Basic Kitchen and Food Service Management

The BC Cook Articulation Committee

BCCAMPUS
VICTORIA, B.C.

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6.

Converting and Adjusting Recipes and Formulas

Recipes often need to be adjusted to meet the needs of different situations. The most common reason to adjust recipes is to change the number of individual portions that the recipe produces. For example, a standard recipe might be written to prepare 25 portions. If a situation arises where 60 portions of the item are needed, the recipe must be properly adjusted.

Other reasons to adjust recipes include changing portion sizes (which may mean changing the batch size of the recipe) and better utilizing available preparation equipment (for example, you need to divide a recipe to make two half batches due to a lack of oven space).

Conversion Factor Method

The most common way to adjust recipes is to use the conversion factor method. This requires only two steps: finding a conversion factor and multiplying the ingredients in the original recipe by that factor.

Finding Conversion Factors

To find the appropriate conversion factor to adjust a recipe, follow these steps:

1. Note the yield of the recipe that is to be adjusted. The number of portions is usually included at the top of the recipe (or formulation) or at the bottom of the recipe. This is the information that you HAVE.
2. Decide what yield is required. This is the information you NEED.
3. Obtain the conversion factor by dividing the required yield (from Step 2) by the old yield (from Step 1). That is, conversion factor = (required yield)/(recipe yield) or conversion factor = what you NEED ÷ what you HAVE.

Example 5

To find the conversion factor needed to adjust a recipe that produces 25 portions to produce 60 portions, these are steps you would take:

1. Recipe yield = 25 portions

2. Required yield = 60 portions
3. Conversion factor
    1. = (required yield) ÷ (recipe yield)
    2. = 60 portions ÷ 25 portions
    3. = 2.4

If the number of portions and the size of each portion change, you will have to find a conversion factor using a similar approach:

1. Determine the total yield of the recipe by multiplying the number of portions and the size of each portion.
2. Determine the required yield of the recipe by multiplying the new number of portions and the new size of each portion.
3. Find the conversion factor by dividing the required yield (Step 2) by the recipe yield (Step 1). That is, conversion factor = (required yield)/(recipe yield).

Example 6

For example, to find the conversion factor needed to change a recipe that produces 20 portions with each portion weighing 150 g into a recipe that produces 60 portions with each portion containing 120 g, these are the steps you would take:

1. Old yield of recipe = 20 portions × 150 g per portion = 3000 g
2. Required yield of recipe = 40 portions × 120 g per portion = 4800 g
3. Conversion factor
    1. = required yield ÷ old yield
    2. = 4800 ÷ 3000
    3. = 1.6

Key Takeaway

To ensure you are finding the conversion factor properly, remember that if you are increasing your amounts, the conversion factor will be greater than 1. If you are reducing your amounts, the factor will be less than 1.

Adjusting Recipes Using Conversion Factors

Now that you have the conversion factor, you can use it to adjust all the ingredients in the recipe. The procedure is to multiply the amount of each ingredient in the original recipe by the conversion factor. Before you begin, there is an important first step:

Before converting a recipe, express the original ingredients by weight whenever possible.

Converting to weight is particularly important for dry ingredients. Most recipes in commercial kitchens express the ingredients by weight, while most recipes intended for home cooks express the ingredients by volume. If the amounts of some ingredients are too small to weigh (such as spices and seasonings), they may be left as volume measures. Liquid ingredients also are sometimes left as volume measures because it is easier to measure a litre of liquid than it is to weigh it. However, a major exception is measuring liquids with a high sugar content, such as honey and syrup; these should always be measured by weight, not volume.

Converting from volume to weight can be a bit tricky and may require the use of tables that provide the approximate weight of different volume measures of commonly used recipe ingredients. Once you have all ingredients in weight, you can then multiply by the conversion factor to adjust the recipe.

