

Innovative pulse and cereal-based food fermentations for human health and sustainable diets

From Expectations to Experience - How Tasting Fermented Plant-Based Foods Shapes Consumption Intentions

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Sub task 4.2.3 (UCPH-lead): Consumer acceptance of innovative fermented foods



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Introduction and motivation

- Despite all planetary, societal and health benefits uptake of PB and PBFF remains limited among omnivorous Western consumers. (Graça et al., 2015; Michel et al., 2021; Onwezen et al., 2021)
- Uptake of PB and PBFF is shaped by dominant sensory norms that position animal-based products as the unquestioned benchmark (Jaeger and Giacalone, 2021; Perez-Cueto et al., 2022).
- Plant-based products are judged through a sensory lens grounded in meat-centered food cultures, which can lead to perceptions of inferiority in taste, texture, and mouthfeel (Elzerman et al., 2011; Hoek et al., 2011; Jaeger et al., 2023).
- These expectations are shaped by experiences, familiarity, and food consumption patterns, including the prominence of animal-based products in many Western diets (Cardello et al., 2022).



The sensory experience and neophobia

- Given that sensory quality is a primary driver of food choice (Collier et al., 2023), negative sensory expectations or experiences can substantially limit acceptance and repeated consumption of plant-based foods among meat-eaters (Jaeger and Giacalone, 2021).

Main research question

- The present study examines how sensory experiences of plant-based fermented foods, relate to intentions to increase future consumption of plant-based fermented foods.

Additional research question

- Food neophobia, (Pliner and Hobden, 1992), might explain hesitations to PBFF, as food neophobia has consistently been linked to lower acceptance of alternative protein sources (Barrena and Sánchez, 2013;

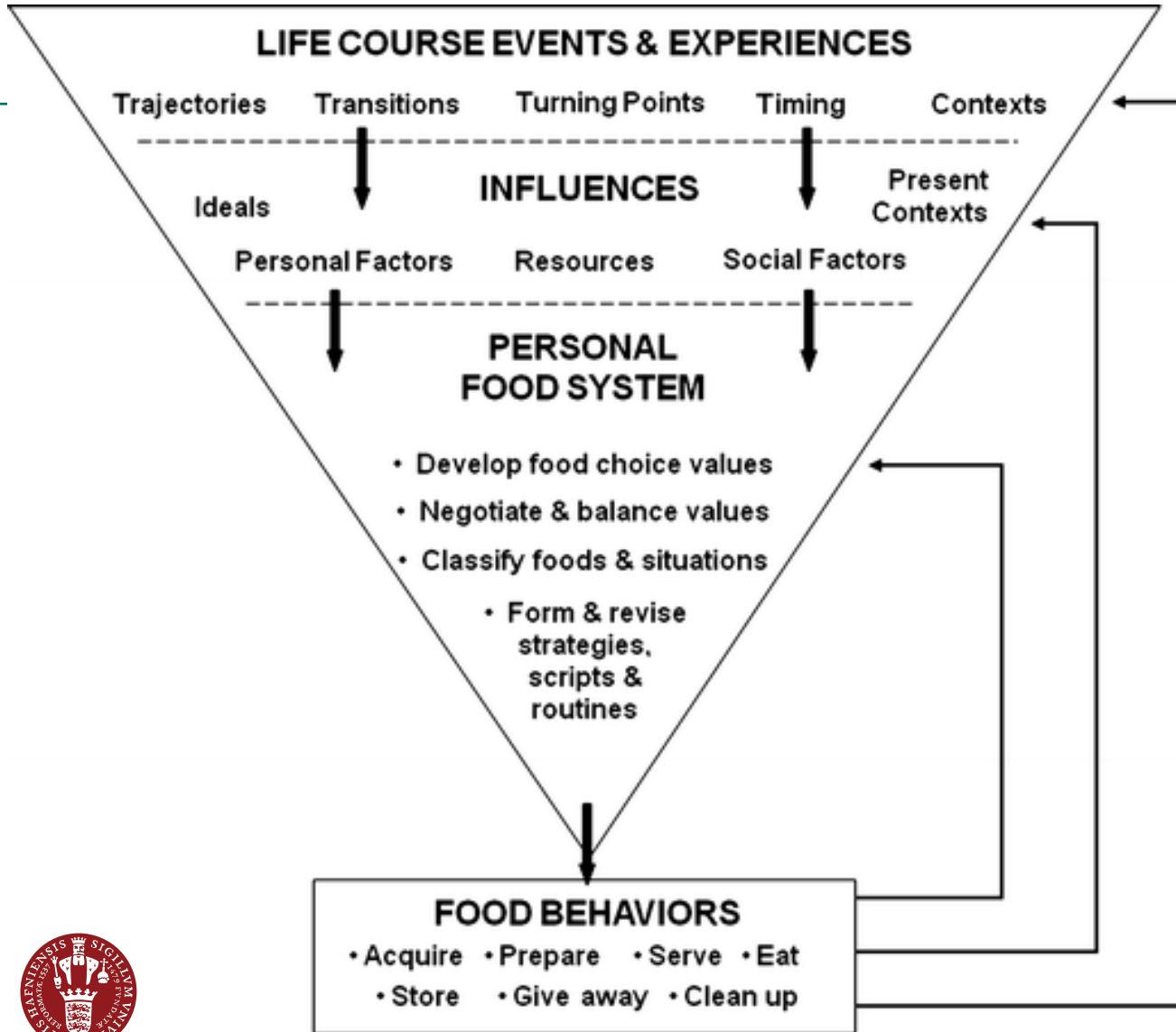
Hoek et al., 2011; Jaeger et al., 2021; Onwezen et al., 2021).



