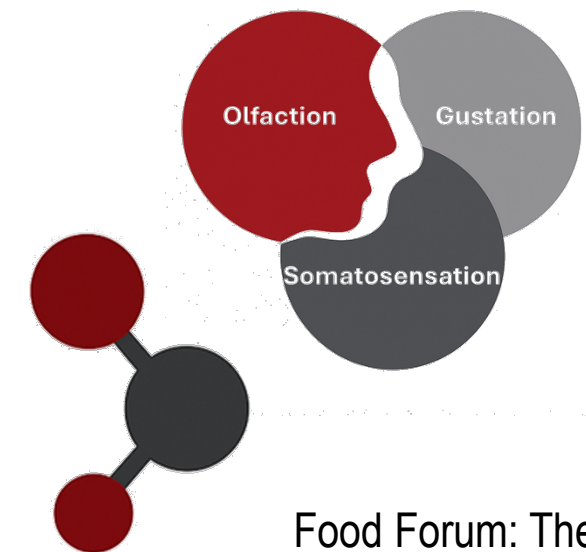


Flavor Chemistry Meets Consumer Choice: A Pathway to Healthful Diets



Devin Peterson

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Food Forum: The Role of Science, Technology, and Communication in Advancing Healthful Foods and Diets



Disclosures - Acknowledgements

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Funding



**Flavor Research and
Education Center (FREC)**

**Industry Sponsored
Research**

Food and Value



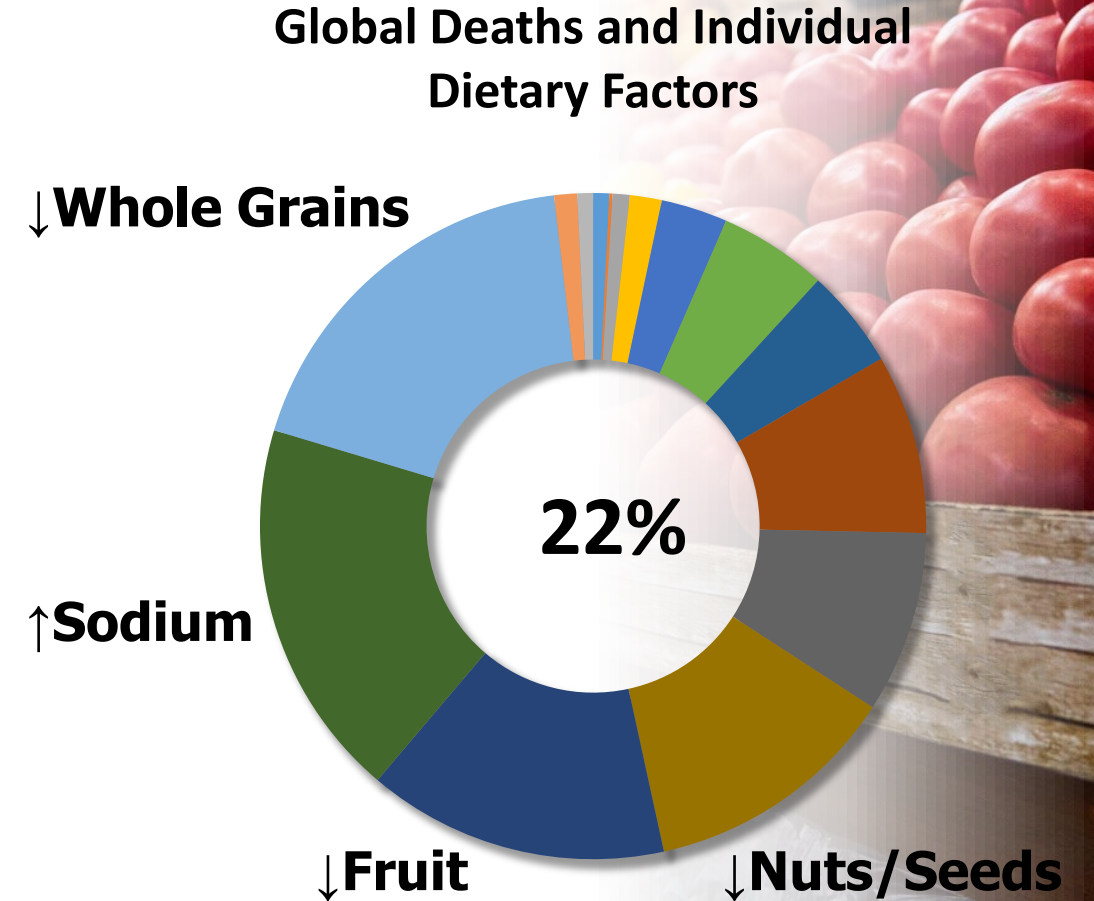
Food and Health Today

- Over the past century, deficiencies of essential nutrients have dramatically decreased

(USDA Dietary Guidelines)

- 22% of deaths are attributed to poor dietary patterns globally

(Afshin et al., 2019. *The Lancet* 393:1958-72)