When using U.S. or imperial recipes, often you must change the quantities of the original recipe into smaller units. For example, pounds may need to be expressed as ounces, and cups, pints, quarts, and gallons must be converted into fluid ounces.

Converting a U.S. Measuring System Recipe

The following example will show the basic procedure for adjusting a recipe using U.S. measurements.

Example 7

Adjust a standard formulation (Table 13) designed to produce 75 biscuits to have a new yield of 300 biscuits.

Table 13: Table of ingredients for conversion recipe in U.S. system

Ingredient	Amount
Flour	3¼ lbs.
Baking Powder	4 oz.
Salt	1 oz.
Shortening	1 lb.
Milk	6 cups

Solution

1. Find the conversion factor.
    1. conversion factor = new yield/old yield
    2. = 300 biscuits ÷ 75 biscuits
    3. = 4
2. Multiply the ingredients by the conversion factor. This process is shown in Table 14.

Table 14: Table of ingredients for recipe adjusted in U.S. system

Ingredient	Original Amount (U.S)	Conversion factor	New Ingredient Amount
Flour	3¼ lbs.	4	13 lbs.
Baking powder	4 oz.	4	16 oz. (= 1 lb.)
Salt	1 oz.	4	4 oz.
Shortening	1 lb.	4	4 lbs.
Milk	6 cups	4	24 cups (= 6 qt. or 1½ gal.)

Converting an Imperial Measuring System Recipe

The process for adjusting an imperial measure recipe is identical to the method outlined above. However, care must be taken with liquids as the number of ounces in an imperial pint, quart, and gallon is different from the number of ounces in a U.S. pint, quart, and gallon. (If you find this confusing, refer back to Table 7 and the discussion on imperial and U.S. measurements.)

Converting a Metric Recipe

The process of adjusting metric recipes is the same as outlined above. The advantage of the metric system becomes evident when adjusting recipes, which is easier with the metric system than it is with

the U.S. or imperial system. The relationship between a gram and a kilogram (1000 g = 1 kg) is easier to remember than the relationship between an ounce and a pound or a teaspoon and a cup.

Example 8

Adjust a standard formulation (Table 15) designed to produce 75 biscuits to have a new yield of 150 biscuits.

Table 15: Table of ingredients for conversion recipe in metric system

Ingredient	Amount
Flour	1.75 kg
Baking powder	50 g
Salt	25 g
Shortening	450 g
Milk	1.25 L

Solution

1. Find the conversion factor.
    1. conversion factor = new yield/old yield
    2. = 150 biscuits÷75 biscuits
    3. = 2
2. Multiply the ingredients by the conversion factor. This process is shown in Table 16.

Table 16: Table of ingredients for recipe adjusted in metric system

Ingredient	Amount	Conversion Factor	New Amount
Flour	1.75 kg	2	3.5 kg
Baking powder	50 g	2	100 g
Salt	25 g	2	50 g
Shortening	450 g	2	900 g
Milk	1.25 L	2	2.5 L

Cautions when Converting Recipes

Although recipe conversions are done all the time, several problems can occur. Some of these include the following:

- Substantially increasing the yield of small home cook recipes can be problematic as all the ingredients are usually given in volume measure, which can be inaccurate, and increasing the amounts dramatically magnifies this problem.
- Spices and seasonings must be increased with caution as doubling or tripling the amount to satisfy a conversion factor can have negative consequences. If possible, it is best to under-season and then adjust just before serving.
- Cooking and mixing times can be affected by recipe adjustment if the equipment used to cook or mix is different from the equipment used in the original recipe.

The fine adjustments that have to be made when converting a recipe can only be learned from experience, as there are no hard and fast rules. Generally, if you have recipes that you use often, convert them, test them, and then keep copies of the recipes adjusted for different yields, as shown in Table 17.

