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### ► To cite this version:

Alexia Geny, Guro Helgesdotter Rognså, Øydis Ueland, Rachel Smith, Lisa Methven, et al.. Acceptability of newly protein-fortified recipes in older adults in France. 15. Pangborn sensory science symposium, Aug 2023, Nantes, France. hal-04210018

**HAL Id: hal-04210018**

**<https://hal.science/hal-04210018>**

Submitted on 19 Sep 2023

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# Acceptability of newly protein-fortified recipes in older adults in France

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CONTEXT



To combat older adults undernutrition, public health policies advocate fortification (HAS, 2007). However, the challenge remains in developing products with nutritional benefits and satisfying sensory aspects. The present study assessed the acceptability of standard and protein-fortified variants of 6 recipes.

FORTIFIED RECIPES

Fortified recipes provided an additional load of 6.4 to 17 g of protein per portion (mean = 10.3, SD = 3.6), depending on the technological constraints.

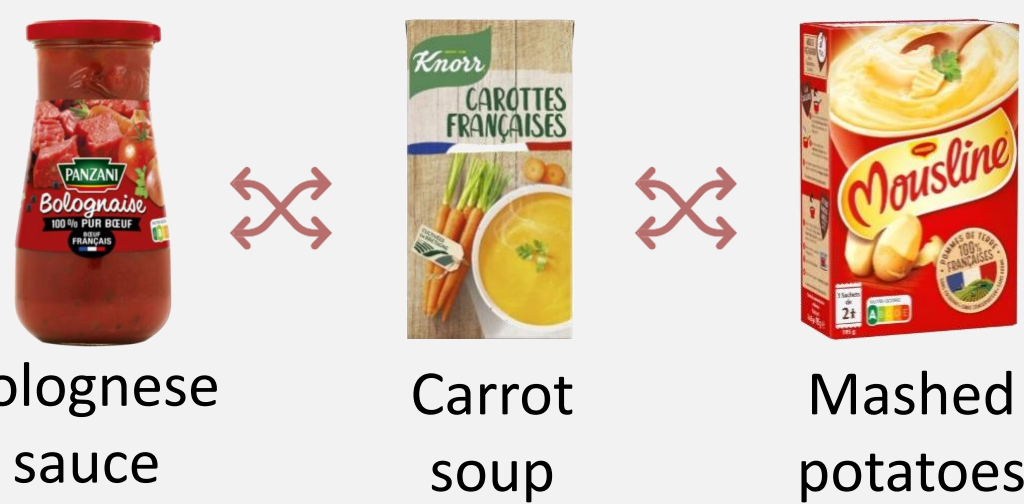
This additional load was reached by using:



METHODS

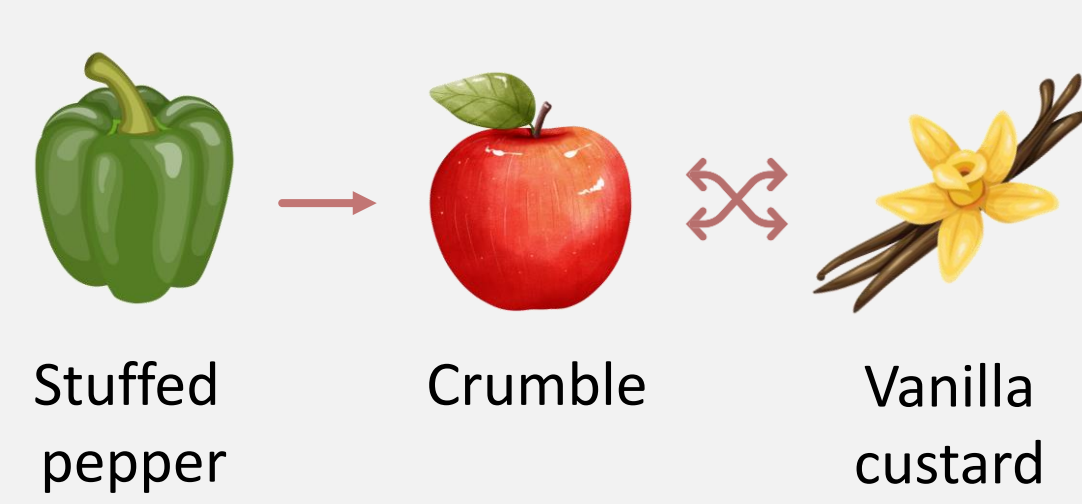
Test 1 – Ready-to-heat recipes

n=65; 51% women; age = 74.6  
monadic sequence; balanced order  
standard (STD) and fortified (FOR)