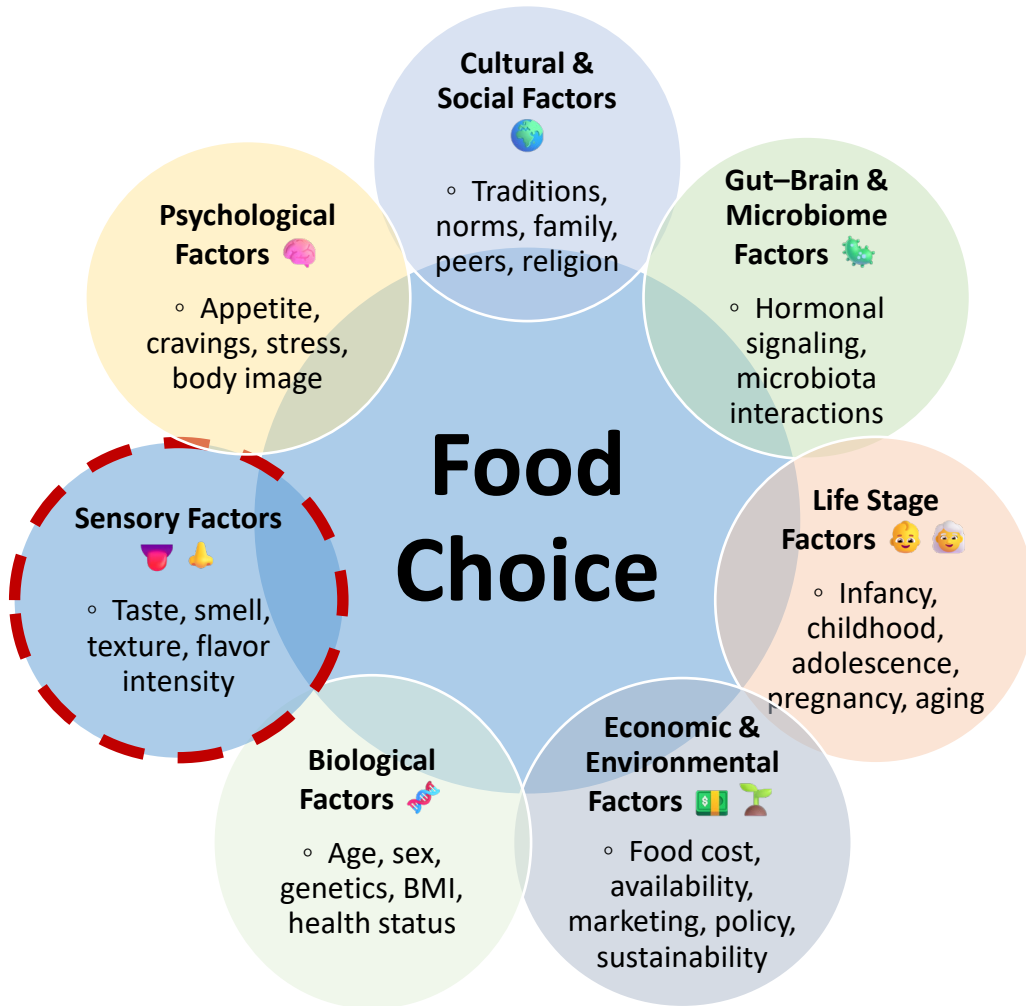
Food and Health

“We can help create a culture - imagine this - where our kids ask for healthy options instead of resisting them.”

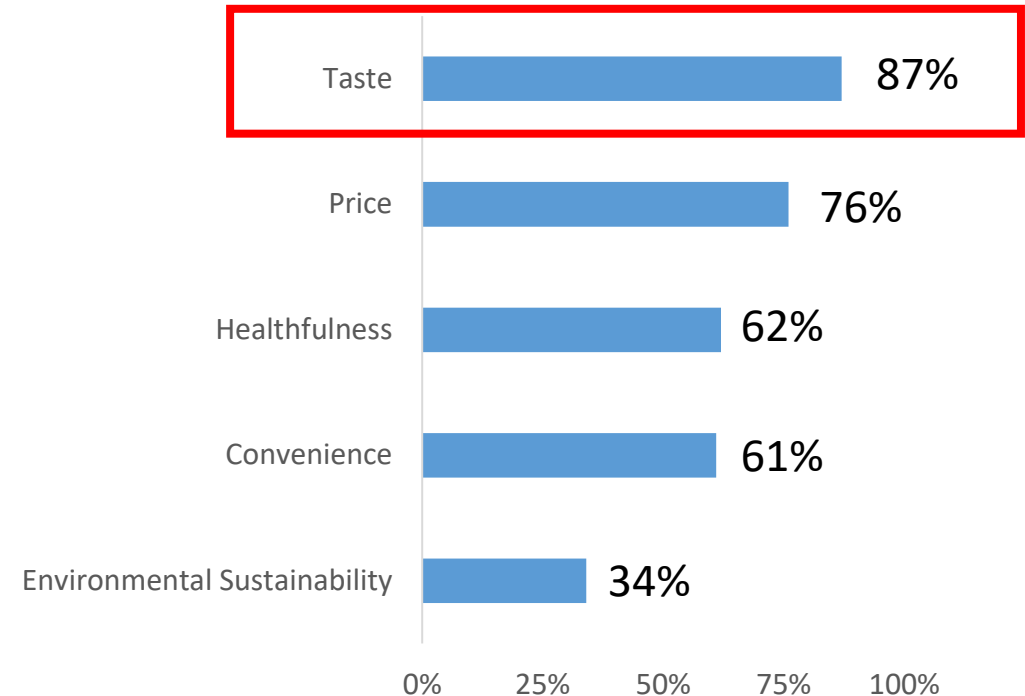
-Michelle Obama



Factors Governing Food Choice



Percentage of consumers ranking topics as top two drivers on food purchase decisions (n = 1022)



Biruete, A. et al. 2025. *Advances in Nutrition*. 16: 100531

2023 Food and Health Survey, IFIC



Negativity Bias

Humans pay more attention to (and give more weight to) negative stimuli compared to positive stimuli

