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Elucidating the relative effects of sensory modalities on fat perception, and investigating the relationship between fatty acid sensitivity, fat perception and preference

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Fat can be perceived through mouthfeel, odour and taste. The influence of each modality on fat perception remains undefined. Fatty acids are oral stimuli and individual sensitivity to fatty acids varies¹. The association between fatty acid sensitivity, fat intake and preference has been studied^{1,2}, but limited studies associate this to fat perception in real foods. This study examines this association and the effects of each modality on fat perception.

Two sub-studies conducted. In Study 1 (n=46), fat intensity was assessed in milk/cream of five fat levels. Rating was done under four conditions: mouthfeel-odour masking, odour masking, mouthfeel masking and no-masking. Mouthfeel masking was achieved using thickener and paraffin, odour masking using nose-clips. Fatty acid sensitivity was measured by a staircase 3-AFC method using milk containing oleic acid (0.0088%-0.89%w/v). In Study 2 (n=51), fat levels in rating were extended to 7 and a 2-AFC discrimination test was used to confirm discrimination. Food preference and frequency questionnaires assessed food liking and intake.

Fat intensity was rated higher without nose-clips ($p < 0.0001$), implying that odour enhanced fat perception. Samples with mouthfeel-masking were rated higher, showing that increased viscosity and lubricity increased fat perception ($p < 0.0001$). Participants could distinguish fat levels when limited to the “taste” modality in rating and 2-AFC-test.

High-fat likers (HFLs, n=36) and dislikers (HFDs, n=14) were identified from the preference questionnaire. HFLs presented higher liking of 22 high fat foods ($p < 0.05$), and higher fat ($p = 0.026$). They presented lower perceived fat intensity under “taste” modality ($p < 0.05$), but no difference found in “overall” intensity, nor in oleic acid sensitivity.

Mouthfeel and odour can enhance fat perception. Fat levels can be discriminated based on taste. Individual’s preference to high-fat foods varies and it could influence the fat consumption. Moreover, this may be driven by oral fat perception.

¹Stewart, et al. (2011) *Clin Nutri* 30:838-844.

²Martinez-Ruiz, et al. (2014) *Physiol Behav* 129:36-42.