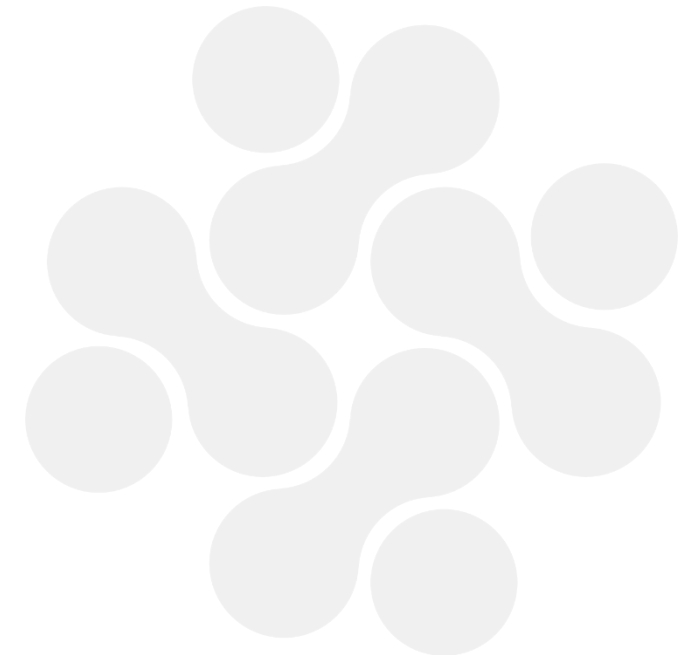
A food choice process model



HealthFerm



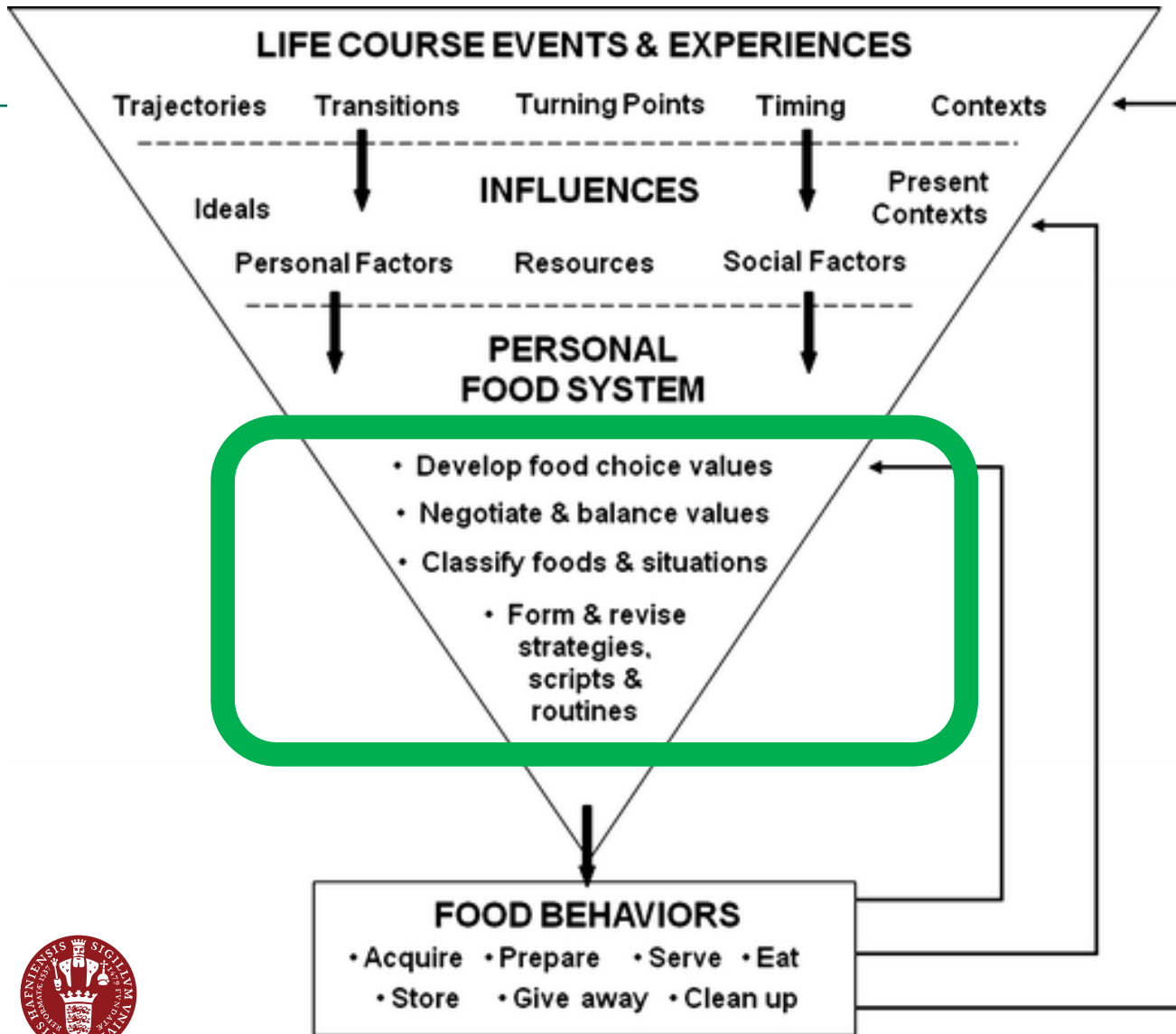
Food behaviors take place in a complex arena in interplay among a cornucopia of factors



A food choice process model



HealthFerm



Food behaviors take place in a complex arena in interplay among a cornucopia of factors

We will try to influence the personal food system with exposure to an exquisite PBFF meal experience developed by chefs from LYFE, and measure the effect it has on central parts of their beliefs around



