## HIGHALTITUDECOOKING

Practically all recipes and cooking directions are formulated for use at sea level. Many of these recipes need adjustments to give equally good results at altitudes above sea level. Adjustments in some recipes are necessary because as the altitude increases, the atmospheric pressure decreases. Air becomes thinner at high altitudes and consequently exerts less pressure. In general, the Intermountain area should be adjusted to 4,000 S5,000 feet. Check the elevation in your area and also the temperature at which water boils for accurate adjustments. The two necessary adjustments are boiling time and leavening amounts. There are no definite rules to use when modifying a sea level recipe for use at high altitudes. However, some general guidelines are worth consideration.

## ADJUSTMENTS TO MAKE . . .

## BOILING POINT:

At high altitudes, the atmospheric pressure is less and the boiling point of
 the liquid will be reached at a lower temperature. To check the temperature of the boiling point of water in your altitude, place a thermometer in boiling water (suspend in water, don't let touch the pan bottom). Leave the thermometer in water for a few minutes after the water is boiling to allow the thermometer to reach it's maximum temperature. This lowered boiling point amounts to 1.9 degrees for each 1,000 feet increase in altitude.

MEAT COOKING: When meats and poultry are cooked by simmering or braising, additional time is required at high altitudes. Because longer boiling time will be required and moisture evaporation will be greater, additional liquid may be needed. Oven temperatures are not affected by altitude changes. Sea level time tables may be used as a guide for meats cooked in the oven.

JAMS, JELLIES AND PRESERVES: Cook jelly mixture to a temperature 8 degrees higher than the boiling point of water (see previous boiling adjustments). If you do not have a thermometer, you can use the "sheet" test. This is done by dipping a cool metal spoon into the boiling jelly mixture. When two drops form together and sheet off the spoon, the jelly should be done. When using commercial pectin, follow package directions.

## FOOD PRESERVATION:

| WATER BATH CANNING: If processing time is 20 minutes or less, add 1 minute for every 1,000 feet of elevation above sea level. In Weber County, that would be 5 minutes. If processing time is over 20 minutes, add 2 minutes for every 1,000 feet of elevation. Weber County $=10$ minutes.
| PRESSURE CANNING: The processing time will not change but the pressure needs to increase 1 pound for every 2,000 feet of elevation. In Weber County, the recommended pressure is $12 \frac{1}{2}$ pounds.

## VEGETABLES

| COOKING: It is difficult to give definite rules because of the variations in size, variety, stage of maturity and degree of doneness desired in vegetables. Generally the cooking time will need to be increased from 4 to $11 \%$ at 5,000 feet altitude. Cooking time can be reduced by using a pressure cooker pan. Frozen vegetables require less time than similar fresh products. Usually it is sufficient to add only a minute or two to the cooking time by package directions. Baked vegetables cook about the same.
| FREEZING: Vegetables are blanched before freezing to inactivate enzymes. Blanching or steaming time should be increased one minute longer than the specified times for 5,000 feet or more above sea level.

FRYING: Moist foods will require lower oil temperatures because of the lower boiling point of the water within them. French fries normally require an oil temperature of 365 degrees but at high altitudes may only require 355 degrees.

COOKIES: Although many sea-level cookie recipes yield acceptable results at high altitudes, they often can be improved by a slight increase in baking temperature, a slight decrease in baking powder or soda, fat, and sugar, and/or a slight increase in liquid ingredients and flour. They may require reduction in baking powder and sugar and a decrease in the amount of fat. These changes increase the strength of the batter and improve it's ability to retain the steam long enough for a crust to form. Many cookie recipes contain a higher proportion of sugar and fat than necessary, even at low altitudes. For more nutritious cookies with fewer calories, up to one-fourth of the sugar called for often can be replaced with nonfat dry milk powder without loss in product quality.

## PANCAKES, GRIDDLE CAKES

OR BATTER CAKES: Use about one-fourth less leavening called for in the recipe.

