[http://drupal.eurofir.eu/eurofir\_aisbl/compiler\_guidelines/recipe\_calculation](http://drupal.eurofir.eu/eurofir_aisbl/compiler_guidelines/recipe_calculation" \t "_blank)

How do recipes and composite foods come to their nutritional values?

**The most reliable method of identification of nutrient data is the food analysis in laboratories. However, food analyses are cost and time consuming. Therefore, calculation methods have been developed on the basis of analysis, which allow the determination of the nutrient content of many prepared foods.**

There are generally two types of composite foods in food composition databases (FCDBs): recipes in the classic sense and simple processed food. Among the recipes in the classic sense there are dishes like sliced bread or a lasagne, while a simple processed food can be a grilled steak or boiled eggs. In both cases, the nutrient levels will be determined with the same method of calculation.

There is hardly any food that is not cooked in any form before consumption. Depending on the type and condition of the food and the desired end product, the required heat treatment will follow (e.g. boiling in water, frying in butter or steaming). The purpose of the preparation is to convert the food into an edible condition. The improvement of the hygienic and sensory properties of the food, an increase in the digestibility and usability (e.g. protein) and the removal of contaminants (e.g. heavy metals) are aspects, which play an important role.

The preparation, however, leads in addition to these desirable also to undesirable changes in nutritional content. Thus, by heating or boiling in water losses occur due to water-soluble and/or heat-sensitive nutrients (e.g. vitamins and minerals). If the nutrient content of a processed food product is used for the calculation of a composite food with many ingredients, these losses have to be taken into account. Two factors are used.

The**nutrient retention factor** does say something about how much of a nutrient is retained after the preparation of a foodstuff.

The **yield factor** provides information on weight changes during the food preparation, e.g. water absorption during cooking of pasta and water loss during the preparation of meat.

The Network of Excellence EuroFIR provides a proposal on the application of recipe calculation methods in handling and calculating food composition data (FCD). The following calculation is based on the EuroFIR approach for recipe calculation in FCDBs.

Steps fort he calculation of nutritional values of foods:

Step 1. Select recipe and analyse all details from cooking procedure & ingredient description Recipe: Omelette, fried Example: Nutrient: Riboflavin, determination of the riboflavin (Vitamin B2) content in Eggs Cooking method: Frying

| **Ingredients** | **Amount in recipe (g)** |
| --- | --- |
| **Eggs** | **110** |
| Milk | 500 |
| Salt | 130 |
| Flour | 2 |
| Oil | 14 |

Step 2. Take suitable yield and nutrient retention factors from the datasets with recommendations and rules for the use of factors (number 1 in the literature’s list, see below)   
Yield factor for dishes containing eggs: 0.95, nutrient retention factor for riboflavin in eggs: 0.85

Step 3: Determine the weight of each ingredient (edible part). Convert household measures if necessary

Step 4: Sum the weights of ingredients

| **Ingredients** | **Amount in recipe (g)** |
| --- | --- |
| **Eggs** | **110** |
| Milk | 500 |
| Salt | 130 |
| Flour | 2 |
| Oil | 14 |
| **Weight, total, raw (g)** | **756** |

Step 5: Apply yield factor to adjust for weight changes  
= Weight, total, cooked (g) = weight, total, raw (g) \* yield factor  
= 756 \* 0.95 = 718 g

| **Weight, total, cooked (g)** | **718** |
| --- | --- |

Step 6: Find nutrient values per 100 g of raw ingredients from FCDB or other sources

**Nutrient content per 100 g raw ingredient (Source: SwissFIR,**[**swissfir.ethz.ch**](http://swissfir.ethz.ch)**)**

| **Ingredients** | **Riboflavin (mg)** |
| --- | --- |
| Eggs | 0.50 |
| Milk | 0.20 |
| Flour | 0.05 |
| Salt | 0 |
| Oil | 0 |

Step 7: Calculate the nutrient content per 100 g of cooked dish (Calculation of the riboflavin content of eggs in 100 g cooked dish)  
= Nutrient content of ingredient per 100 g uncooked \* raw weight of ingredient (g) / total cooked weight (g)   
= 0.50 \* 110 g / 718 g   
= 0.08 mg

Step 8: Apply retention factor to adjust for nutrient content changes   
= Nutrient content per 100 g cooked recipe \* nutrient retention factor   
= 0.08 \* 0.85 = 0.07 mg  
There is 0.07 mg riboflavin in 100 g eggs in the omelette, fried.   
The correction of the nutrient content is then carried out for the rest of the ingredients and the riboflavin content in all ingredients then added. Thus, ones get the total riboflavin content of 0.21 mg in 100 g of omelette, fried.

| **Ingredients** | **Riboflavin (mg/100 g) in raw ingredient** | **Riboflavin (mg/100 g) in cooked ingredient, before correction** | **Riboflavin (mg/100 g) in cooked ingredient, after correction** |
| --- | --- | --- | --- |
| Eggs | 0.50 | 0.08 | 0.07 |
| Milk | 0.20 | 0.14 | 0.13 |
| Flour | 0.05 | 0.009 | 0.009 |
| Salt | 0 | 0 | 0 |
| Oil | 0 | 0 | 0 |

| **Riboflavin, total in 100 g omelette, fried** | **0.21** |
| --- | --- |

Literature:

1. Vásquez-Caicedo AL, Bell S, Hartmann B: Report on collection of rules on use of recipe calculation procedures including the use of yield and retention factors for imputing nutrient values for composite foods (D2.2.9). EuroFIR, 2008. ([3.8 MB - PDF](http://drupal.eurofir.eu/sites/default/files/TechWeb%20Downloads/RecipeCalculation/EuroFIR%20recipe%20calculation%20procedures%20including%20yield%20and%20re.pdf))
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3. Bognár A: Tables on weight yield of food and retention factors of food constituents for the calculation of nutrient composition of cooked foods (dishes). Berichte der Bundesforschungsanstalt für Ernährung BFE - R - - 02-03, Karlsruhe, 2002.
4. Bognár, A., Nährstoffverluste bei der haushaltsmäßigen Zubereitung von Lebensmitteln. AID VerbraucherDienst informiert, 1988.