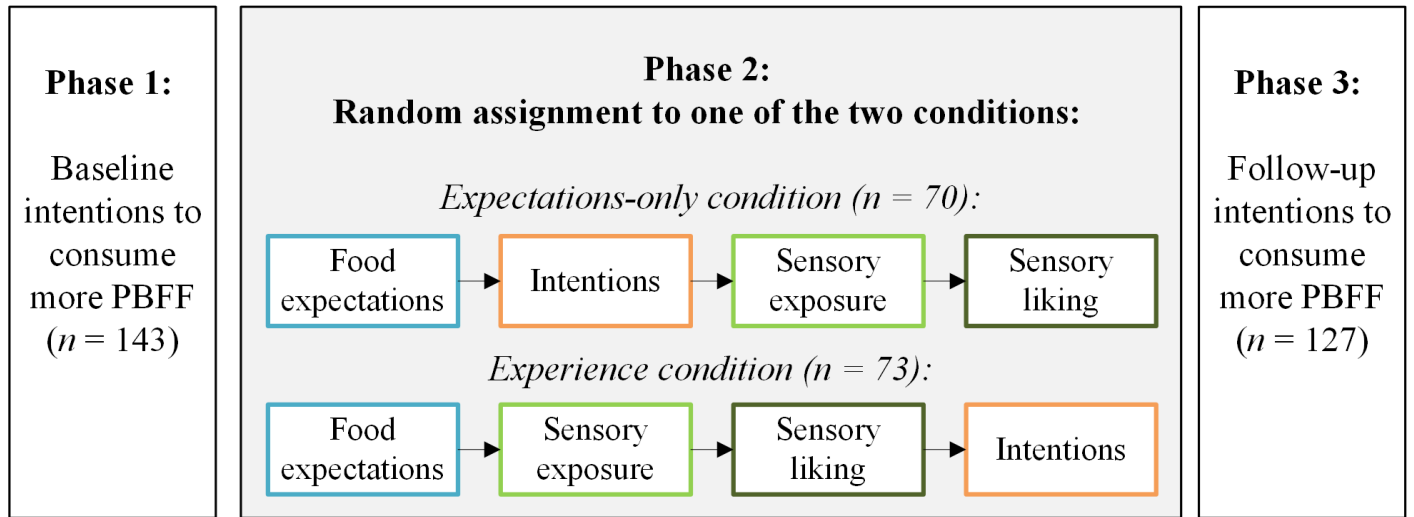
Research questions pinned out

- **RQ1:** Does reporting intentions after sensory exposure to PBFF (vs. prior to exposure to PBFF) lead to higher intentions to increase PBFF consumption, and is this effect moderated by food neophobia?
- **RQ2:** Do intentions to increase PBFF consumption change at different measurement points (pre-, during and post-experiment) depending on when sensory exposure occurs, and are these changes moderated by food neophobia?