QUICK BREAD: Quick breads vary from muffin-like to cake-like in cell structure. The cell structure of biscuits and muffins or muffin-type quick breads is firm enough to withstand the increased internal pressure at high altitudes quite well without adjustment.
However, a bitter or alkaline flavor may result from inadequate neutralization of baking soda or powder. In such cases, a slight decrease in the baking soda or baking powder usually improves results. Quick breads with a cake-like texture are more delicately balanced and usually benefit from adjustments for altitude. Characteristics of a quick bread that has not been adjusted properly for altitude include: a porous, sugary crust; a coarse, gummy, or oily texture; and a low volume in proportion to weight. These characteristics usually can be improved by a slight reduction in the proportion of leavening agents, sugar, and fat, and/or a slight increase in the proportion of flour, eggs, and liquid ingredients. Appropriate selection of pan size and baking temperature also are important.

PASTRIES: No change necessary.

ICING, BOILED: In high altitudes, it helps to add to the sugar $1 / 8$ teaspoon glycerin and to allow a longer cooking period.

CANDY: The purpose of boiling this mixture is to evaporate the liquid to a desired degree of concentration within a reasonable time. Because these mixtures will boil at a lower temperature, they will be "done" at a lower temperature. There are two ways to test for doneness. This is with the cold water test or with a thermometer designed for this purpose. When the cold water test is used, it will be necessary to learn the feel of the mixture at different stages (soft ball, hard ball, crack, etc). The following chart indicates adjustments for 5,000 feet altitude.


| CANDY | TEST IN COLD WATER | DEGREES |
| :--- | :--- | :---: |
| Fudge, Penuche, Fondant | SOFT BALL - can be picked up but flattens | $224-230$ |
| Caramels | FIRM BALL - holds shape unless pressed | $232-238$ |
| Divinity, Taffy, <br> Caramel Corn | HARD BALL - holds shape though pliable | $240-258$ |
| Butterscotch/English Toffee | SOFT CRACK - separates into hard threads but not brittle | $260-280$ |
| Brittles | HARD CRACK - separates into hard and brittle threads | $290-300$ |

## BAKING AT high altitudes

Although most foods pose few problems, other than somewhat longer cooking times, recipes for baked products developed at sea level can present a real challenge. The reason for most baking problems is lower atmospheric pressure due to a thinner blanket of air above. This decreased pressure affects food preparation in the following ways:

1) Leavening gases expand more
2) Moisture evaporates faster from foods at a given temperature
3) Water and other liquids boil at lower temperatures
4) In addition, because the climate of high altitude areas usually is drier than at lower elevations, flour may be drier and doughs therefore may require more liquid to reach the proper consistency

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> | YEAST BREAD |
| :--- |
| AND ROLLS: |
| Many changes |
| are necessary - |
| higher baking |
| temperature, more |
| liquid, less yeast, |
| more and shorter |
| rising periods. |


| YEAST: The dough rises faster in high altitudes than at lower altitudes because the atmospheric pressure is much less at high elevations than at sea level. In Weber County, it is recommended that we use one-fourth package of yeast to one loaf of bread.
| RISING PERIODS: High altitude has its most pronounced effect on the rising time of yeast breads. Yeast bread dough rises more rapidly at high altitudes and may become overproofed. Watch it carefully and allow it to rise only until doubled in bulk. Since the development of a good flavor in bread partially depends on the length of rising time, it is best to allow it to rise a second time, and punch down again before molding into loaves or rolls.
| TEMPERATURE: Correct baking temperature is most necessary for high quality bread. In Weber County, bread baked at 450 degrees for 35-40 minutes will be better than if it is baked at a lower temperature for a longer time. Fancy breads contain more sugar which makes them brown too fast at high temperatures so they should be baked at 375 degrees.


## CAKES

Many cake recipes perfected for sea level need no modification up to an altitude of 3,000 feet. Above that, decreased atmospheric pressure may cause a cake to rise too quickly, causing its cell structure to overexpand. Oven temperatures are usually increased although oven temperature is not affected by altitude change. The reason you raise the oven temperature at high altitudes for leavened foods is to bake the product faster and set the cell structure so it will not fall. Angel food and sponge cakes present special high altitude problems. The leavening gas for these cakes is largely air. It is important not to beat too much air into the eggs. They should be beaten only until they form a peak that falls over, not until they are stiff and dry. Overbeating causes too much expansion of air cells and leads to their collapse. Using less sugar, more flour, and a higher baking temperature also helps strengthen the cell structure of foam-type cakes.

