

The role of serum properties in juiciness perception of plant-based meat analogues

Yifan Zhang¹, Guido Sala¹, Elke Scholten¹, Markus Stieger^{2,3}

¹ Physics and Physical Chemistry of Foods, Wageningen University & Research, Wageningen, the Netherlands

² Food Quality and Design, Wageningen University & Research, Wageningen, the Netherlands

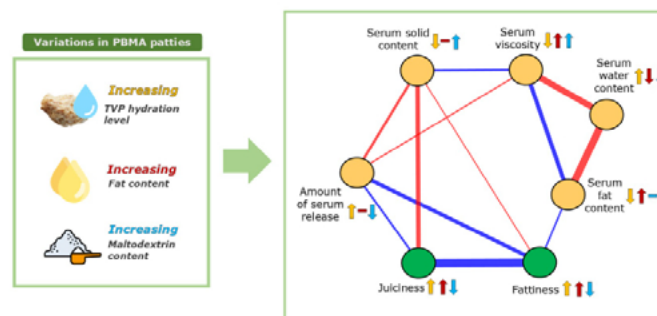
³ Division of Human Nutrition and Health, Sensory Science and Eating Behavior, Wageningen University & Research, Wageningen, The Netherlands

yifan2.zhang@wur.nl

Plant-based meat analogues (PBMA) play a crucial role in driving the protein transition, but their market growth is hindered by sensory limitations. In particular, a lack of juiciness and fattiness remain major barriers to consumer acceptance. Previous studies showed that these attributes correlate strongly with the amount of released serum (expressible fluid) during mastication. However, the role of serum properties on those attributes still remains unclear. This study aimed to reveal the separate effects of serum quantity, composition and viscosity on the perception of PBMA patties, identifying the mechanisms behind juiciness and fattiness. Serum properties were varied by altering the hydration level of textured vegetable proteins (TVPs), fat and maltodextrin content of raw patties. This resulted in quantity of released serum ranging from 8 to 20 %w/w, fat content from 12 to 65 %w/w, and serum viscosity from 6 to 360 mPa·s. These variations allowed us to identify which parameters contributed most to different sensory attributes. While serum quantity strongly influenced perception, serum composition also played a role. Especially, fattiness was driven by the content, while juiciness remained unaffected. By using network analysis via undirected graphical models (UGMs), we were able to verify that this effect was not related to viscosity enhancement of fat droplets, but mostly through other effects, such as lubrication. We will further discuss how juiciness and fattiness thus arise from different mechanisms, and how these attributes may be modulated.

Keywords:

Plant-based meat analogues, juiciness, fattiness, rheology, texture



Graphical abstract

References:

- [1] Zhang, Y., Brouwer, R., Sala, G., Scholten, E., & Stieger, M. (2024). Exploring relationships between juiciness perception, food and bolus properties of plant-based meat analogue and beef patties. *Food Hydrocolloids*, 147, 109443. <https://doi.org/10.1016/J.FOODHYD.2023.109443>.
- [2] Zhang, Y., Sala, G., Scholten, E., & Stieger, M. (2024). Role of bolus properties in dynamic texture perception of meat analogue and beef patties: Juiciness is driven by serum release during early stages of mastication. *Food Hydrocolloids*, 157, 110450. <https://doi.org/10.1016/j.foodhyd.2024.110450>.