- **RQ3:** To what extent do expectations formed prior to sensory exposure and actual sensory liking predict intentions to increase PBFF consumption, after accounting for food neophobia?



Methods overview: between- and within-subjects design

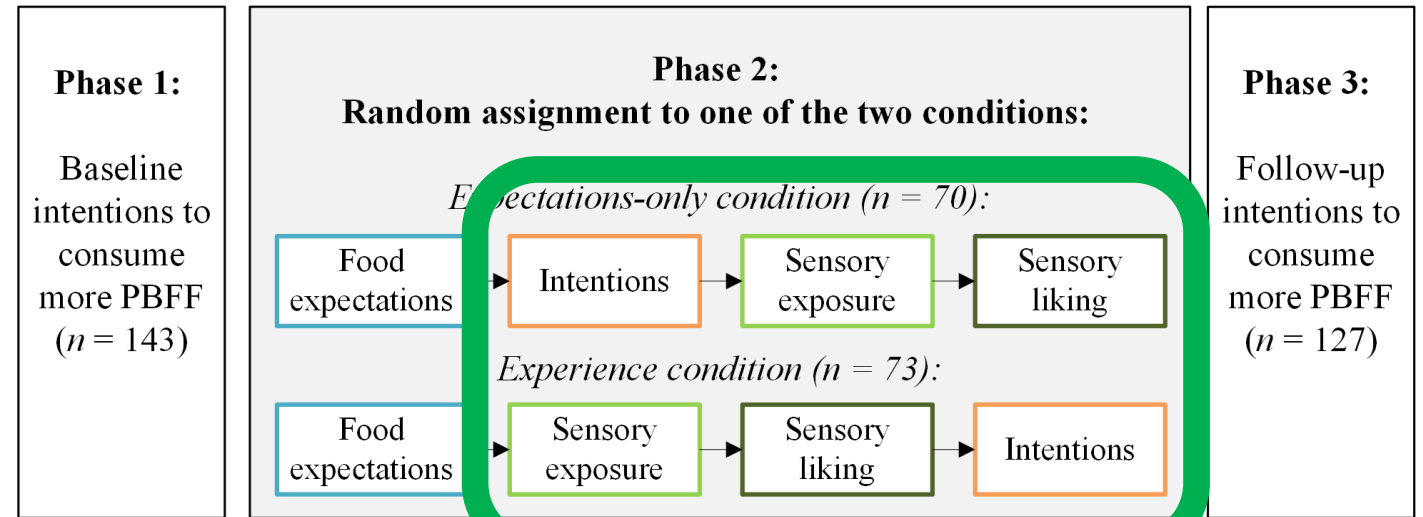
- Phase 1:
 - online, 5 min, 1 week prior to
- Phase 2:
 - 3-course dinner in lab, 16 guests/session, ca. 60 mins . Each respondent assigned to one of two conditions
- Phase 3:
 - online, 2 min, 1 week after
- Incentive
 - goodie bag worth 17 EUR