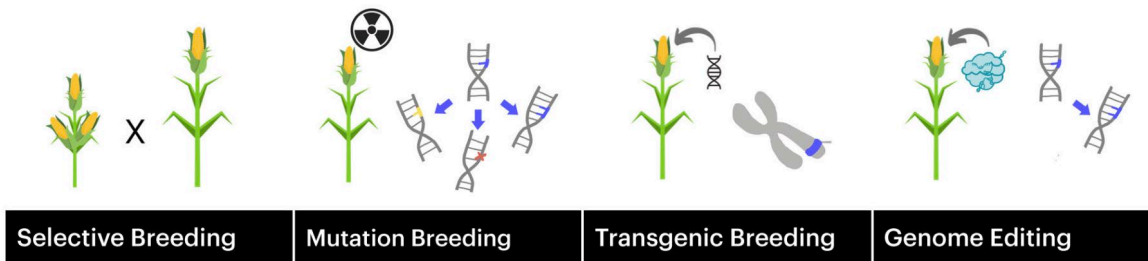


Fredrickson, B. (2009). *Positivity*

Advancements in Agriculture

Agronomic vs Consumer Traits

- Focus has been on enhancing **disease resistance** and increasing **yield** to ensure global food security
- Not on **acceptability**



Adapted image from Innovative Genomics Institute
<https://innovativegenomics.org/news/crispr-agriculture-2022/>

Manzoor et al. *Front. Genome Ed.* 6:1399051
Patil et al. 2024. *Curr Agri Res*, 12(3)



PowerPoint Stock Photo



Flavor: Multi-Modal Sensation

A holistic vision to
understand food
flavor as a driver
of **consumer
preference**

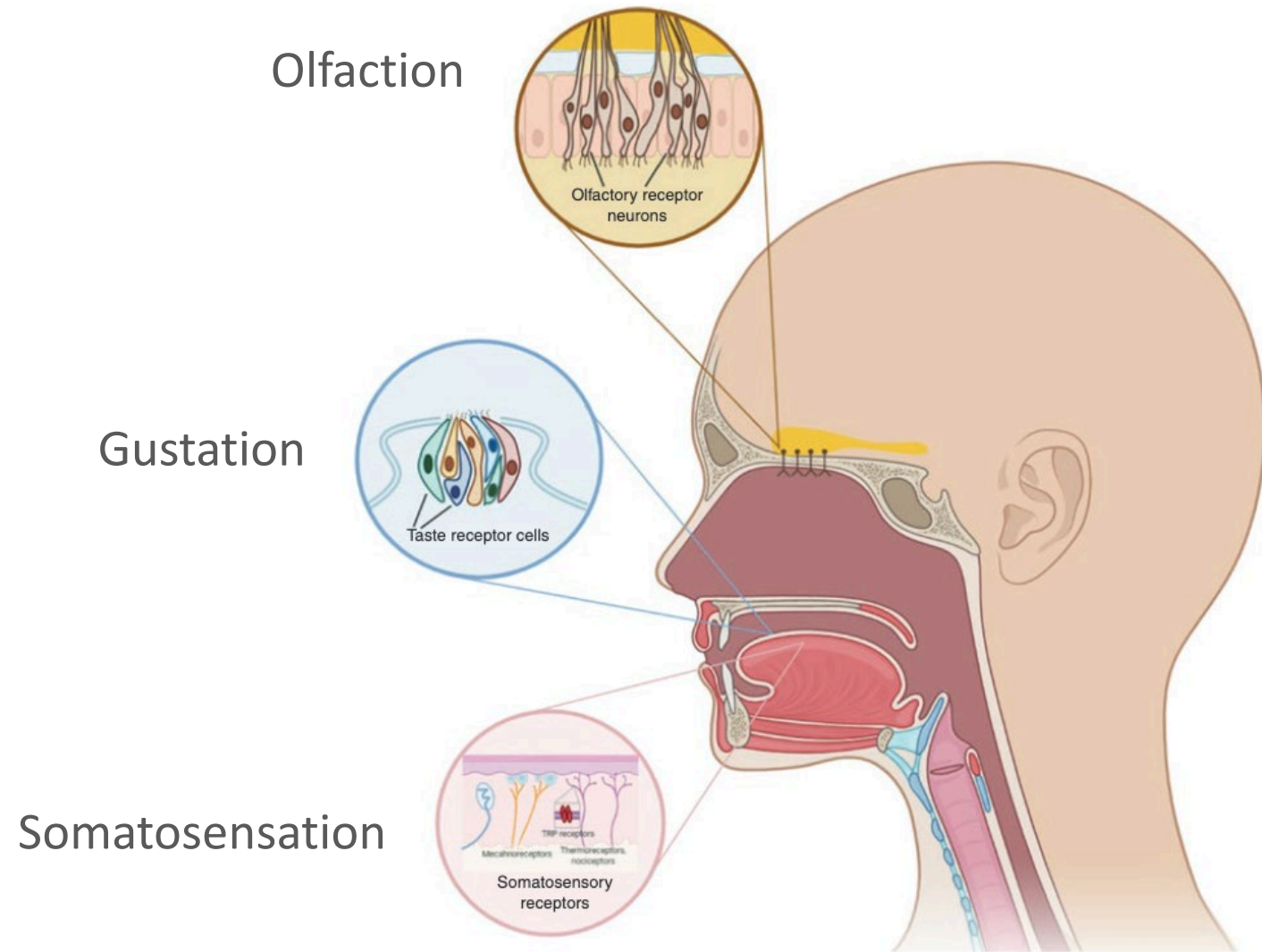
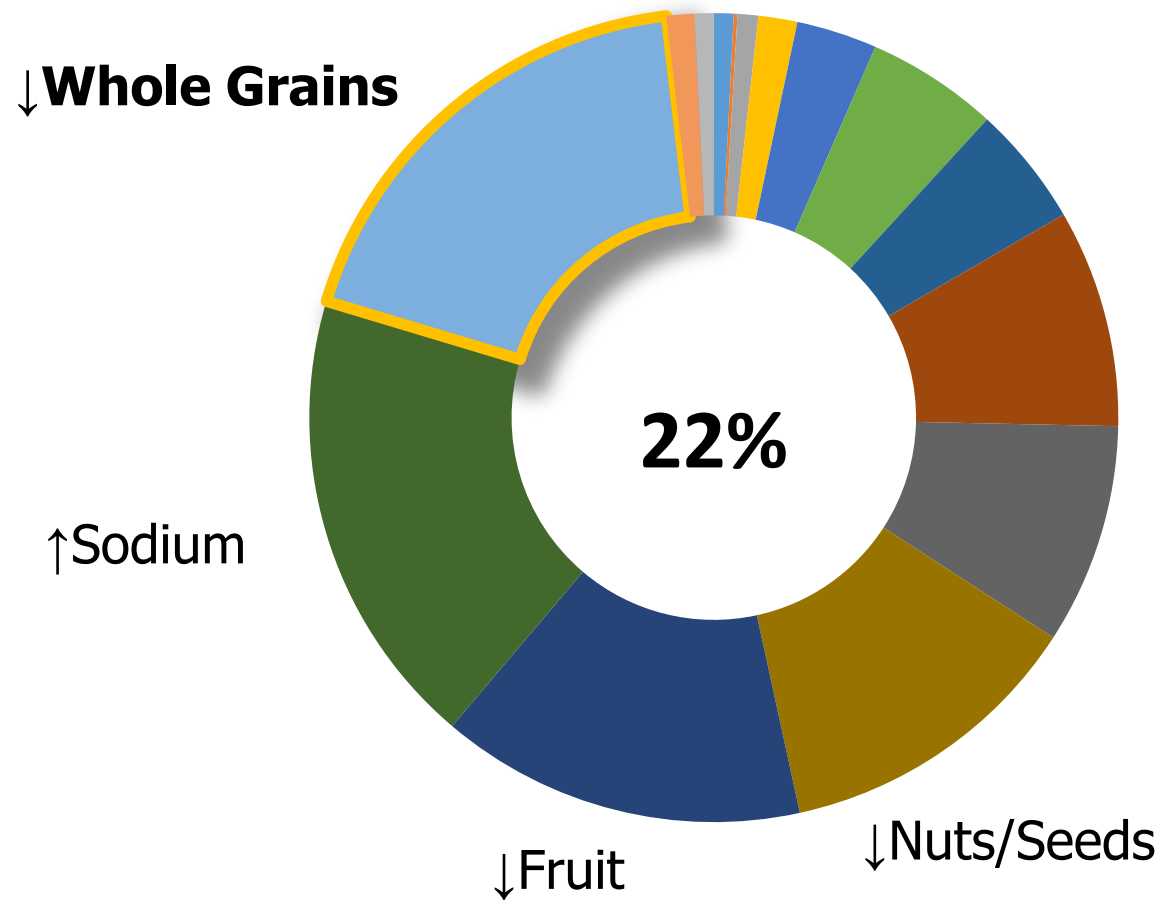