Recipes for Different Yields of Cheese Puffs

Table 17.1: Cheese Puffs, Yield 30

Ingredient	Amount
Butter	90 g
Milk	135 mL
Water	135 mL
Salt	5 mL
Sifted flour	150 g
Large eggs	3
Grated cheese	75 g
Cracked pepper	To taste

Table 17.2: Cheese Puffs, Yield 60

Ingredient	Amount
Butter	180 g
Milk	270 mL
Water	270 mL
Salt	10 mL
Sifted flour	300 g
Large eggs	6
Grated cheese	150 g
Cracked pepper	To taste

Table 17.3: Cheese Puffs, Yield 90

Ingredient	Amount
Butter	270 g
Milk	405 mL
Water	405 mL
Salt	15 mL
Sifted flour	450 g
Large eggs	9
Grated cheese	225 g
Cracked pepper	To taste

Table 17.4: Cheese Puffs, Yield 120

Ingredient	Amount
Butter	360 g
Milk	540 mL
Water	540 mL
Salt	20 mL
Sifted flour	600 g
Large eggs	12
Grated cheese	300 g
Cracked pepper	To taste

Baker's Percentage

Many professional bread and pastry formulas are given in what is called **baker's percentage**. Baker's percentage gives the weights of each ingredient relative to the amount of flour (Table 18). This makes it very easy to calculate an exact amount of dough for any quantity.

Table 18: A formula stated in baker's percentage

Ingredient	%	Total	Unit
Flour	100.0%	15	kg
Water	62.0%	9.3	kg
Salt	2.0%	0.3	kg
Sugar	3.0%	0.45	kg
Shortening	1.5%	0.225	kg
Yeast	2.5%	0.375	kg
Total weight:	171.0%	25.65	kg

To convert a formula using baker's percentage, there are a few options:

If you know the percentages of the ingredients and amount of flour, you can calculate the other ingredients by multiplying the percentage by the amount of flour to determine the quantities. Table 19 shows that process for 20 kg flour.

Table 19: Baker's percentage formula adjusted for 20 kg flour

Ingredient	%	Total	Unit
Flour	100.0%	20	kg
Water	62.0%	12.4	kg
Salt	2.0%	0.4	kg
Sugar	3.0%	0.6	kg
Shortening	1.5%	0.3	kg
Yeast	2.5%	0.5	kg
Total weight:	171.0%	34.20	kg

If you know the ingredient amounts, you can find the percentage by dividing the weight of each ingredient by the weight of the flour. Remember, flour is always 100%. For example, the percentage of water is 6.2 ÷ 10 = 0.62 × 100 or 62%. Table 20 shows that process for 10 kg of flour.

Table 20: Baker's percentages given for known quantities of ingredients

Ingredient	%	Total	Unit
Flour	100.0%	10	kg
Water	62.0%	6.2	kg
Salt	2.0%	0.2	kg
Sugar	3.0%	0.3	kg
Shortening	1.5%	0.15	kg
Yeast	2.5%	0.25	kg

Example 9

Use baker's percentage to find ingredient weights when given the total dough weight.

For instance, you want to make 50 loaves at 500 g each. The weight is 50 × 0.5 kg = 25 kg of dough.

You know the total dough weight is 171% of the weight of the flour.

To find the amount of flour, 100% (flour) is to 171% (total %) as n (unknown) is to 25 (Table 21). That is,

1. $100 \div 171 = n \div 25$
2. $25 \times 100 \div 171 = n$

3. $14.62 = n$

Table 21: Formula adjusted based on total dough weight

Ingredient	%	Total	Unit
Flour	100.0%	14.62	kg
Water	62.0%	9.064	kg
Salt	2.0%	0.292	kg
Sugar	3.0%	0.439	kg
Shortening	1.5%	0.219	kg
Yeast	2.5%	0.366	kg
Total weight:	171.0%	25.00	kg

As you can see, both the conversion factor method and the baker's percentage method give you ways to convert recipes. If you come across a recipe written in baker's percentage, use baker's percentage to convert the recipe. If you come across a recipe that is written in standard format, use the conversion factor method.