## HIGH ALTITUDE (5,000 FEET) ADJUSTMENTS FOR CAKE

BAKING POWDER: For each teaspoon, decrease
1/8-1/4 teaspoon

SUGAR: For each cup, decrease 2-3 tablespoons

LIQUID: For each cup, increase . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 2 tablespoons
FLOUR: For each cake mix, increase . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 2 tablespoons

| QUALITY CHECK FOR CAKES |  |  |
| :--- | :--- | :--- |
| INGREDIENT | If too MUCH is used, cake is . . . | If too LITTLE is used, cake is . . |
| Leavening | Very coarse; loose; sometimes slightly <br> fallen; bitter taste; runs over top of pan | Small; compact; heavy; light color |
| Flour | Dry; peaked or cracked top; bread <br> like; compact; tough crust | May fall; slightly heavy or soggy |
| Sugar | Tough; heavy; thick crust-cracked, <br> sugary, sticky; coarse texture; runs <br> over top of pan | May be dry and coarse; tough; does <br> not brown readily |
| Fat | Crisp; uneven edges; greasy and <br> crumbly; heavy; falls | Coarse texture; tough crust; dry cake; <br> light color |
| Liquid | Tunnels; heavy streaks; soggy | Coarse; bread like; dry; cracks on top |
| Temperature | Coarse; thick; tough crust; peaked and <br> often cracked | Undersized; heavy; close; crumbly <br> texture; pale; sticky crust; runs over <br> top of pan |
| Pan size | TOO LARGE - Undersized cake; light <br> crust color | TOO SMALL - Runs over top; falls in <br> center |

## HIGHALTITUDERECIPES

## MOUNTAINTOP WHITE BREAD

7 cups white flour, apx.
$1 / 2$ tablespoon dry granular yeast $1 / 4$ cup warm water ( 110 degrees F ) $21 / 2$ cups warm milk

3 tablespoons shortening
3 tablespoons sugar
1 tablespoon salt

Combine yeast and warm water; set aside. Combine warm milk, shortening,
 sugar and salt in mixing bowl. Add 4 cups of the flour, beat well. Add softened yeast and enough flour to make a soft dough. Mix until the dough forms in an elastic ball in the bowl. Cover and let rest 10-15 minutes (makes dough easier to knead). Place 1 cup of the flour on the kneading surface; top with dough. Knead 10-15 minutes keeping dough as soft as possible. When the dough is smooth and satiny, and small blisters develop just under the surface of the dough, it has been kneaded enough. Place the dough into a lightly oiled bowl; turn over to coat all sides. Cover and let rise in a warm place away from drafts until tripled in bulk. Punch it down, turn it over, cover and let rise 40 minutes. Punch it down, turn it over, cover and let rise 20 minutes. Divide into two balls for loaves; cover and rest dough 10 minutes. Mold into loaves and put into two greased loaf pan. Cover with a damp cloth; let rise until dough is even with the top of the pan. Bake at 450 degrees F. for 40-45 minutes. Turn bread out onto wire cooling racks; cool and package.

## BEN LOMOND PEAK YELLOW CAKE

2 cups sifted cake flour
$1-1 / 2$ teaspoons baking powder
$1 / 2$ teaspoon salt
$1 / 3$ cup shortening
1 cup sugar
1 teaspoon vanilla
2 eggs, beaten
3/4 cup skim milk
Grease and flour two 8 -inch cake pans or one $9 \times 13 \times 2$ inch cake pan. Mix and sift flour, baking powder, and salt; set aside. Cream shortening in mixer bowl until light. Add sugar and vanilla gradually and cream until light and fluffy (about 5 minutes on medium speed). Add beaten eggs and beat one minute on medium speed. Add flour mixture and milk together by fourths, mixing one minute on low speed after each addition. Pour batter into prepared pan(s). Bake at 375 degrees F for 25 to 30 minutes. Remove from oven and cool for about 12 minutes. Remove from pans and allow to finish cooling on rack.

## Variations:

* Chocolate S Substitute $1 / 2$ cup sifted cocoa for $1 / 2$ cup flour.
* Spice S Add $1 / 2$ teaspoon nutmeg, $1 / 4$ teaspoon cloves, and 1 teaspoon cinnamon to the flour mixture.


