

Altitude Adjusters

make for happy cooks (and happy eaters!)



By Vicki Hayman and Denise Smith

Do your cookies flatten, cakes collapse, and pasta take longer to cook? Cooking at high altitude requires recipe adjustments to ensure the best results.

Most recipes and temperature guidelines are calibrated for sea level conditions. The lower atmospheric pressure at high altitudes (generally 3,000 feet or higher is considered high altitude) can wreak havoc on your culinary performance. ALL of Wyoming is above 3,000 feet.

Knowing a few simple adjustments is a game-changer!

What's different about cooking and baking at high elevations?

- Low air pressure: Air pressure

is lower at high altitudes, which means foods may take longer to bake.

- Faster evaporation: Lower air pressure and dry air means batters, doughs, soups, and stews may lose moisture faster.
- Lower boiling points: Water boils at lower temperatures at high altitudes, which can lead to longer cooking times. You might also have trouble sustaining what is known as a rolling boil.
- Quicker rising times: Gases expand more at high altitudes, which means doughs rise faster. You may need to use less leavening agent (baking soda, baking powder).

These differences affect range-top cooking, slow cooking, candy making, canning, and the internal structure of baked goods.

Where to Start

Unfortunately, there is no black-and-white rule for converting all recipes to high altitude recipes. Understanding ways altitude

affects cooking and becoming familiar with common cooking adjustments will be helpful if you live above 3,000 feet.

If unhappy with the finished texture or appearance, try one change at a time, making the smallest adjustment first and working up to the largest until you like the results. Sometimes repeated trials are needed, making one change at a time to arrive at recipe success. The following altitude adjusters are a place to start.

Good Rules of Thumb

Here is a quick summary of what happens when altitude begins to affect cooking and baking. See the publication *Cooking & Baking It Up: High Altitude Adjusters* at <http://bit.ly/highaltitudecooking> for more detailed information.

Range-top Cooking

As altitude increases, water comes to a boil more quickly but at a lower temperature; foods take longer to cook in liquids. Don't increase the heat, as that will only cause the liquid to boil away faster. Covering foods during cooking will help retain moisture.



Deep-fat Frying

To prevent fried foods from over-browning on the outside and under-cooking on the inside, lower the temperature of the fat at high altitudes. In general, decrease the frying temperature about 3°F for each 1,000 feet increase in elevation from sea level. Using a food thermometer will ensure safe internal temperatures for fried foods.

Slow Cooking

The lower boiling point at high altitude means the slow cooker simmers at a lower temperature, which makes it important to ensure food reaches a high enough temperature to destroy bacteria. Start the food cooking on HIGH for the first hour; then turn it to the LOW setting for the remainder of cooking. Use a food thermometer to check the temperature of cooked food.

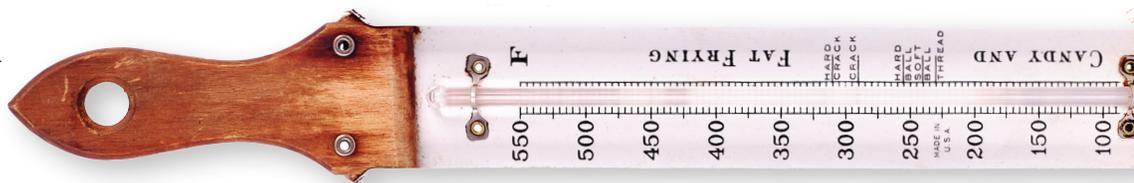
Pressure Cooking

Recipes may require adjustment. Increase cooking time for dial-gauge pressure cookers with a maximum weighted gauge of 15 pounds. Add one to two minutes for most vegetables at 5,000 feet and up. Very dense vegetables, such as beets, whole potatoes, and sweet potatoes, may require an additional five minutes. If food is under-cooked after pressure is released, simmer uncovered until done. More cooking liquid may also be needed to compensate for increased altitude and cooking time.

Candies, Syrups, and Jellies

Adjusting for evaporation is the key to making syrups, candies, and jellies. The lower the boiling point, the sooner moisture evaporation begins. At high altitudes, when sugar

General adjustments			
Adjustment	3,000 feet	5,000 feet	7,000 feet
Increase liquid. For each cup add:	1–2 tablespoons	2–4 tablespoons	3–4 tablespoons
<i>Liquids evaporate faster in all cooking processes.</i>			
Reduce baking powder. For each teaspoon decrease:	1/8 teaspoon	1/8–1/4 teaspoon	1/4 teaspoon
<i>Prevents excess rising that stretches cell structure, producing coarse, irregular texture causing dough to sink in the center resulting in low volume.</i>			
Reduce sugar. For each cup decrease:	0–1 tablespoon	0–2 tablespoons	1–3 tablespoons
<i>Because of faster liquid evaporation, sugar solutions become more concentrated, affecting the texture.</i>			
Increase flour. For each cup add:	0–1 tablespoon	0–2 tablespoons	2–4 tablespoons
<i>Flour strengthens the structure of baked goods.</i>			
Increase oven temperature	15–25°F	15–25°F	15–25°F
<i>Helps set the batter before the cells expand too much. Cookies may not need a temperature increase.</i>			



mixtures, such as candies, syrups, and jellies, are cooked at the temperature for sea level recipes, the faster loss of liquid can cause the mixture to become too concentrated. Depending on the type of sugar mixture, the texture may become sugary or hard. To adjust for high altitude, cook the syrup at a lower temperature than indicated in the sea level recipe. When using a candy thermometer, first test the temperature at which your water boils, then reduce the finish temperature by the difference between the temperature of your boiling water and 212 degrees.

