1. ABOUT THE DATASET

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Title: Data used in the article ‘Effect of rare sugars on physical and sensory properties of doughs and biscuits’

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Rights-holder(s): Ana Maria Gomez-Betancur, Beril Pinarli, Universitat de València, University of Reading

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Description: This dataset contains data obtained from experimental work on the physical and sensory properties of doughs and biscuits elaborated with different sugars (e.g., sucrose, fructose, allulose, tagatose), where fructose, allulose, and tagatose were used for total sucrose replacement. The data was obtained using a Kenwood Mixer, a convection oven, a differential scanning calorimeter (DSC), a rheometer, a texture analyser, a moisture analyser, a water activity analyser, a calliper, and a Chroma meter (colour). The sensory analysis data was obtained from trained panellists from MMR Research Worldwide Ltd.

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Related publication:

Gomez-Betancur, A. M., Lignou, S., Pinarli, B., Norton, V. and Rodriguez-Garcia, J. (2025) *Effect of rare sugars on physical and sensory properties of doughs and biscuits.* Food Hydrocolloids for Health, 8. 100230. ISSN 2667-0259 doi: 10.1016/j.fhfh.2025.100230

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2. TERMS OF USE

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3. PROJECT AND FUNDING INFORMATION

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This work was funded by the Biotechnology and Biological Sciences Research Council through a UKRI BBSRC Food Biosystems Doctoral Training Partnership(DTP), grant number BB/T008776/1.

4. CONTENTS

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Data processing and preparation activities

Data was collected in Excel files. Different tabs have been assigned for different measurements. For data presentation an index tab at the beginning of each Excel file was created with the sample nomenclature, an explanation of the content of the file and a description of each of the variables studied.

File listing

1. ’Figure2-DSC-Thermograms.xlsx’: this file contains data of the thermal analysis performed on wheat flour-sugar solution mixtures:
   1. Figure2: Means of Peak Temperature (ºC) or *Tg*. and final graphs.
   2. Figure2: Thermograms for wheat flour-water dispersion (no sugars)
   3. Figure2: Thermograms for wheat flour-sucrose solution mixture
   4. Figure2: Thermograms for wheat flour-fructose solution mixture
   5. Figure2: Thermograms for wheat flour-allulose solution mixture
   6. Figure2: Thermograms for wheat flour-tagatose solution mixture
2. ‘Figure3-RheologyGraphs.xlsx’: this file contains data of the rheological analysis performed on biscuit doughs:
   1. Figure 3: Means of complex shear modulus (G\*) of doughs and final graphs.
   2. Figure 3: Temperature sweeps for sucrose dough
   3. Figure 3: Temperature sweeps for fructose dough
   4. Figure 3: Temperature sweeps for allulose dough
   5. Figure 3: Temperature sweeps for tagatose dough
3. ‘Dough-Biscuits-Characteristics.xlsx’: this file contains data of the physical properties of doughs and biscuits, and of the sensory analysis performed in biscuits:
   1. Figure 4: Dough texture
   2. Table 1: Biscuit moisture and water activity
   3. Table 1: Biscuit dimensions
   4. Table 1: Biscuit texture
   5. Table 1: Biscuit colour
   6. Table 1: Delta E estimation (colour)
4. ‘Table2-SensoryDataV3.xlsx’
   1. Table 2: Sensory data

Variables explanation:

1. ’Figure2-DSC-Thermograms.xlsx’:

• Water: Wheat flour and water dispersion without sugars

• Sucrose: Wheat flour and sucrose solution mixture

• Fructose: Wheat flour and fructose solution mixture

• Allulose: Wheat flour and allulose solution mixture: RO-E

• Tagatose: Wheat flour and tagatose solution mixture n: SO-E

• *Tg*: Peak temperature or endothermic peak observed in the thermograms (ºC), corresponding to the starch gelatinisation temperature.

2. ‘Figure3-RheologyGraphs.xlsx’:

• Sucrose: Dough prepared with sucrose

• Fructose: Dough prepared with fructose

• Allulose: Dough prepared with allulose

• Tagatose: Dough prepared with tagatose

• *G\**: Complex shear modulus (Pa). Variable used to describe the viscoelasticity behaviour of the sample.

1. ‘Dough-Biscuits-Characteristics.xlsx’:

• Sucrose: Biscuits prepared with sucrose

• Fructose: Biscuits prepared with fructose

• Allulose: Biscuits prepared with allulose

• Tagatose: Biscuits prepared with tagatose

• Hardness: For dough, it is the maximum force to compress the biscuit dough (N)

• Moisture: Moisture content of the system (%)

• Aw: water activity – water available for microorganisms to grow

• Width: Maximum distance between end to end of the cross section of the biscuit (mm)

• Length: Maximum distance between end to end of the biscuit (mm)

• Height: Maximum distance through the biscuit parallel planes (mm)

• Hardness: For biscuits, maximum force to fracture the biscuit (N)

• Fracturability: Distance required to break the biscuit (mm)

• L\*: Colour coordinate indicating lightness 0 (black) and 100 (white)

• a\*: Colour coordinate indicating -a\* (greenness) and +a\* (redness)

• b\*: Colour coordinate indicating -b\* (blueness) and +b\* (yellowness)

• BI: Browning index – level of browning, estimated using the colour coordinates

• ΔE: overall colour difference respect to the control sample (sucrose) estimated with the colour coordinates

1. ‘Table2-SensoryDataV3.xlsx’:

• Sucrose: Biscuits prepared with sucrose

• Fructose: Biscuits prepared with fructose

• Allulose: Biscuits prepared with allulose

• Tagatose: Biscuits prepared with tagatose

• Appearance: Attributes of appearance (golden colour, uneven top surface, density of crumb)

• Odour/Aroma: Attributes of odour/aroma (baked, sweet, brown spices, golden syrup, floury, popcorn)

• Taste/Flavour: Attributes of taste/flavour (sweet, salty, bitter, floury, vegetable oil, golden syrup, burnt)

• Texture/Mouthfeel: Attributes of texture/mouthfeel (hardness of first bite, crunchy, drying, mouth coating, pasty, body, tooth packing)

• After effects: After effect attributes (sweet, bitter, salivating, drying, tooth packing, tongue tingling, burnt)

• LSD: Least Significant Difference (LSD) is calculated at the 95.00% confidence level with the interaction as the error term

• Prob: Probability value is taken from the Sample row of the ANOVA table corresponding to each attribute

• Scale type: Scale used to assess the attributes, in this case from 0 to 100

5. DATA WITHHELD

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Sensory profile raw data for biscuits is not publicly available due to the trained panel being employed by a third party (MMR Research Worldwide Ltd., not the University of Reading.

6. METHODS

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Please see Materials and Methods section in the related article:

Ana Maria Gomez-Betancur, Stella Lignou, Beril Pinarli, Victoria Norton, Julia Rodriguez-Garcia. Effect of rare sugars on physical and sensory properties of doughs and biscuits. 2025. Food Hydrocolloids for Health. Submitted.

The section includes materials, reagents, preparation of wheat flour-sugar solution mixtures, doughs, biscuits, DSC analysis, rheology analysis, textural analysis (dough and biscuits), biscuit moisture, biscuit water activity, biscuit dimensions, biscuit colour, sensory profiling evaluation, and statistical analysis.

Data processing and preparation activities: Data was collected in MS Excel files. Different tabs have been assigned for different measurements. For data presentation an index tab at the beginning of each Excel file was created with the sample nomenclature, an explanation of the content of the file and a description of each of the variables studied.