Test 2 – Cooking-from-scratch recipes

n=56; 66% women; age = 74.1  
monadic sequence; balanced order  
standard (STD) and fortified (FOR)



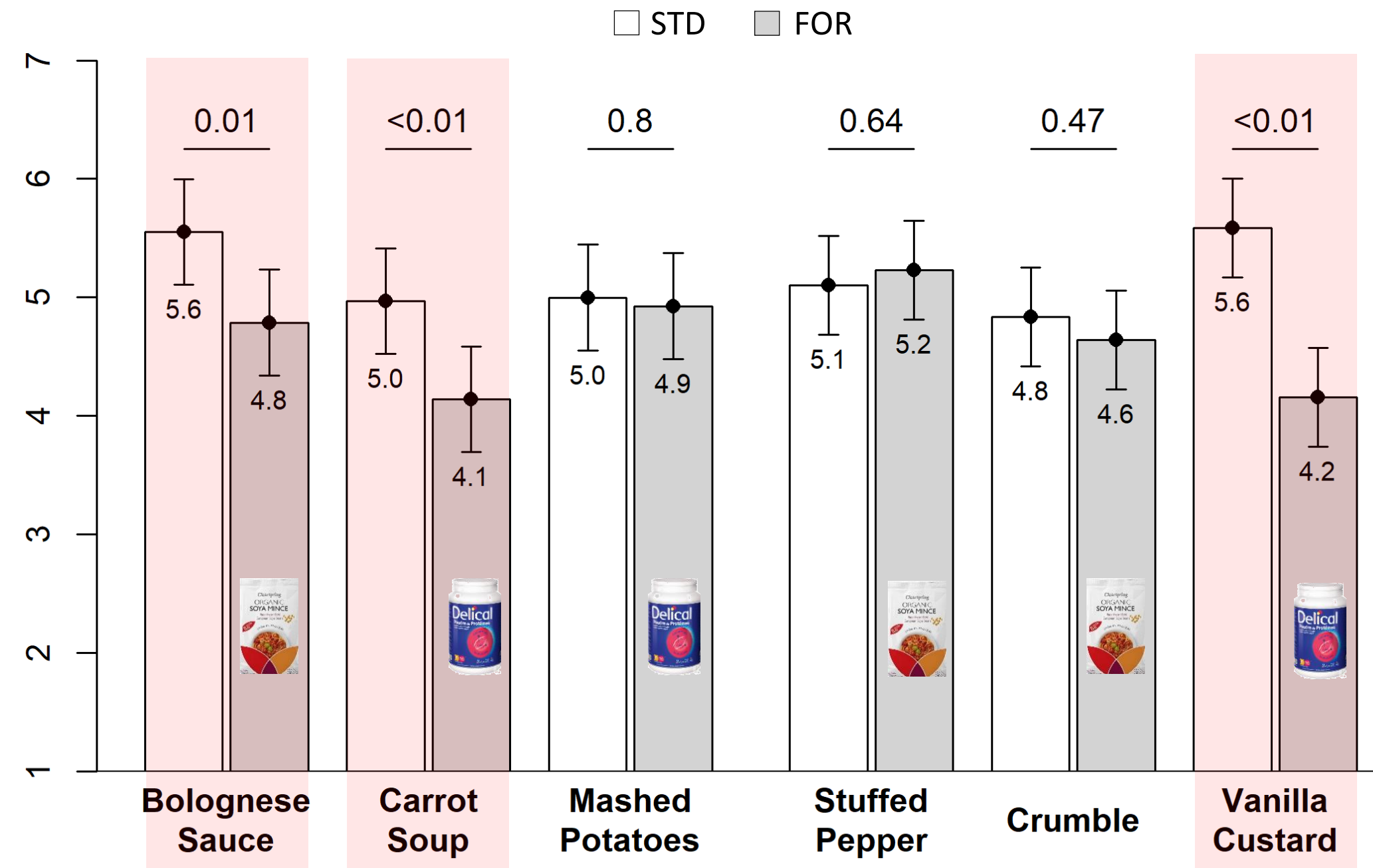
For each recipes, participants were served with the two variants (STD and FOR). Participants were not informed about the nature of the difference between the two variants.

