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Effect of mechanical contrast on sensory perception of heterogeneous liquid and semi-solid foods

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An increase in food palatability can often be achieved by adding texture contrast into homogeneous products. The presence of contrasting textures within a single bite is often liked since it provides an intra-oral variation of the sensory stimulus (e.g. creamy yoghurt with crunchy cereal pieces). In composite foods with embedded particles, the relation between different mechanical properties of the dispersed and continuous phase along with the sensory and hedonic perception remains unclear. This study investigated the influence of size and mechanical properties (hardness) of dispersed particles present in liquid and gelled food matrices on sensory perception and hedonic response. κ-carrageenan particles varying in size (0.8, 2.4, 4.2 mm) and hardness (fracture stress, σF, of 25, 100, 250 kPa) were added at a volume fraction of 15 w/w% to liquid, starch-based model soups and semi-solid, protein-based model gels. A Rate-All-That-Apply (RATA) method with untrained panellists (n=54) was performed to characterize the sensory profile of all samples. Additionally, they evaluated liking for all samples. Both size and hardness of the added κ-carrageenan particles significantly influenced the sensory perception of the soups and gels. The particle size mainly affected the type of descriptors selected, while the hardness of the particles determined the intensity of the selected descriptors. Soups and gels with small particles (0.8mm) were perceived mainly as gritty, whereas products with medium particles (2.4mm) were perceived mainly as beady. Increasing the particle size to 4.2mm caused a perception of lumpy and heterogeneous sensations. Attributes such as creaminess and chewiness were seen to depend on the hardness of the particles. We conclude that hardness and size of embedded heterogeneities can significantly tune the sensory product profile of model soups and gels. The approach of texture contrast could be used to design new foods with a certain desired sensory perception.