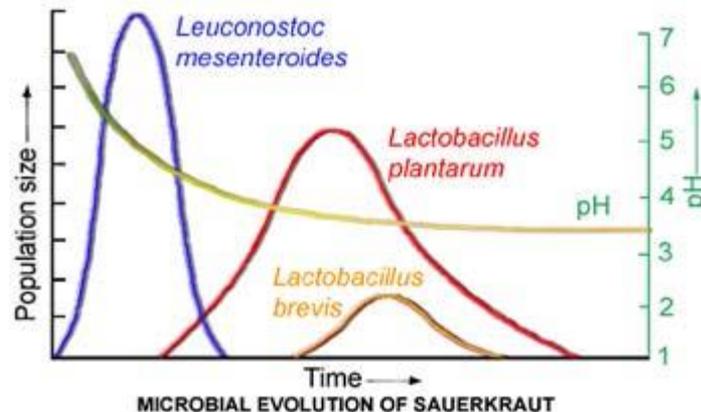
Type of salt	Weight equivalent	Measure
Table salt	7 $\frac{3}{4}$ ounces (220 g)	$\frac{3}{4}$ cup + 1 Tbl.
Canning salt	7 $\frac{3}{4}$ ounces	1 cup
Kosher salt	7 $\frac{3}{4}$ ounces	1 $\frac{1}{2}$ cups

- Use a clean, food-grade container
  - Don't use a landscape planter, a plastic garbage bag, a heavily pitted crock, or a galvanized steel or iron bucket!
- Place crock at a temperature best for bacteria to grow and ferment sugar to acid
  - Below 60° - fermentation will slow or stall
  - Above 78° - it's too warm for fermentation and spoilage takes over