Image credit: Linne & Simons *in*: Sensory Science and Chronic Diseases. 2021



Afshin et al., 2019. *The Lancet*, 393:1958-72

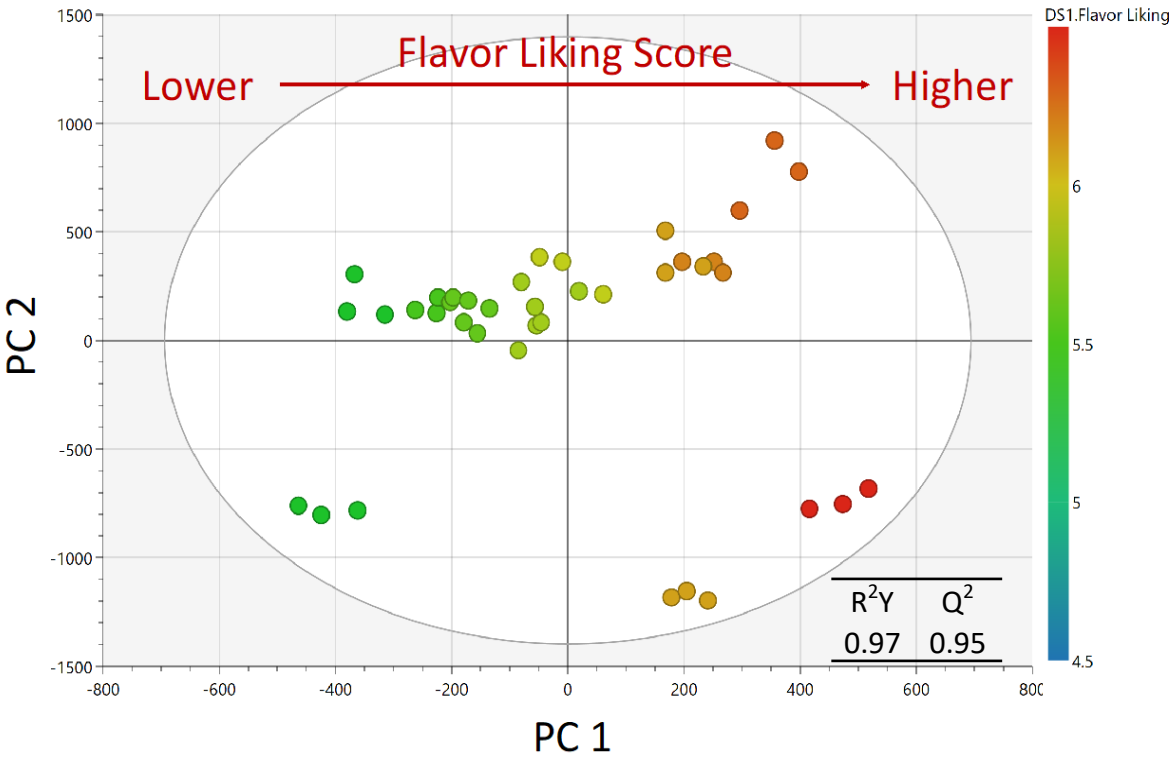
Whole Grains



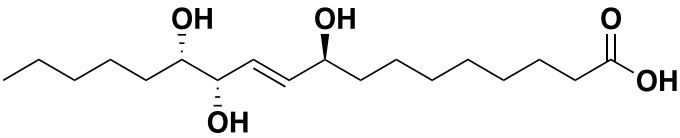
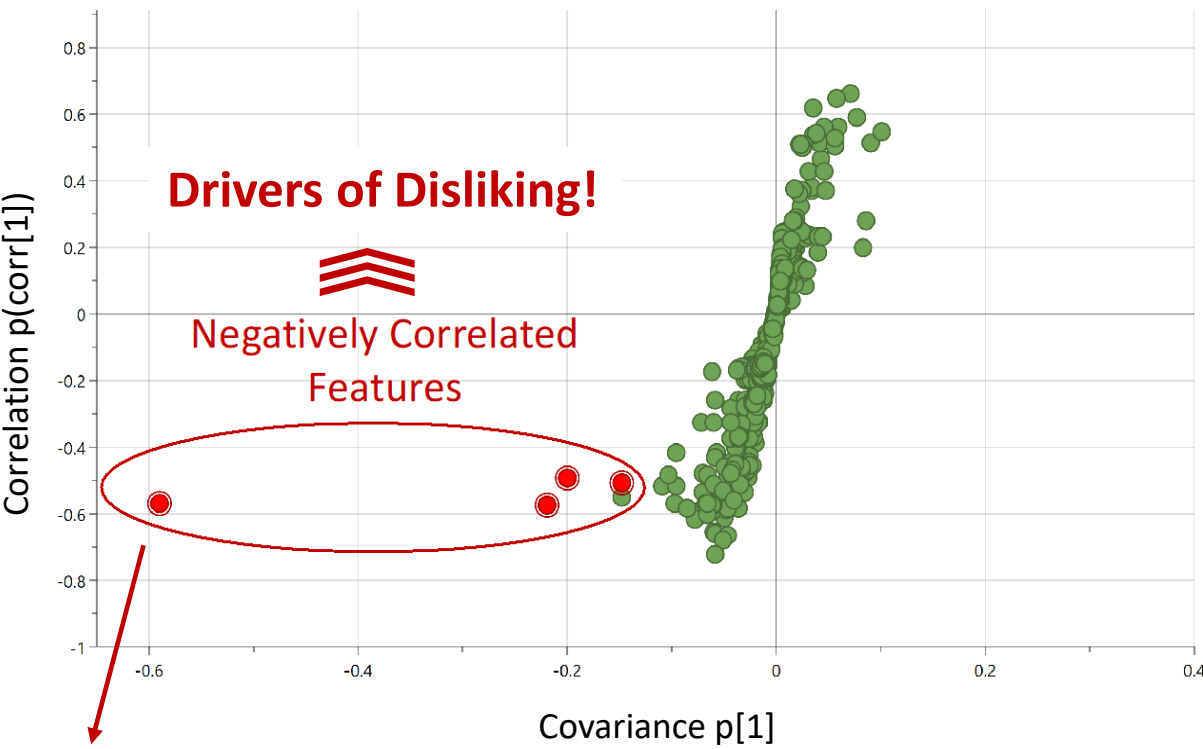


Whole Wheat Bread – Drivers of Disliking ‘Flavoromics’

