1. ABOUT THE DATASET

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Title: Data used in the article ‘The functionality of inulin as a sugar replacer in cakes and biscuits; highlighting the influence of differences in degree of polymerisation on the properties of cake batter and product’

Creator(s): Kleopatra Tsatsaragkou, Lisa Methven, Afroditi Chatzifragkou and Julia Rodriguez Garcia

Organisation: University of Reading

Rights-holder(s): University of Reading

Publication Year: 2021

Description: This dataset contains data obtained from experimental work in the physical properties laboratory and Sensory Science Centre of the Department of Food and Nutritional Science of the University of Reading. The data was obtained using the rheometer (viscosity, frequency sweeps, temperature ramps), texture analyser (hardness, stickiness, etc.), moisture balance, water activity meter, colorimeter and the trained sensory panel. Data replicates are presented in the same columns.

Cite as: Kleopatra Tsatsaragkou, Lisa Methven, Afroditi Chatzifragkou and Julia Rodriguez Garcia (2021): Data used in the article ’The functionality of inulin as a sugar replacer in cakes and biscuits; highlighting the influence of differences in degree of polymerisation on the properties of cake batter and product’. University of Reading. Dataset. http:// dx.doi.org/10.17864/1947.291.

Related publication:

Kleopatra Tsatsaragkou, Lisa Methven, Afroditi Chatzifragkou and Julia Rodriguez Garcia. The functionality of inulin as a sugar replacer in cakes and biscuits; highlighting the influence of differences in degree of polymerisation on the properties of cake batter and product. 2021. Foods. In preparation.

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2. TERMS OF USE

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3. PROJECT AND FUNDING INFORMATION

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Title: ‘SuReBic: Sugar reduced biscuits and cakes that meet consumer sensory, naturalness and costs expectations.’

Dates: November 2017-December 2018

Funding organisation: European Union

Grant no.: 18175

This EIT Food activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under Horizon2020, the EU Framework Programme for Research and Innovation. The research was carried out in collaboration with DouxMatok Limited, Strauss Group and Puratos NV.

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. Data cleansing consisted in using the same sample nomenclature and creating an index tab at the beginning of each Excel file with an explanation of the content of the file and a description of each of the variables studied.

File listing

1. Inulin\_data: this file contains all the data of the analysis done in the inulin ingredients to assess their degree of polymerisation.
2. Batters\_Cakes\_data: this file contains data of the analysis done in cake batters and cakes in terms of:
   1. Batter viscosity
   2. Viscoelastic properties of cake batters
   3. Rheological properties of batters during heating
   4. Water loss during baking, cake water activity
   5. Colour properties of cake crumb
   6. Cake Heigh and Cellular Structure of the Crumb
   7. Textural properties of cakes
   8. Sensory profiling of cakes
3. Doughs\_Biscuits\_data: this file contains the data of the analysis done in biscuit doughs and biscuits in terms of:
   1. Viscoelastic properties of biscuit doughs
   2. Rheological properties of biscuit during heating
   3. Textural properties of biscuit doughs
   4. Water activity and moisture content of biscuit crumb
   5. Colour properties of biscuits
   6. Dimensions and Textural properties of biscuits
   7. Sensory profiling of biscuits

Variables explanation

1. Inulin\_data:
   * Orafti® HSI (BENEO GmbH, Gremany) (Orafti)
   * Fibruline® Instant (Cosucra, Belgium)(Fibruline)
   * Degree of polymerisation (DP)
2. Batters\_Cakes\_data:

* Control: full sugar cake
* RS Orafti: 30% sugar reduced cake with Orafti® HSI inulin
* RS Fibruline: 30% sugar reduced cake with Fibruline® Instant
* Viscosity: resistance to flow [Pa·s]
* Shear rate: Force applied in one direction [1/s]
* Angular Frequency: rheological oscillation measurements[rad/s].
* Elastic modulus or Storage modulus (G’): elastic component of a viscoelastic product [Pa]
* Viscous modulus or Loss modulus(G’’): Viscous component of a viscoelastic product [Pa]
* Complex shear modulus (G\*): G\*= Gꞌ + i Gꞌꞌ
* Weight Loss (WL)= initial weight of the batter minus final weight after baking; all of these divided by the initial weight of the batter [%]
* Moisture: water available in the system [%]
* Water activity (aw): water available for microorganism to grow
* Lightness (L\*): 0 (black) and 100 (white)
* Colour coordinate a\*: -a\* (greenness) and +a\* (redness)
* Colour coordinate b\*: -b\* (blueness) and +b\* (yellowness)
* Height: cake height was measured at the centre point from the cross section of the product [cm]
* Cell area: mean value of the area of the cells measured (mm2)
* Cell circularity: circularity = 4π (area/perimeter2) a circularity value of 1.0 indicates a perfect circle, and as the value approaches 0.0, it indicates an increasingly elongated polygon
* Cell density: number of cells per crumb area evaluated (cells/cm2)
* Firmness: the force value required to compress the sample by 25% of its height (grams force)
* Springiness: the force with which the crumb resisted the defined mechanical stress during compression (Fres/Fmax) x 100 [%]

1. Doughs\_Biscuits\_data:

* Control: full sugar biscuit
* RS Orafti: 30% sugar reduced biscuit with Orafti® HSI inulin
* Shear rate: Force applied in one direction [1/s]
* Angular frequency: Rheological oscillation measurements[rad/s]
* Elastic or Storage modulus (G'): Elastic component of a viscoelastic product [Pa]
* Viscous or Loss modulus (G''): Viscous component of a viscoelastic product [Pa]
* Loss tangent (tan delta): Tangent of the phase angle (δ) between stress and strain. tan δ = Gꞌꞌ/ Gꞌ
* Complex shear modulus (G\*): G\*= Gꞌ + i Gꞌꞌ
* Thermal setting temperature (TST): The first derivative of the curve (dtanδ/dt) was calculated, and the inflection points were identified, which precisely corresponded to the thermal setting temperature of the systems
* Hardness: The maximum force to compress the biscuit dough (grams force
* Stickiness: The normal force applied to release the probe from the biscuit dough (grams force)
* Water activity (aw): Water available for microorganism to grow
* Moisture: Water available in the system [%]
* Lightness (L\*): 0(black) and 100 (white)
* Colour coordinate (a\*): -a\* (greenness) and +a\* (redness)
* Colour coordinate (b\*): -b\* (blueness) and +b\* (yellowness)
* Hardness: Maximum force to fracture the biscuit [grams force]
* Length: Maximum distance between end to end of the biscuit [cm]
* Width: maximum distance between end to end of the cross section of the biscuit [cm]
* Thickness: Maximum distance through the biscuit parallel planes [cm]

5. DATA WITHHELD

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Sensory profile raw data for cakes and biscuits are available on request from the corresponding author. The data are not publicly available due to the trained panel being employed by a third party, not the University of Reading.

6. METHODS

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Please see Materials and Methods section in the related article Tsatsaragkou et al. (2021, in preparation).