The three plant-based dishes with PBFF products: sourdough toast, plant-based fermented steak and plant-based fermented crème fraîche.

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A moment to appreciate the successful complex logistics needed for this experiment

- Materials from partners:

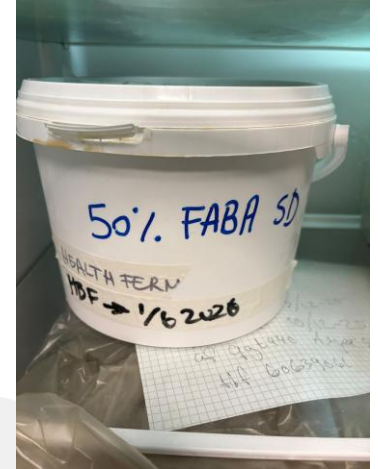
- Viable sourdough starter and fava bean flour from
- PBFF steak from **planted.**
- Oddly-good Dream Fraiche from



- Knowhow and people



- Chef Marion Esteve: Recipes and head chef
- 6 assistant chefs, 3 experimenters, 143 respondent in 11 sessions over 5 days



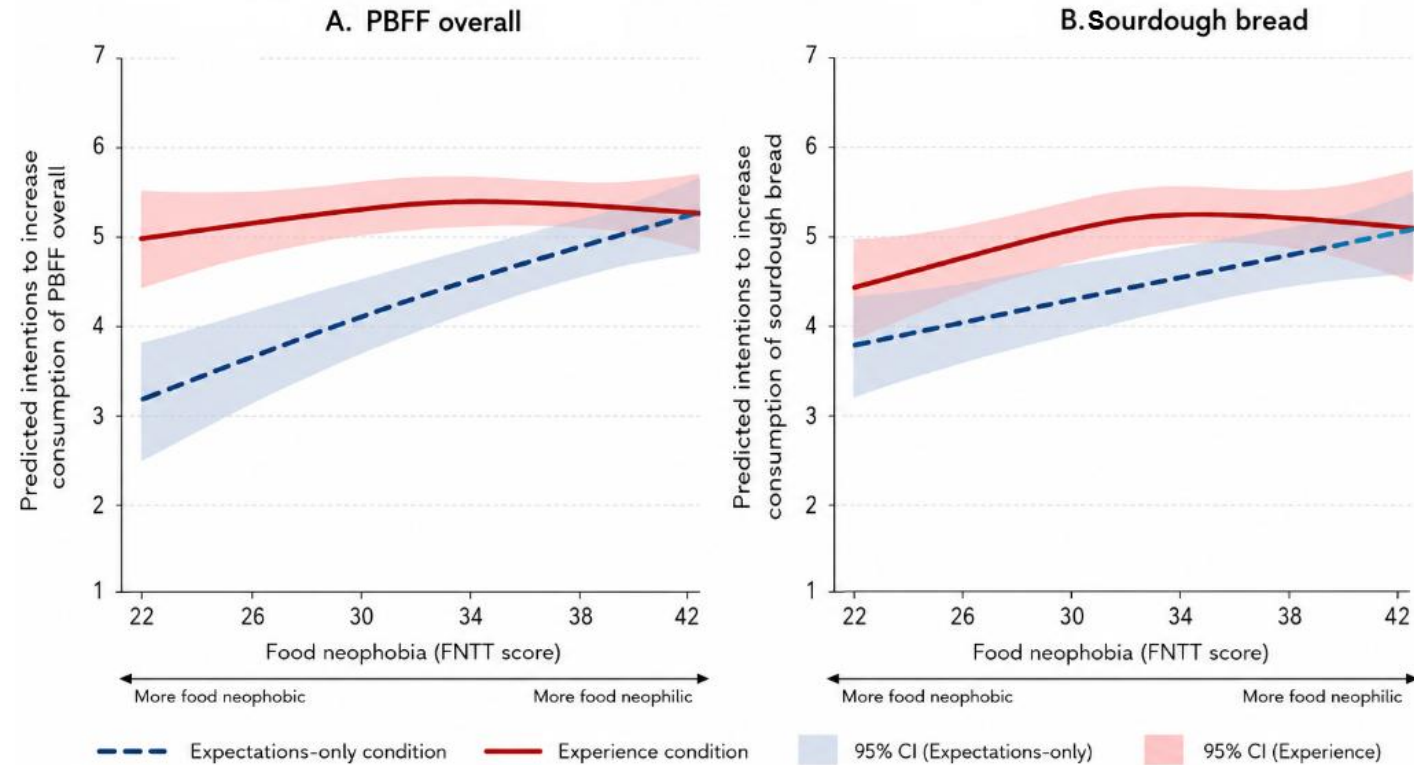
Results

RQ1: Does exposure increase intentions, and is that modulated by Food Neophobia

Overall and sourdough intentions

- No overall exposure effect
- Strong effect of neophobia
- Interaction effect

No significant hierarchical models for plant-based fermented meat nor plant-based fermented dairy



Model-predicted intentions to increase (A) overall consumption of plant-based fermented foods and (B) consumption of sourdough bread across the observed range of food neophobia for the expectations-only and experience conditions. Intentions to consume more plant-based fermented foods were measured on a 7-point Likert scale ranging from 1 (*Strongly disagree*) to 7 (*Strongly agree*). Shaded areas represent 95% confidence intervals.

