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UNIVERSITY & RESEARCH

Sensory database

Background information & context

Profiling the basic tastes and fat sensation using a trained sensory panel (SVT study)

Version 4

Agrotechnology &
Food Sciences Group

DATE
December 16, 2020

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1. Introduction

In the SVT (Smaak, Vet en Textuur) study we profiled the perceived intensities of the 5 basic tastes, i.e. sweet, salt, sour, bitter and umami, as well as fat sensation for 627 foods. Panellists were trained to evaluate the taste intensity and fat sensation using a modified Spectrum™ method (see appendix I-II). The solutions and foods have pre-defined anchors on a visual analogue scale. Using the Spectrum™ method, panellists have a similar frame of reference by which they evaluate foods (Meilgaard et al., 2007). To monitor the performance (discriminatory power, agreement and reproducibility) of the panellists, 8 control foods were profiled every 6 weeks. The paper describing the detailed data collection is: Teo et al., 2018. Below a summary of the data collection is given.

2. Methods

2.1 Subjects

Fifteen panellists were selected based on taste recognition, taste discrimination, mental concentration and sensory profiling abilities. The panel included 12 women and 3 men; aged between 20-50 years old, with a BMI between 19.1-27.6 kg/m² and no medication or health issues.

2.2 Training and scale, reference foods

The training procedure has been described in more detail elsewhere (van Stokkom et al., 2016). Panellists received intensive training for a minimum of 63 hours in total, over a period of six months by means of reference solutions, modified products and several food products per basic taste. The reference solutions contained increasing concentrations of chemicals based on the basic tastes, i.e. sucrose for sweetness, sodium chloride for saltiness, citric acid for sourness, caffeine for bitterness and monosodium glutamate (MSG) for umami. For fat sensation only reference foods were selected, using a linear scale from ‘not intense at all’ to ‘extremely intense’. The definition of fat sensation was obtained by consensus of the panellists. During the profiling phase of the study, 25 reference products were provided on request of the panellist (see Appendix II).

2.3 Selection of foods for profiling

Foods (N=627) were selected based on food consumption data from the Dutch National Food Consumption Survey (DNFCS 2007-2010; van Rossum et al., 2011). The DNFCS provides information on dietary intake based on 24-hour recalls (in duplicate). Dietary intake of adults between 19-50 years old was used (N=1,402). The mean age of participants was 33 ± 9 years old, with a BMI of 25 ± 5 kg/m², 704 were male and 698 were female. NEVO codes were selected based on consumption frequency, and contribution to the consumption of energy, macronutrients and sodium. In addition, NEVO codes were selected that explained most of the variation in energy intake of individuals. Expert knowledge from research dietitians was used for the selection of brands and standardization of preparation and serving methods. The twenty-three food groups were obtained from the Dutch Food Composition Database (RIVM, 2011). Products tested were given a unique food code, which was based as much as possible on the NEVO code. Exceptions were if multiple brands, flavours or preparation methods were tested for one NEVO code, foods were tested at both room and refrigerator temperature, when foods were tested as a reference or control food, or when foods were tested on request. Reference foods were profiled only on the dominant taste. The database file contains the exact type and brand which was profiled, including the method of preparation.

2.4 Control foods

To monitor the performance (discriminatory power, agreement and reproducibility) of the panellists, 8 control foods were profiled every 6 weeks. These monitoring results described in Teo et al., 2018.

2.5 Aggregated taste intensity values

Panellists profiled each of the foods in triplicate; these ratings were averaged to obtain mean taste intensity values for each panellist for each product. These values were again averaged, resulting in the mean taste and fat intensity values for each product. The data and a short description of the variables can be found in the file “20170202 Sensory database v004.csv”. The file “20170202 Sensory database v004_codebook.csv”, contains the description variables in the dataset.

2.6 Combining data with food consumption data

The database has been used as a basis for quantifying the exposure to basic tastes in several populations. The data has been merged for multiple purposes with 24h recall data and FFQ data of different populations. An overview can be found below.

Used references

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Rossum, C.T.M. van, Fransen, H.P., Verkaik-Kloosterman, J., Buurma-Rethans, E.J.M., Ocké, M.C. Diet of children and adults aged 7 to 69 years. *Dutch National Food Consumption Survey 2007-2010, RIVM-Rapport 350050006*. Bilthoven: RIVM 2011.

