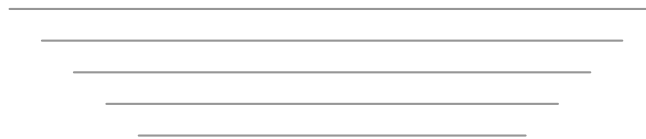


Difference in nutrient values of recipes due to different calculation methods and sets of nutrient retention factors

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



Outline

- Introduction
- Material and methods
- Results
- Conclusions



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.



Calculation methods for recipes

Ingredient Method	Ingredient 1: $NV \times 1/YF \times RF$ Ingredient 2: $NV \times 1/YF \times RF$ Ingredient 3: $NV \times 1/YF \times RF$ ----- Recipe: Sum of above
Recipe Method	Ingredient 1: NV Ingredient 2: NV Ingredient 3: NV ----- Recipe: Sum of above $\times 1/YF \times RF$
Mixed Method	Ingredient 1: $NV \times RF$ Ingredient 2: $NV \times RF$ Ingredient 3: $NV \times RF$ ----- Recipe: Sum of above $\times 1/YF$



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



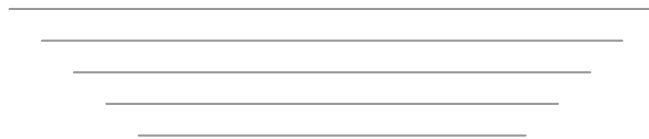
Results – nutrient retention factors (RF)

- Number of RF values: Bogнар >> 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 Bogнар has RF for protein
- **Minerals:**
 - British RF: no RF => always highest NV
 - Bogнар 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 0.9; none for vit. E or K) < or > Bogнар (0.6 – 1; none for vit. K)
 - Water soluble retention: UK (0.2 -1) < Bergstroem (0.4 -0.9) < or > Bogнар (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)