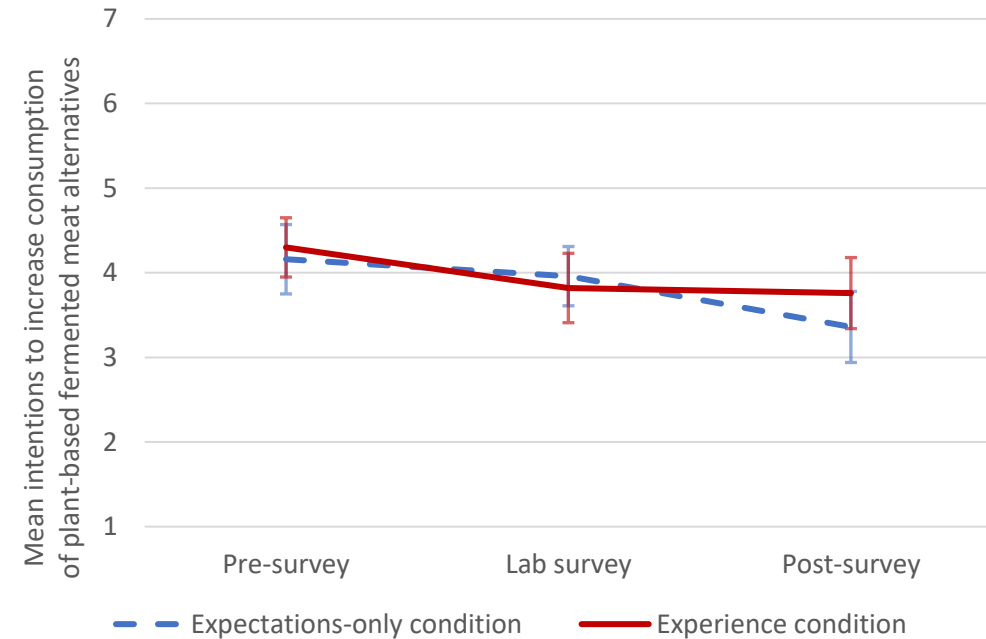
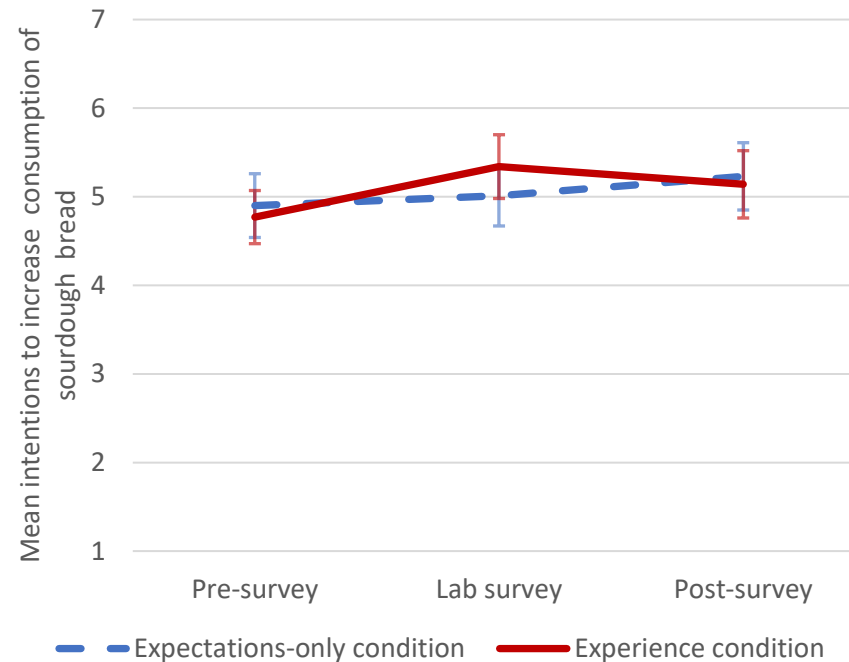


RQ2: The effect of the timing of sensory exposure on intentions to increase PBFF consumption