Within each test, participants assess for each sample:

- Liking on a 7-point scale (Maître et al., 2015)
- Oral comfort on a 5-point scale (Vandenbergh-Descamps et al., 2018) chewing, humidifying, swallowing
- Check-All-That-Apply (CATA) question with 23 attributes on texture and taste

RESULTS

LIKING



Standard recipes ≥ Fortified recipes

Liking of fortified products is dependent on the matrices type (liquid to solid)



Milk protein isolate is less appreciated than soya minced extrudates, especially when incorporated into liquid matrices

1 = not liked at all; 7 = very liked; Estimation ± IC; F(recipe\*variant) = 5.30; p<0.001  
DV = recipe + variant + recipe\*variant + test + test\*variant + sex + subject

CHECK-ALL-THAT-APPLY



Citation frequency difference  
**FOR - STD**

Fortified products are significantly less light, moist, smooth, tasty, lumpier, stickier and thicker

McNemar's Chi-squared test  
Small circle: difference of 5 quotes  
Big circle: difference >30 quotes  
na : not applicable;  
\*p<0.05; \*\*p<0.01; \*\*\*p<0.001

ORAL COMFORT

FOR - STD	Chewing Range : 1.1-2.1	Humidifying Range : 1.1-2.3	Swallowing Range : 1.0-2.1
Bolognese sauce	0.8**	0.8**	0.7**
Carrot soup	0.1	0.4*	0.5**
Mashed potatoes	0.6**	0.6**	0.4**
Stuffed pepper	-0.3*	0	-0.3*
Crumble	0	0.5**	0.2*
Vanilla custard	0.2	0.3*	0.3*

1 = very easy; 5 = very difficult; Ranges are in the easy part of the scale  
Estimation differences; \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

➤ The impact of fortification on oral comfort is dependent of the recipes.



Soy minced rehydrated in water and almond powder  
Added to the ready-to-heat bolognese sauce  
→ Create lumps and decrease sauce ratio



Soy minced rehydrated in stock  
Replace partly cooked meat  
→ Moister and smaller than cooked meat pieces

➤ The more liquid recipe it is, smoother the impact of fortification is on chewing.

➤ Same trend for humidifying and swallowing: a product that is more difficult to humificate is more difficult to swallow.

CONCLUSION

Fortified recipes are never better liked than standard ones. The impact of fortification on liking is dependent on the product. Indeed, the liking difference between standard and fortified recipes is more pronounced for liquid recipes than for recipes requiring more chewing. The CATA reveals that -liquid-fortified recipes are less tasty, which can explain this result. Overall, fortification decrease oral comfort, especially for humidifying and swallowing dimensions. CATA results are going on the same direction. Finally, it would be interesting to compare this work with home-use tests where older people would prepare fortified recipes at home (non-blind condition).

FUNDING

This work received funding by the French "Investissements d'Avenir" program, project ISITE-BFC (contract ANR-15-IDEX-0003) and from ANR (ANR-20-HDHL-0003 FORTIPHY), Research Council Norway (RCN 321819), BBSRC (BB/V018329/1) under the umbrella of the European Joint Programming Initiative "A Healthy Diet for a Healthy Life" (JPI HDHL) and of the ERA-NET Cofund ERA-HDHL (GA N°696295 of the EU Horizon 2020 Research and Innovation Programme).

The authors thanks the platform CHEMOSENS (INRAE, PROBE research infrastructure, ChemoSens facility, Dijon 21000, France)

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