Difference in nutrient values of recipes due to different calculation methods and sets of nutrient retention factors

U. Ruth Charrondiere, Annalisa Sivieri, Barbara Burlingame (FAO)

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Introduction

• Calculation of recipes and cooked foods can be an important part of food composition databases

• Differences exist between different recipe calculation systems and yield and nutrient retention factors

⇒ Investigation if these differences have significant impact on nutrient values of recipes

Definitions

• Yield factor (YF): % weight change in foods or recipes due to cooking.

• Nutrient retention factor (RF): % retention of nutrients, especially vitamins and minerals, in food or dish after, e.g. storage, preparation, processing, warm holding or reheating.
Material and methods

- 7 recipes were selected covering different food groups:
  - Basil Fettuccine, boiled
  - Risotto, Milanese, simmered
  - Plain cake
  - Meatloaf, baked
  - African Chicken in Peanut-Tomato Sauce
  - Black bean chili and sweet potatoes, simmered
  - Curried lentil and pumpkin soup
- Nutrient values mainly from Danish databank and some British data
- Nutrient retention factors (RF) from Bergstroem, Bognar, and from McCance and Widdowson applied at food group level
- Yield factors from Bergstroem
- 3 recipe calculation systems (Recipe, Ingredient and Mixed Methods)
- Compilation tool (developed by FAO/INFOODS)
Results – calculation method

• All recipes show similar results (independent of food groups of ingredients)
• Mixed and Recipe Methods are similar for all nutrients (within analytical variation)
• Ingredient Method significantly different NVs (higher or lower depending on difference of YF and nutrient content of ingredient)
• Differences in nutrient values of calculated recipes are less due to the calculation method than due to retention factors

Results – nutrient retention factors (RF)

• Number of RF values: Bognar >> Bergstroem > UK
• Differences in resulting NVs:
  – NV: Recipe Method (RF applied at recipe level) < Mixed Method (RF applied at ingredient level)
  – RF applied in Ingredient Method random difference to other two
• Macronutrients: same NV except protein, as only Bognar has RF for protein
• Minerals:
  – British RF: no RF => always highest NV
  – Bognar RF 0.43-1 depending on cooking method and mineral. Cause for some nutrients lowest NVs
  – Bergstroem: 0.9 if applied
• Vitamins:
  – Fat soluble retention: UK (0.8 or 1 for vit. E only) < Bergstroem (0.85 for meat or 0.5; none for vit. E or K) < or > Bognar (0.6 – 1; none for vit. K)
  – Water soluble retention: UK (0.2 -1) < Bergstroem (0.4 -0.9) < or > Bognar (0.45 – 1; none for biotin). E.g. UK lowest for folate, vitamin C; similar for vitamin B12 or 6
Discussion

• for Ingredient Method additional difficulty to find appropriate YF for each ingredient and to keep total recipe weight similar

• Bognar’s RF are mainly based on analysis (for UK and Bergstroem, origin of RF at group level are not always known)

Conclusions

• Recipe and Mixed Method provide similar NVs except where differences in RF are big (low retention results in significant lower NVs with recipe method)

• Ingredient Method provides randomly significantly different results compared to other methods

• Bognar’s RF are likely be of highest quality and available for many foods/food groups and cooking methods

⇒ Verification through analytical determination are needed to determine which method and set of RF give correct results ⇒ nutrient analysis and measurement of RF and YF of all raw ingredients and of total recipe (same food samples)