Sourdough and
PBF meat
affected

Not for overall
and PBF dairy

Neophobia again
strong
modulator



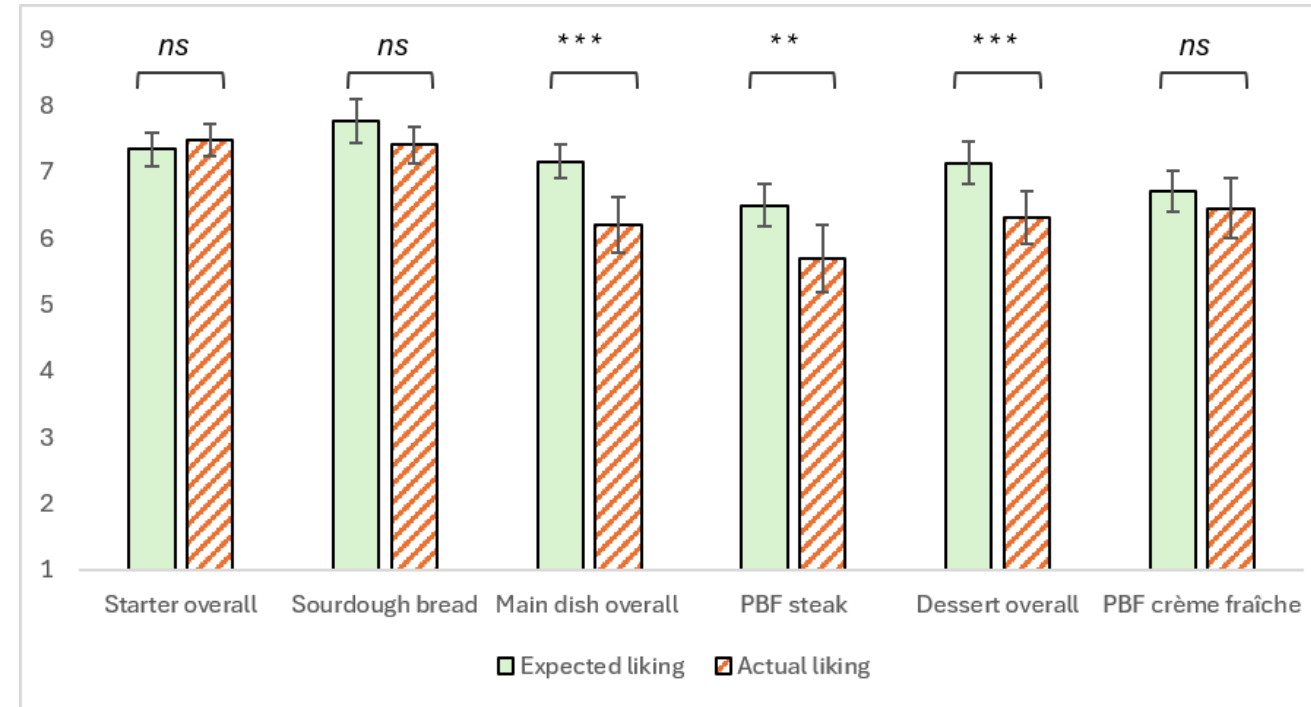
Mean intentions to increase consumption of sourdough bread (left) and PBF meat (right) measured at pre-survey, lab survey and post-survey for the expectations-only and experience condition. Responses were measured on a 7-point Likert scale ranging from 1 (*Strongly disagree*) to 7 (*Strongly agree*) with the statement "*I intend to consume more sourdough fermented bread in the next six months*". Error bars: 95% CI.



RQ3: The influence of sensory expectations and liking on intention to increase consumption of PBFF

Prediction of intentions

- Liking of sourdough, but not starter
- For PBF meat overall model predicts, but not individual predictors
- Liking of PBF Dairy strongest predictor



Expectations and actual liking of the dishes and each plant-based fermented food among participants in the experience condition ($n = 73$). Error bars: 95% CI. Asterisks indicate significant differences between expected liking and actual liking for each product (* $p < .05$, ** $p < .01$ and *** $p < .001$).



Conclusions

- Direct exposure to plant-based fermented foods, and the opportunity to evaluate these products based on sensory experience rather than expectations alone attenuate the negative effects of food neophobia on intentions to increase consumption of these foods.
- Results show that intentions are not fixed but can change once sensory input is provided. Specifically, depending on the liking of the food, intentions increased or decreased once sensory exposure to the products was available, indicating that sensory experience plays a critical role in shaping responses to novel plant-based fermented foods.
- Liking ratings were more strongly associated with intentions to increase consumption than sensory expectations. Expectations alone provide an incomplete basis for predicting consumer behavior in this context. Additionally, it seems that the effect of tastings on intentions is product-specific and have limited effect on general intentions.



- Sensory exposure is important in the promotion of plant-based fermented foods.
- Facilitating tasting opportunities may be particularly effective in reducing neophobia-related barriers and supporting the acceptance and potential uptake of plant-based fermented foods.
- Producers of plant-based fermented foods should consider taste samples and sensory engagement as part of their marketing strategies.
- Consumer interest in plant-based fermented food is not increased before satisfactory sensory properties are experienced



Thank you

- Execution
 - Chef Marion Esteve, LYFE
 - Kitchen staff/student helpers: Livia Allington, Carina Hartvig Nielsen, Amanda Nordmann Kjær, Klara Johanne Tang, Marie Brunsgaard, Jeppe Aarup Andersen
- Materials
 - Puratus, Valio and Planted
- Selection of dishes
 - Jean-Paul Garrin UMU for allowing us to select the dishes based on his tests
- 143 participants for their willingness



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