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Related publications

Lease, H., Hendrie, G.A., Poelman, A.A.M., Delahunty C. & Cox, D.N. (2016). A sensory-diet database: a tool to characterise the sensory qualities of diets. *Food Quality and Preference*, 49, 20-32.

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Viskaal-van Dongen, M. V., van den Berg, M. C., Vink, N., Kok, F. J., & de Graaf, C. (2012). Taste–nutrient relationships in commonly consumed foods. *British Journal of Nutrition*, 108, 140–147.

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Van Stokkom, V. L., Teo, P. S., Mars, M., De Graaf, C., Van Kooten, O., & Stieger, M. (2016). Taste intensities of ten vegetables commonly consumed in the Netherlands. *Food Research International*, 87, 34-41. 10.1016/j.foodres.2016.06.016

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van Bussel, L. M., Kuijsten, A., Mars, M., Feskens, E. J. M., & van't Veer, P. (2019). Taste profiles of diets high and low in environmental sustainability and health. *Food Quality and Preference*, 78, 103730. 10.1016/j.foodqual.2019.103730

Nguyen, A. N., van Langeveld, A. W., de Vries, J. H., Ikram, M. A., de Graaf, C., Mars, M., & Voortman, T. (2020). Dietary taste patterns in early childhood: the Generation R Study. *The American Journal of Clinical Nutrition*. 10.1093/ajcn/nqaa296

Appendix I Nature and position of the reference solutions and products shown per taste and fat sensation

Sensation	Food references		Solution references	
	Food	% Scale	Solution	% Scale
Sweet	Biscuits, Verkade Knappertjes	20.0	Sucrose 20 g/L (R1)	13.33 ^a
	Custard, Campina, vanilla	33.0	Sucrose 50 g/L (R2)	33.33 ^a
	Sponge cake, AH basic	50.0	Sucrose 100 g/L (R3)	66.67 ^a
	Marshmallows, Haribo Chamallows	67.0		
	Sweetened condensed milk, Friesche Vlag	88.0		
Salt	Crackers, LU Cracotte	14.0	NaCl 2 g/L (R1)	16.67 ^a
	Potato crisps, Pringles Original	48.0	NaCl 3.5 g/L (R2)	33.33 ^a
	Cheese, Old Amsterdam, 48+	74.0	NaCl 5 g/L (R3)	56.67 ^a
	Soy sauce, Kikkoman	94.0		
Sour	Rye bread, Bolletje, dark	15.0	Citric acid 0.5 g/L (R1)	13.33 ^a
	Butter milk, AH	38.0	Citric acid 0.8 g/L (R2)	33.33 ^a
	Yoghurt, AH Biogarde	50.0	Citric acid 1.5 g/L (R3)	66.67 ^a
	Sour pickles, AH	78.0		
	Lemon juice, Sicilia, bottled	97.0		
Bitter	Juice, AH, grapefruit	57.0	Caffeine 0.5 g/L (R1)	13.33 ^a
	Chocolate, Lindt, 85% cacao	70.0	Caffeine 0.8 g/L (R2)	33.33 ^a
			Caffeine 1.5 g/L (R3)	66.67 ^a
Umami	Seaweed, Saitaku Sushi Nori	28.0	MSG 1.2 g/L (R1)	13.33 ^b
	Crab sticks, Vici	43.0	MSG 3.0 g/L (R2)	33.33 ^b
	Parmesan cheese, Zanetti Grana Padano	69.0	MSG 7.0 g/L (R3)	66.67 ^b
	Soy sauce, Kikkoman	86.0	-	-
Fat sensation	Crackers, Haust Snack cups	9.0	-	-
	Custard, Campina, whipped cream	55.0	-	-
	Cream cheese, Philadelphia Original	72.0		
	Chocolate, Verkade, white	73.0		
	Unsalted butter, Boer en Land Friesland	97.0		
	Campina			

Appendix II Illustrations of fixed scales with reference foods and solutions

Fixed scale (Sweet)



Fixed scale (Sour)



Fixed scale (Bitter)



Fixed scale (Salt)



Fixed scale (Umami)



Fixed scale (Fat)