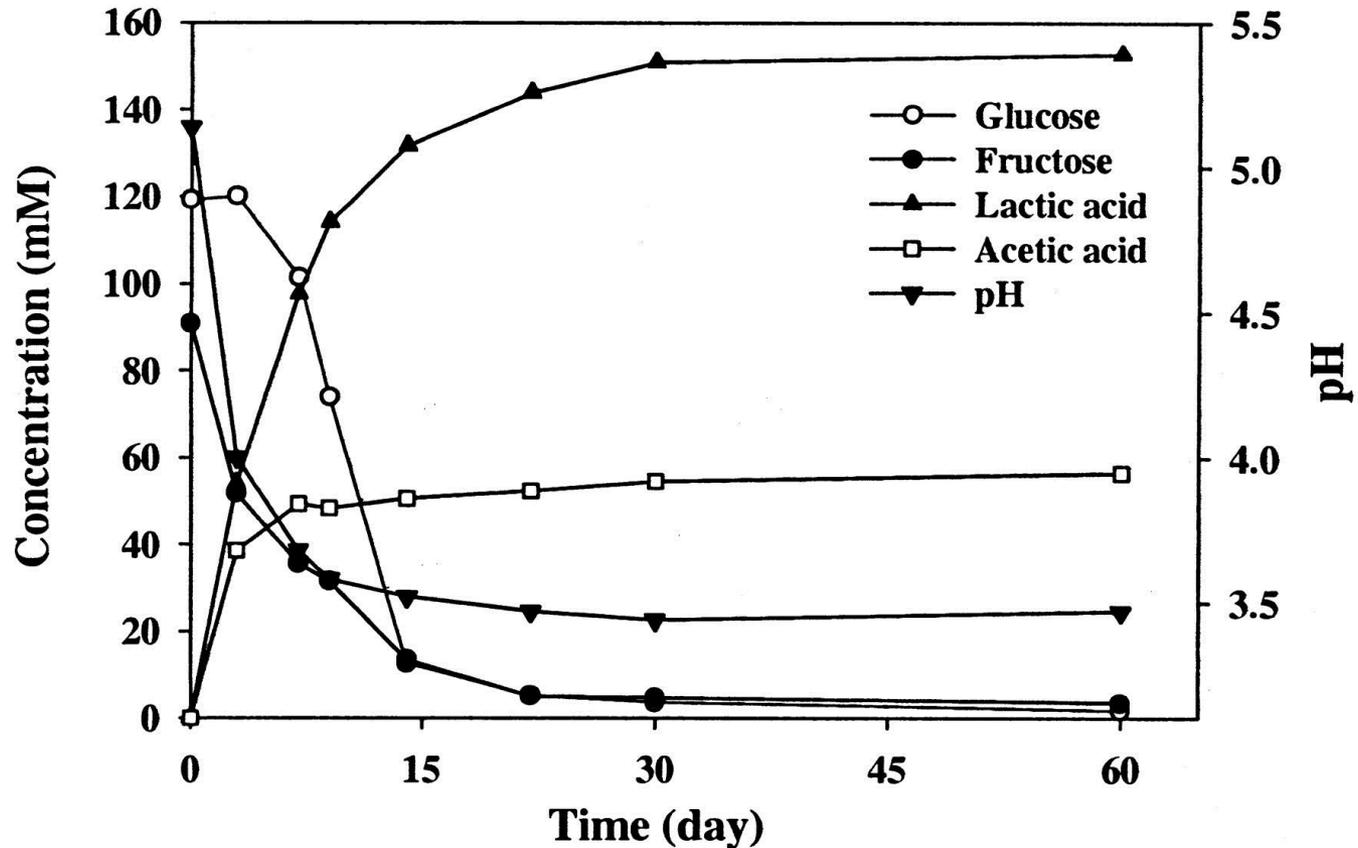
# Microbial Evolution of Sauerkraut

Over 2-4 weeks at  $\sim 70^{\circ}\text{F}$ , a microbial succession takes place.

- *L. mesenteroides* grows first until acid reaches 1%. It then declines.
- *Lactobacillus plantarum* steps in and grows until acid reaches  $\sim 2\%$ . *L. brevis* grows, producing acetic acid.
- Final pH of  $\sim 3.5$  is safe for canning in a boiling water canner.



Changes in the concentrations of substrates and products and pH in a commercial sauerkraut fermentation.

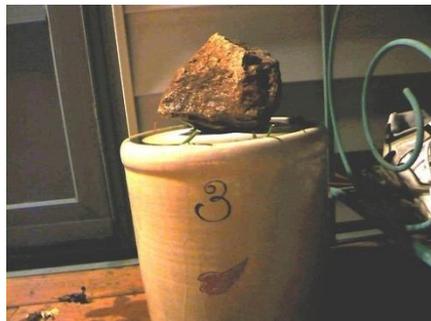


Lu Z et al. Appl. Environ. Microbiol. 2003;69:3192-3202

Applied and Environmental Microbiology

# More key concepts

- Cover the crock to seal out air, help bacteria growth, and keep spoilage at bay. Be sure to skim skum.
  - Traditional – an inverted plate with a weight on top
  - Modern – a food-grade plastic bag filled with brine
  - Sauerkraut brine: 6 Tablespoons salt + Gallon of water
  - Dill brine:  $\frac{1}{2}$  C. salt +  $\frac{1}{4}$  C. vinegar + 8 cups of water



OLD



NEW



# Genuine (crock) Dills



- Choose very fresh cucumbers for pickling. Rinse well and remove 1/16<sup>th</sup> inch from the blossom end to help prevent softening. [Alum is not recommended.]
- Add the correct proportion of salt (8%) and choose a cool (~70°F) room for fermentation.
- After 3-4 weeks, you'll know when the pickles are ready....by tasting!
- Heat process pickles for storage (best) or move them to the refrigerator (2<sup>nd</sup> best)
  - Prepare fresh brine, heat, pour over cukes and process in a boiling water canner, OR
  - Heat fermentation brine to boiling and fill jars packed with cukes; process in a boiling water canner

# More on vegetable fermentation

- At this time, no tested recipes exist for safe extended fermentation of carrots, beets, greens or other vegetables.
  - Fresh kimchi can be prepared as long as standing in salt is limited to 24 hours at room temperature.  
<https://www.exploratorium.edu/cooking/pickles/recipe-kimchi.html>
- Do not use salt substitutes in fermented products. Rinsing prior to eating can reduce salt by ~40%.
- Hollow pickles usually result from a delay from harvest to processing.
- Never use an oven or dishwasher to ‘can’ your fermented products.
- Using a vacuum sealer to seal jars is **not** an acceptable substitute for canning.



# Making Yogurt at Home

[www.uga.edu/nchfp/](http://www.uga.edu/nchfp/) or [fyi.uwex.edu/safepreserving/](http://fyi.uwex.edu/safepreserving/)

Historically yogurt was naturally spoiled milk; now we can control the process for high quality product every time.

- Yogurt is a **controlled fermentation**. We add good bacteria to pasteurized milk for the desired flavor, aroma and texture.
- For safety, use **pasteurized milk**. Try whole, lowfat or nonfat milk.
- Use a food thermometer to measure temperature.



# Recipe for Homemade Yogurt

- Mix: 4 cups **milk**

  - 1/3 cup **nonfat dry milk**

- Heat together to 200°F (a double boiler works best). Stir to avoid scorching.
- Hold for 10 minutes (thin yogurt) or 20 minutes (thicker yogurt).
- Cool rapidly to 112-115°F.
- Add ¼ cup yogurt **starter** to 1 cup heated milk.
- Add warmed starter/milk back to rest of milk.
- Pour into clean, warm containers and incubate 105-115°F.
  - After 4 hours (just set) yogurt will be slightly tart and silky.
  - After 8 hours, yogurt will be tart and firm. Store refrigerated.
- Add fruit as a topping or base on serving. Fruit added prior to fermentation can produce a weak, watery gel.