OPLS Regression



S-Plot



Pinellic acid (Bitter) >>>

Conc range = 43-260 mg/kg
Threshold = 19.2 mg/L

Cong et al. 2021. Food Chem, 364:130362



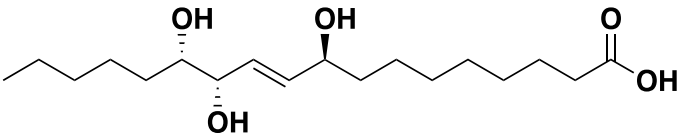
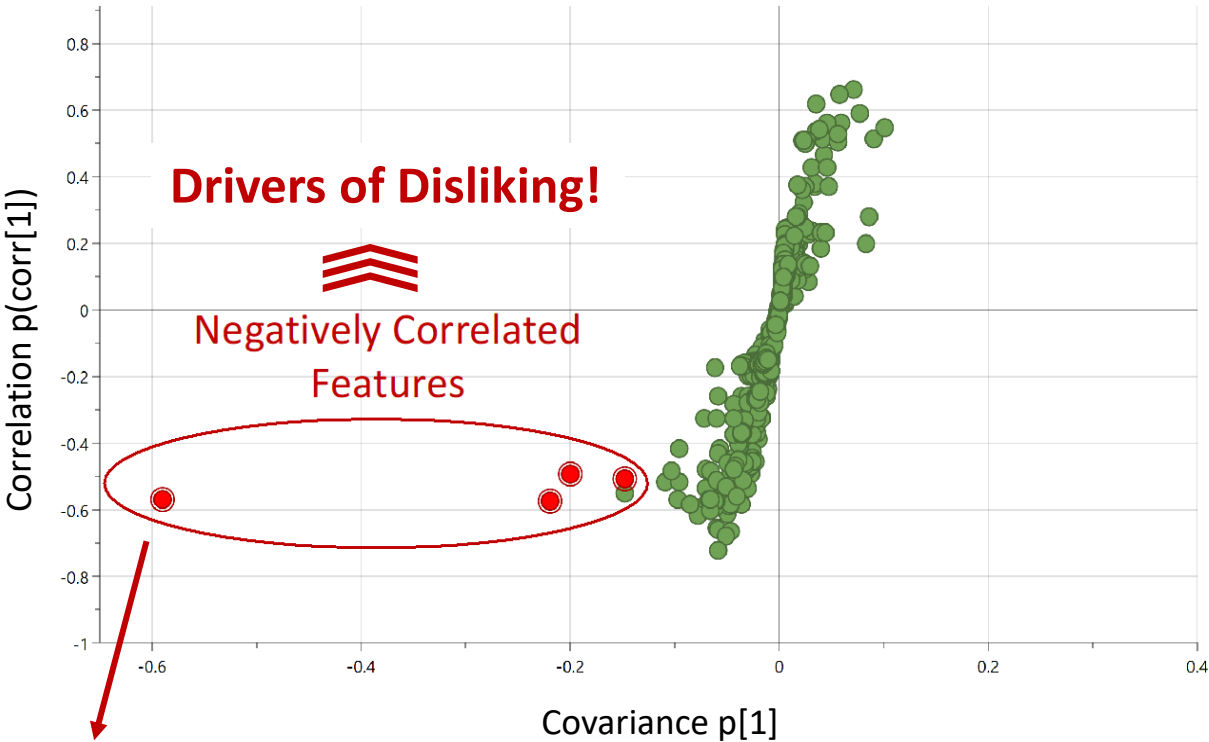
Whole Wheat Bread – Drivers of Disliking ‘Flavoromics’