This is the approximate decrease of 2 degrees for every increase of 1,000 feet in elevation.

You may also use the cold-water test, which is reliable at any altitude. (we suggest visiting <http://bit.ly/candywatertest> for details.) Cook jellies to a finish temperature 8 degrees above the boiling point of your water.

Canning

Lower atmospheric pressure and lower boiling temperatures make altitude adjustments essential for home canning. Not adjusting for altitude may make your foods unsafe

(risk of botulism, or other food-borne illnesses). Processing times must be increased for boiling-water canning.

See <http://bit.ly/uwfoodpreserve> for resources on preserving specific types of food in Wyoming. The series covers getting started, jellies, fruit, meat, pickles, tomatoes, vegetables, wild berries, and more.

Baking

Lower air pressure affects baked goods two main ways: they lose moisture quicker and rise easier.

Problems usually can be corrected by adjusting baking temperature and one or more key ingredient (including baking powder, baking soda, sugar, liquid, or fat).

In general, to make doughs rise at more normal rates, decrease sugar and fat (the tenderizers) and increase eggs and flour (the strengtheners). Reducing leavening agents (baking powder, baking soda, etc.) can also reduce rising rates.

Using a mix? Check the package or manufacturer's website for specific

directions for high-altitude baking.

By following the suggested altitude adjustments and with a little practice you can expect high-quality results – most of the time. Remember you may not be able to achieve perfect results every time. Using high-altitude recipes or high-altitude adjustments when trying new recipes pays off.

Contact your local University of Wyoming Extension office for more information about cooking at high altitudes.

Free publication helps keep the eating season bright

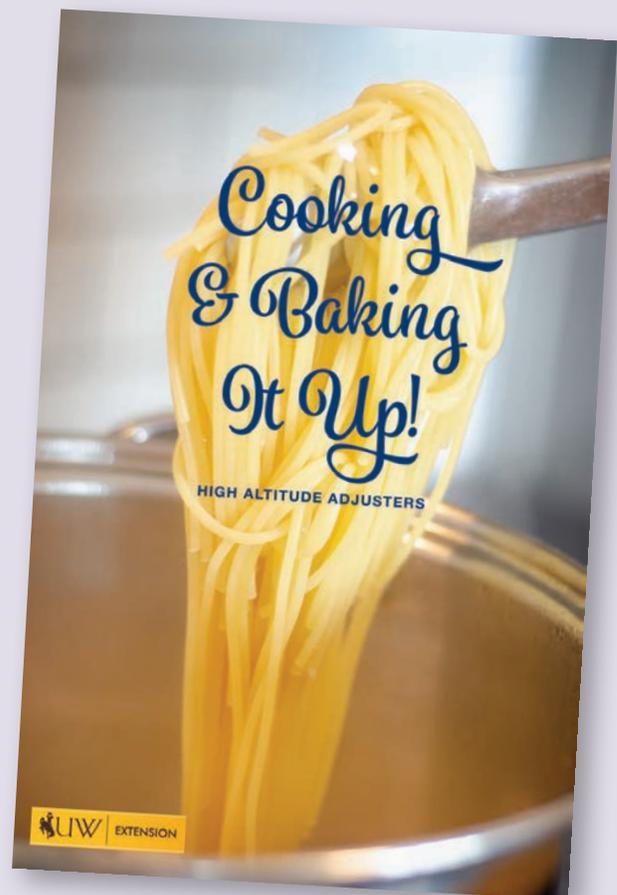
The holiday season is approaching. Are you satisfied with how your baked and cooked items turn out?

Cooking and Baking it Up: High Altitude Adjusters offers ways to compensate menus for Wyoming's high altitude.

The publication is divided into:

- * Cakes
- * Candies, syrups, and jellies
- * Cookies
- * Quick breads
- * Yeast breads
- * Puddings and pies
- * Range-top cooking
- * Boiled eggs, and
- * Deep frying

Author Vicki Hayman (and co-writer of this article) and former extension educator Phyllis Lewis and specialist Melissa Bardsley also offer suggestions for canning high- and low-acid foods and canning safety. The publication can be viewed or downloaded in pdf, HTML, or e-Pub formats free at <http://bit.ly/wyo-altitude>.



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