

# Food Science for the Win

## Hearty Stew



The kitchen is an ideal lab for experimenting and being curious while embracing your inner scientist. Explore the science of making a stew, which is cooked “low and slow” in a covered pan with liquid. This method makes beans tender and fluffy, turns tough meat tender, and turns simple ingredients into a healthy and inexpensive dinner.

### Basic Concepts and Terms

- **Braise** - To brown foods in fat, then cook with a small amount of liquid in a covered dish. Usually uses cheap cuts of meat, which can be of different sizes. The liquid becomes a gravy or sauce.
- **Stew** - Lean, uniformly sized small pieces of meat and vegetables. Everything is covered in liquid, which becomes a broth.
- **Connective tissue** - Part of cuts of meat made of collagen. When it reaches **154°F**, collagen breaks apart and reforms into soft gelatin. Low and slow cooking turns tough stringy meat into delicious cut-with-a-fork meals. But beware! Overcooked meat will dehydrate.
- **Maillard reaction** - Between **284-320°F**, proteins clash with nearby sugar molecules to fuse into new substances. Hundreds of new substances are born, some brown in color and many carrying aromas. Browning onions and beef before cooking in the oven will give your stew a lovely deep brown color and complex flavor.
- **Pyrolysis** - Also known as burning, starts at **356°F**.
- **Phytohaemagglutinin** - Lectin found in raw red kidney beans, and to a lesser extent in other beans. To remove this toxin, soak the beans for 8 hours or more, and boil them for 20 minutes.

### Basic Equipment

- **A pan (such as a dutch oven) or casserole works best for stews**
  - Needs to be oven safe, especially the handles.
  - Must be wide enough to be able to brown the food on the stove, and deep enough to hold the vegetables.
  - A pan with a stainless steel or enameled interior browns food best. Non-stick interior doesn't make the “crusty” bits.
  - Pan needs a well-fitting lid.
- **Sharp knife or vegetable peeler**
- **Cutting board**
- **Spatula**
- **Thermometer** (optional, to test stew temperature)

# General Stew Recipe

## Prep the meat

1. Cut the meat into 1" cubes.
2. Remove excess moisture from the meat. On a cutting board, put meat between a top and bottom layer of paper towels, then press down for a minute or so.
3. Add a flour coating. Remove the top layer of paper towel and dust ¼ cup flour over the meat. You could put flour and meat in a bowl or zipper-top bag and toss to mix well.
4. Place pan for stew on high heat. Test if it's hot enough by adding a drop of water to the pan and waiting for it to sizzle.
5. Add a tablespoon or so of cooking oil, such as olive oil.
6. Distribute meat around pan bottom. Let it sit until it develops a golden-brown color. Do not crowd the pan; you may have to do this in two batches if your pan is small.
7. Use a spatula to turn the meat to brown the opposite side.
8. Remove from the pan and set aside (but don't wash the pan!).

## Brown the onions

1. Get the pan hot again.
2. Add another tablespoon or so of cooking oil.
3. Add 2 medium onions, diced or sliced. Let stand for a few minutes so they start to brown (caramelize). Stir every few minutes to prevent them from burning.
4. A few minutes before the onions are done, add sliced garlic and seasonings (optional).

## Add liquid, then braise or stew

If you want to braise your meal, add just enough liquid to cover the bottom inch or so of the pan. To stew your meal, add enough liquid to almost cover everything.

Use any liquid combination of braising or stewing liquid, including:

- ¼-1 cup red wine, balsamic vinegar, or dark beer
- 4 tablespoons Worcestershire sauce
- chicken/beef/vegetable broth
- water

After adding liquid, also called **deglazing the pan**, make sure to scrape the little bits from the bottom of the pan. These bits are called the **fond**, and they have a lot of flavor.

## Add vegetables

- 4+ peeled carrots, cut into 3" logs or ½" circles
- 4 stalks of celery, cut into ½" pieces
- mushrooms, cleaned and quartered
- 4 medium Yukon Gold potatoes, quartered, peeled or unpeeled
- 2 tablespoons tomato paste

## Assemble dish for the oven

1. Return the browned meat to the pan and mix with the vegetables. Check the amount of liquid. Note that some recipes will specify putting the meat as the base layer, closest to the pan, and putting the vegetables on top.
2. Cover the pan with a tight-fitting lid.
3. Cook in the oven at 300°F. Alternatively, cook on top of the stove over a low flame.
4. Cook for one to four hours, or as the recipe specifies.
5. At the half-way point while it's cooking, check liquid level and add more if needed.
6. Optional: If you want to add peas or other delicate vegetables, do so 15 minutes before removing the pot from the oven. If they cook too long, they will go gray and mushy.

## Simple Winter Cholent

Based on Irving Nachumson's inspiration for the Beanery, which became the crock-pot

### Background on barley

Barley is sold either whole-grain or pearled. Both versions look similar and cost about the same.

- **Pearled** means the hull and grain has been removed, and after cooking about 10 minutes, it has a soft, if not slimy, texture.
- Whole grain is labeled **dehulled**, **hulled**, or even "Italian," but the directions specify to cook it for 45 minutes. Its texture is more firm, not mushy.

### Ingredients

- ½ cup red onion, diced
- 2 cloves garlic, thinly sliced or minced
- ¼ cup dehulled barley
- ½ cup dried beans (can use a mix)
- ½ cup sweet potato, diced
- ½ pound boneless, skinless chicken, diced
- 1 tablespoon salt
- 1 teaspoon pepper
- 1 tablespoon dried green herbs of your choice
- hot peppers, optional (not found in traditional cholent recipes)



### Instructions

1. Put all the ingredients into your crock-pot.
2. Fill the pot with water about a half inch above the top of the ingredients. The barley and beans will soak up much of the water.
3. Cover and cook on low heat. A traditional cholent cooks 10 to 12 hours, however the meal will be cooked enough for eating after 3 hours or so.
4. If using hot peppers, add to the cooking cholent a half hour before serving the meal.
5. Serve with kishke or other sausage.

## Suggested Resources

- **Jewish Slow Cooker Recipes by Laura Frankel.** Explore the cholent's religious and cultural role. [Place a hold](#)
- **The Science of Cooking by Dr. Stuart Farrimond.** Do a deep dive into food science with simple explanations about the Maillard reaction. [Place a hold](#)
- **The Complete Book of Soups and Stews by Bernard Clayton.** A wide range of stews with excellent step-by-step directions. [Place a hold](#)

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