S-Plot

Agronomic vs Consumer Traits

The oxylipin pathway in plants plays a critical role in stress responses and innate immunity

Eckardt 2008. *Plant Cell*, 20(3), 495–497

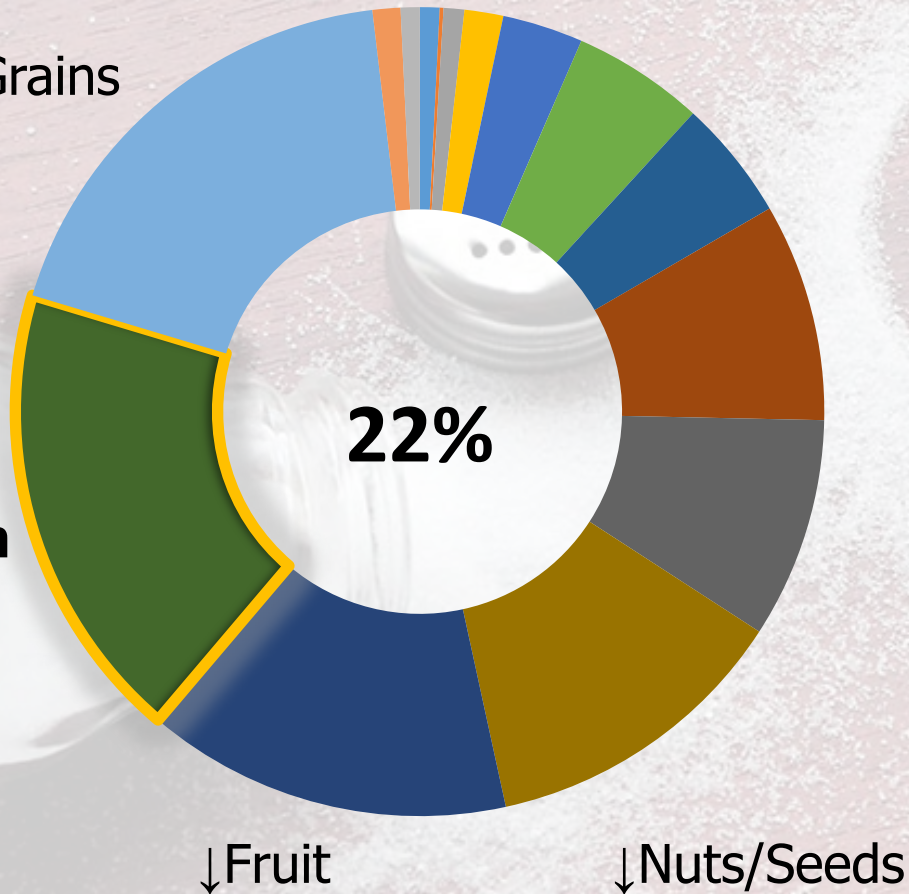


Pinellic acid (Bitter) >>>

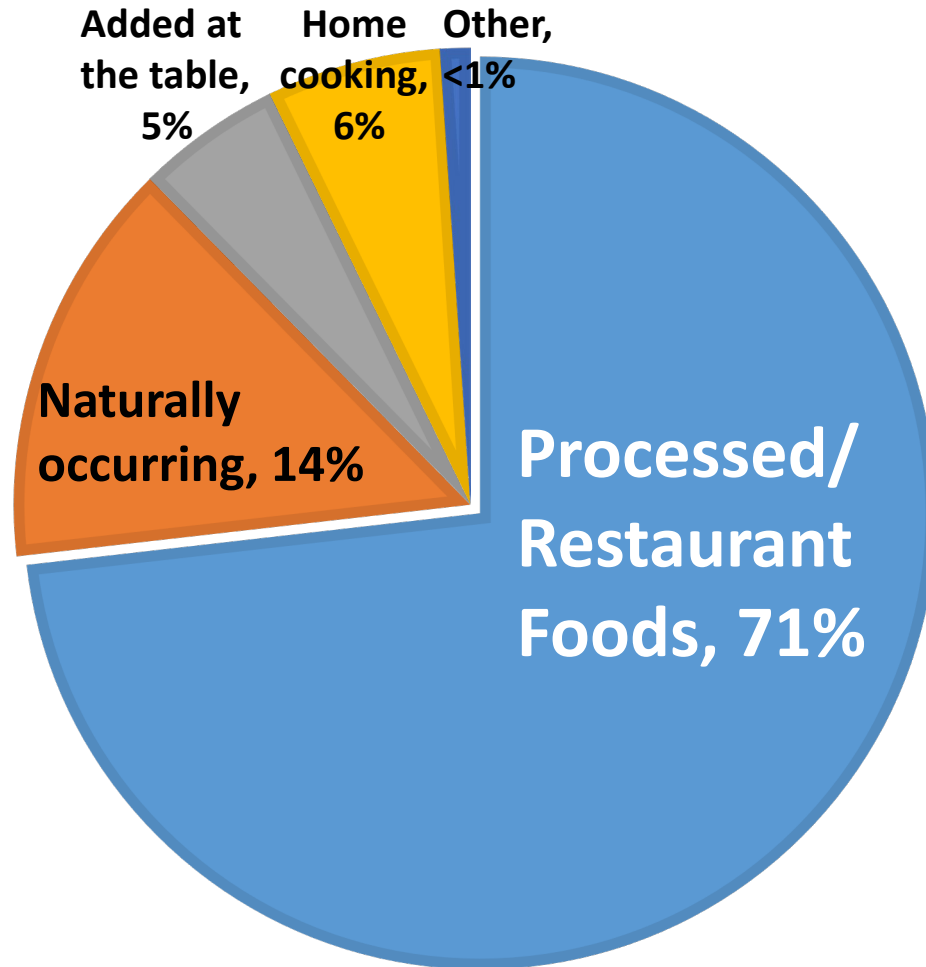
Conc range = 43-260 mg/kg
Threshold = 19.2 mg/L