## MT. OGDEN CHOCOLATE CAKE

2 cups sifted cake flour
1/2 cup cocoa
2 teaspoons baking powder
1 cup sugar
$2 / 3$ cup vegetable oil
1 teaspoon vanilla
2 eggs
1 cup skim milk
Grease and flour pans. Mix and sift flour, cocoa, baking powder, and sugar into mixer bowl. Add oil, vanilla, eggs, and milk. Beat 30 seconds on low speed, scraping frequently. Beat 7-1/2 minutes on medium speed with an upright mixer or 6 minutes on high speed with a portable mixer, scraping 4 to 5 times. Pour batter into prepared pans. Bake at 375 degrees F for the time recommended below.* Remove from oven and cool in pan for about 12 minutes. Remove from pan and allow to finish cooling on rack.

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## HEAVENLY ANGEL FOOD CAKE

1 cup plus 1 tablespoon sifted cake flour
1 cup sugar
14 egg whites
$1 / 4$ teaspoon salt
2 teaspoons cream of tartar
$1 / 2$ cup sugar
$1 / 2$ teaspoon vanilla
$1 / 2$ teaspoon almond extract
Sift together flour and $1 / 2$ cup sugar 3 times. Place egg whites, salt, and cream of tartar into mixing bowl and beat at high speed until soft, but not until stiff peaks form. With the mixer running, add $1 / 2$ cup sugar slowly close to the beaters. Add vanilla and almond extract. Beat until quite stiff, but not dry peaks. Add sifted flour-sugar mixture by fourths. Mix on low speed 10 seconds after each of the first 3 additions and 20 seconds after the last addition. Scrape down
 the sides constantly during this mixing. Pour batter into a 10 -inch ungreased tube pan. Bake at 400 degrees F for approximately 30 minutes. Remove from oven and allow to cool in inverted pan.

## Variations:

* Chocolate SSubstitute $1 / 4$ cup sifted cocoa for $1 / 4$ cup cake flour. Omit the almond extract. Increase the vanilla to 1-1/2 teaspoons.
* Spice S Sift with the flour $1 / 2$ teaspoon nutmeg, $1 / 4$ teaspoon cloves, and 1 teaspoon cinnamon. Omit vanilla and almond extracts.
Topping: Mix whipped cream with crushed peanut brittle, or crushed peppermint candy, or fresh/frozen fruit and top slices of angel food cake.


## WASATCH CARROT CAKE

3/4 cup vegetable oil
1-1/4 cups sugar
4 eggs
1/2 cup skim milk
2 cups shredded carrots

2-1/2 cup all-purpose flour
2 teaspoons cinnamon
1 teaspoon baking soda
$1 / 2$ teaspoon salt
$1 / 2$ cup raisins

18 -oz. can crushed pineapple, undrained
Grease bottom and sides of bundt cake pan. Mix together oil, sugar, eggs, milk, carrots, and pineapple in large bowl. Mix and sift flour, cinnamon, soda, and salt. Add dry ingredients to liquid mixture and mix until well blended. Blend in raisins. Pour batter into prepared pans. Bake at 350 degrees F for 40 to 45 minutes or until toothpick inserted in center comes out clean. Remove from oven and cool in pan for 30 minutes. Remove from pan and frost with Cream Cheese Frosting*, if desired.

* Cream Cheese Frosting: Blend 6-oz. softened cream cheese, 1 tablespoon milk and 2 teaspoons vanilla. Gradually beat in 1-1/2 cups sifted confectioners sugar. Spread on cooled cake.
* Low Fat Version: Reduce sugar to 1 cup, vegetable oil to $1 / 2$ cup, and eggs to two. Substitute 2-1/4 cups whole wheat flour for the 2-1/2 cups all-purpose flour. Omit the salt. Reduce the baking time to $30-40$ minutes or until toothpick comes out clean.


[^0]:    *Oblong, 9x13x2-inch, about 30 to 35 minutes. Reduce heat to 350 degrees F .
    *Two layers, 8-inch, about 28 minutes.

    * 24 cupcakes ( $1 / 2$ full), about 25 minutes.

