

## Steps to follow to calculate nutrient values (NVs) for a multi-ingredient recipe using the mixed recipe method

**Example:** NVs of 'fried rice with tomato' to be calculated from the NVs of the ingredients. Exemplarily, calculations are presented for the  $\beta$ -carotene equivalent content.

### Information available:

Foods on which the recipe calculation will be based:

200 g boiled rice

150 g raw tomatoes

30 g margarine

Weight of raw ingredients = 380 g

Weight loss: 10% which corresponds to a yield factor (YF) of 0.9

$\beta$ -carotene equivalents (CARTBEQ) content = 992  $\mu\text{g}/100$  g raw tomato

Retention factor (RF) for  $\beta$ -carotene for fried vegetables: RF = 0.90; this RF will be used for CARTBEQ

Water content of 380 g raw recipe = 280.7 g water

### **STEP 1:**

Adapt ALL nutrient values of all ingredients, which are expressed per 100 g in the reference database, to the weight of the ingredients in the recipe.

$$\frac{\text{NV per 100 g} \times \text{weight of ingredient in dish}}{100} = \text{NV per weight of ingredient in the dish}$$

Taking the example of 992  $\mu\text{g}$  CARTBEQ per 100 g raw tomato, we have to multiply this value by 150 (for 150 g) and divide it by 100 (as the NV was already expressed per 100 g). We will obtain 1488 mcg CARTBEQ per 150 g raw tomato, as used in the recipe.

### Example:

$$\frac{992 \times 150}{100} = 1488 \mu\text{g CARTBEQ per 150 g raw tomato}$$

### **STEP 2:**

Calculate the cooked weight of the dish based on the raw weight of all ingredients using the formula:

$$\text{Weight of cooked dish} = \sum \text{weights of raw ingredients} \times \text{YF}$$

Example: 380 g  $\times$  0.9 = 342 g fried rice with tomato (= cooked dish)

### STEP 3:

Per nutrient, calculate the nutrient content for each cooked ingredient:

$$\text{NV per weight of ingredient in dish (RF corrected)} = \text{NV per weight of ingredient in dish} \times \text{RF}$$

Taking our example, we apply the formula as following:

$$\text{CARTBEQ per 150 g "raw" tomato (RF corrected)} = \text{CARTBEQ per 150 g raw tomato} \times \text{RF}$$

Example:  $1488 \mu\text{g} \times 0.90 = 1339 \mu\text{g}$  CARTBEQ per 150 g raw tomato (RF corrected)

For each ingredient, calculate the CARTBEQ content as it was done in step 3. We get: 1339  $\mu\text{g}$  from 150 g "raw" tomato, 0  $\mu\text{g}$  from 200 g boiled rice and 108  $\mu\text{g}$  from 30 g margarine (all values are RF corrected).

Remember that the 150 g "raw" tomato is only used in this intermediate calculation step, because in the final recipe the real weight of tomato is less (but we do not know of how much – we only know that the entire recipe lost 10% of its weight).



Remember that the estimated nutrient value of the prepared food, calculated using a retention factor, refers to the weight after preparation.

### STEP 4:

Per nutrient, calculate the sum of CARTBEQ per 342 g fried rice with tomato which was adjusted to nutrient loss. The formula to be used is:

$$\text{NV per weight cooked dish} = \sum \text{NV of ingredients adjusted to nutrient loss}$$

Taking our example, we will sum 1339  $\mu\text{g}$  from 150 g "raw" tomato + 0  $\mu\text{g}$  from 200 g boiled rice + 108  $\mu\text{g}$  from 30 g margarine (all values are RF corrected). The formula would become:

$$\text{CARTBEQ per 342 g fried rice with tomato} = \sum \text{CARTBEQ of ingredients adjusted to nutrient loss}$$

Example:  $1339 + 0 + 108 = 1447 \mu\text{g}$  CARTBEQ per 342 g fried rice with tomato

### STEP 5:

Per nutrient, calculate the nutrient value per 100 g recipe:

$$\text{NV (100 g cooked dish)} = \frac{\text{NV (total weight of cooked dish)}}{\text{total weight of cooked dish}} \times 100$$

Example:

$$\frac{1447}{342} \times 100 = 423 \text{ } \mu\text{g CARTBEQ per 100 g fried rice with tomato}$$

We need to divide by 342 to come to 'NV per g' and when we then multiply by 100 we get the nutrient value in 100 g fried rice with tomato.

**STEP 6:**

To obtain a complete nutrient profile, repeat steps 3 to 5 for all nutrients of each ingredient, except for water and the conversion factors (XN, XFA).

The water content is calculated through a specific formula (see step 7).

Take the values of the nitrogen-to-protein conversion factor (XN) or the fatty acid conversion factor (XFA) of all ingredients and calculate a weighted average according to the relative weight of all ingredients in the recipe. This can be done because conversion factors do not change through cooking.

**STEP 7:**

Calculate the water content according to the formula (Food Standards Agency, 2002):

$$\text{Water content of cooked dish per 100 g} = \frac{\text{Water in raw ingredients} - \text{weight loss on cooking}}{\text{Weight of cooked dish}} \times 100$$

Where: weight loss on cooking = weight of raw ingredients – weight of cooked dish

Taking our example, we know that 380 g raw recipe contains 280.7 g water. While frying the dish, 38 g weight was lost (indicated through YF of 0.9) which is assumed to be all water.

Example:

$$\frac{280.7 - (380 - 342)}{342} \times 100 = 70.96 \text{ rounded to } 71.0 \text{ g water per 100 g fried rice with tomato}$$

Note that water should be displayed with 1 decimal place only, therefore the result needs to be rounded.

**STEP 8:**

Now check all your calculations and formulas again. If you use a software or Excel, check that:

- formulas are correct and refer to the correct cells (to the NVs per 100 g ingredient, the corresponding yield and retention factor and correct recipe weight);
- the NVs were adjusted to the weight per ingredient;

- the sum per nutrient includes the NVs of all ingredients;
- the NV of water and the conversion factors were calculated according to their specific procedure;
- only those NVs of the cooked recipe are retained for publication for which there was no missing NVs for any of the ingredients. The exception is if the missing value is of insignificant contribution to the NV of the entire recipe; and
- no zero values were created by the system if there were no nutrient values for the ingredients.

**STEP 9:**

Document and enter the nutrient values of the cooked dish into the reference database (if the calculations were performed outside the reference database).

If you wish to carry out a real-life calculation of the nutrient values of fried rice with tomato using a simple software application (the [FAO/INFOODS Compilation Tool](#)), do exercise VIII.E4 of the [Food Composition Study Guide](#). It will take you 1-2 hours.

*Source:*

*Food Standards Agency (2002) McCance and Widdowson's The Composition of Foods (6th Summary Edition), Royal Society of Chemistry, Cambridge.*