Cong et al. 2021. *Food Chem*, 364:130362

Sodium Reduction



Sodium Intake in US



Average sodium intake

3,393 mg/day



~ 50% higher

Recommended limit

2,300 mg/day

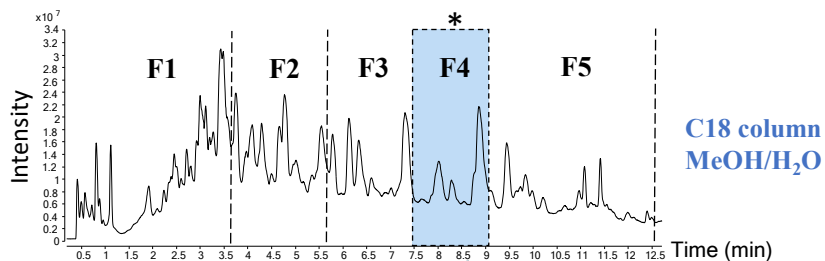
Voluntary sodium reduction goals
for industry

2,750 mg/day

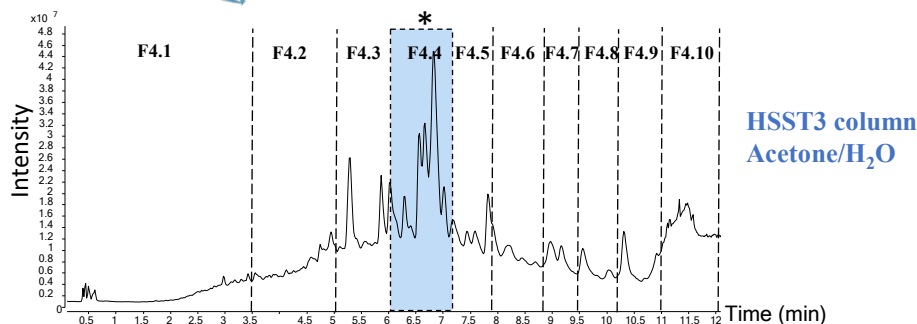
Thyme Natural Saltiness Enhancers



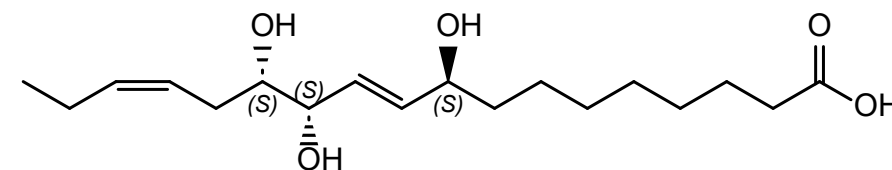
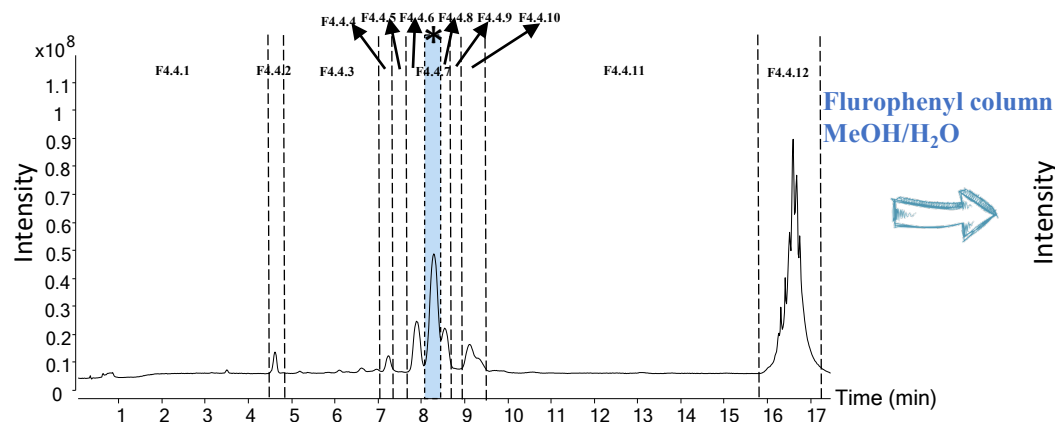
1D Fractionation



2D Fractionation

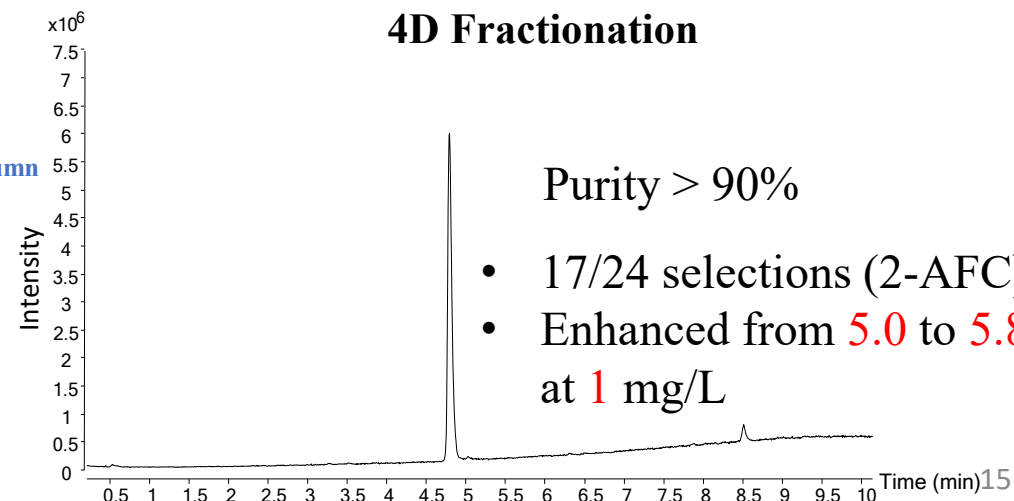


3D Fractionation



Fulgidic acid

4D Fractionation



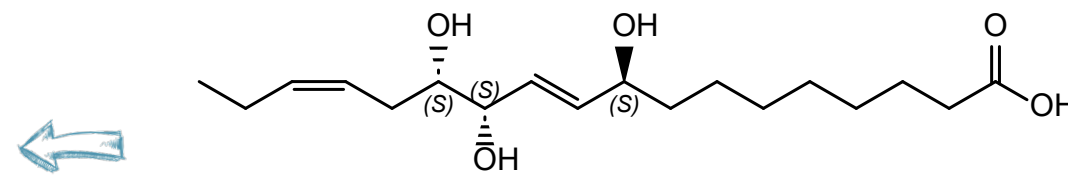
Thyme Natural Saltiness Enhancers



Agronomic vs Consumer Traits

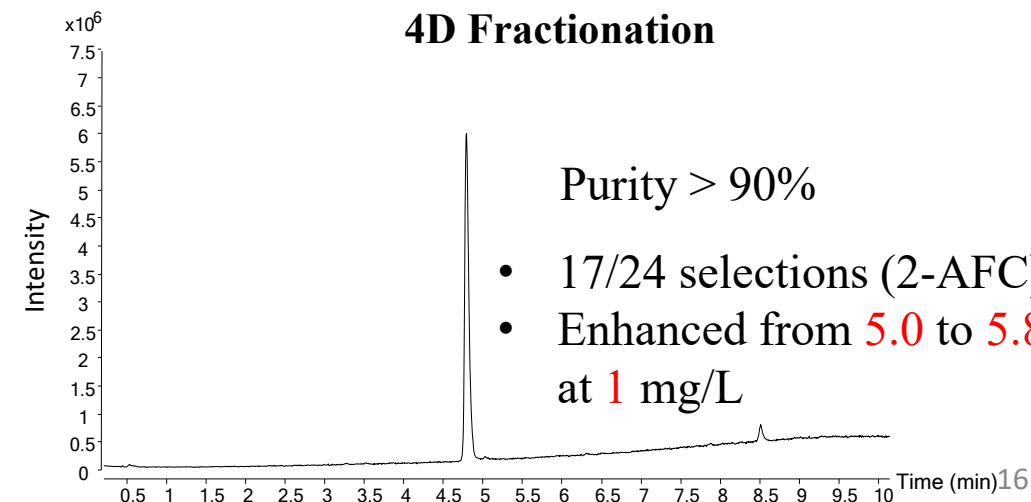
The oxylipin pathway in plants plays a critical role in stress responses and innate immunity

Eckardt 2008. *Plant Cell*, 20(3), 495–497



Fulgic acid

4D Fractionation



Takeaways

- To meet consumer needs and improve health outcomes, the food ecosystem must evolve beyond commodity-based approaches
- Food acceptance shapes formulation and dietary patterns
- Ingredient refinement and formulation (sugar, salt, fat) are tools to elevate food acceptance
- The lack of scientific investment and knowledge impedes advancing healthier food options that meet consumer demands



The Team - Behind the Science

Multicultural team:

1. Nigeria
2. Colombia
3. Mongolia
4. Egypt
5. China
6. USA
7. South Korea
8. India
9. Canada

Research Staff



Dr. Edison Tello

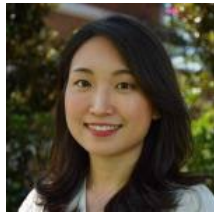


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Swetha Sarangarajan



Joshua Otugbeikwu



Ruiya Bao



Dr. Vince Yang



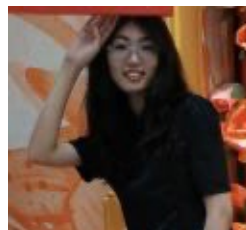
Elizabeth Hochberg



Stephanie Almquist



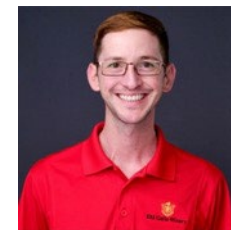
Isabel Gugger



Meihui (Mia) Pian



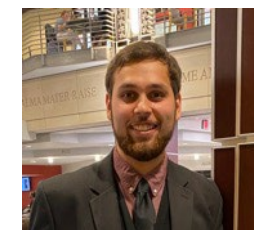
Zhifang (Lexie) Xie



Taylor Lee



Bishoy Abib



Kaden Havener



Thank you



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