1. ABOUT THE DATASET

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Title: Data used in the article ‘Effect of fat replacement with HPMC and lecithin stabilised nanoemulsion on the physical characteristics and sensory attributes of short dough biscuits’

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Organisation: University of Reading

Rights-holder(s): Jansuda Kampa, University of Reading

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Description: This dataset contains data obtained from experimental work on the application of a complex nanoemulsion (CNE) made of extra virgin olive oil and stabilised with hydroxypropyl methylcellulose (HPMC) and lecithin on short-dough biscuits. Four dough and biscuit formulations were evaluated including a control (butter), three formulations where 33% of the butter was replaced with extra virgin olive oil (EVOO), with CNE, and with the individual ingredient of the nanoemulsion added separately (INE). Data was obtained using a texture analyser (dough hardness, biscuit fracture strength and the fracturability, and oil migration), moisture balance (biscuit moisture), water activity meter (biscuit water activity), oven (weight loss during baking), digital calliper (biscuit dimensions), Confocal Laser Scanning Microscopy and Scanning Electron Microscopy (dough and biscuit microstructure), and quantitative descriptive sensory analysis with a trained sensory panel (sensory profiling of the biscuits).

Cite as:

[Kampa, Jansuda](https://researchdata.reading.ac.uk/view/creators/Kampa=3AJansuda=3A=3A.html) and [Rodriguez-Garcia, Julia](https://researchdata.reading.ac.uk/view/creators/Rodriguez-Garcia=3AJulia=3A=3A.html) (2023): Data used in the article ‘Effect of fat replacement with HPMC and lecithin stabilised nanoemulsion on the physical characteristics and sensory attributes of short dough biscuits’. University of Reading. Dataset. <https://doi.org/10.17864/1947.000442>

Related publication:

Jansuda Kampa, Stephanie P. Bull, Antonio Signorello, Richard Frazier and Julia Rodriguez-Garcia. Effect of fat replacement with HPMC and lecithin stabilised nanoemulsion on the physical characteristics and sensory attributes of short dough biscuits. 2022. npj Science of Food, in preparation.

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2. TERMS OF USE

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3. PROJECT AND FUNDING INFORMATION

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No funding was received.

This work was done as part of Jansuda Kampa’s PhD project ‘Development of a novel nanoemulsion with enhanced nutritional profile to reduce saturated fatty acids in bakery products’ (PhD awarded on the 31st of May 2022).

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. Data replicates are presented in the same columns with the heading ‘Replicate’.

File listing:

1. DoughCharacteristics.xlsx: this file contains the data of the textural properties and oil migration of doughs in terms of:
   1. Table1\_hardness: Hardness (N)
   2. Table1\_oil migration (%). Percentage of oil migration at temperature of 18 °C and 30 °C
2. BiscuitCharacteristics.xlsx: this file contains the data of the physical and physico-chemical properties biscuits (Table 2) in terms of:
   1. Table2\_weight loss: Weight loss (WL) during baking (%)
   2. Table2\_moisture: Moisture (%)
   3. Table2\_water activity: Water activity (aw)
   4. Table2\_spreadability: Spreadability index (SI)
   5. Table2\_texture: Fracture strength (N) and fracturability (mm)
   6. Figure4\_Sensory profile: Sensory profile of biscuits
3. ConfocalMicrostructureImages.zip: this folder contains micrographs from Confocal Laser Scanning Microscopy (CLSM) of doughs and biscuits stained with Nile Red. Two types of files are shared:

* Nd2.: these files can be opened and edited by the microscope software (EZ-C1 v.3.40, Nikon, Tokyo, Japan.
* jpg.: these are image files that were used to create the figures that are shared in the publication.

The subfolders are the following:

* 1. CLSMDoughs:
     1. DougRep1\_22112021
     2. DoughRep2\_23112021
  2. CLSMBiscuits
     1. BiscuitRep1\_23112021
     2. BiscuitRep2\_30112021

1. ConfocalMicrostructureData.xlxs: this file contains the information of the files obtained Confocal laser scanning microscopy (CLSM) of stained biscuit doughs and biscuits. Subfolder:
   1. Figure2\_CLSM

Variables explanation:

1. DoughCharacteristics.xlsx:
   1. D: biscuit dough
   2. D-Control: The dough made with butter
   3. D-EVOO: Dough has 33% of the butter was replaced with Extra Virgin Olive Oil
   4. D-CNE: Dough has 30% less saturated fat by replacing butter with a Complex Nano-Emulsion
   5. D-INE: Dough has 30% less saturated fat by replacing butter with the individual ingredients of the complex nanoemulsion.
   6. Hardness: The maximum force recorded as the peak of the curve measured through sphere penetration (N)
   7. N: Newtons
   8. Oil migration: Percentage of oil lost from the dough to the surface (%)
2. BiscuitCharacteristics.xlsx:
   1. B: Biscuit
   2. B-Control: The biscuit made with butter
   3. B-EVOO: 33% of the butter was replaced with Extra Virgin Olive Oil
   4. B-CNE: Biscuit has 30% less saturated fat by replacing butter with a Complex Nano-Emulsion
   5. B-INE: Biscuit has 30% less saturated fat by replacing butter with the individual ingredients of the complex nanoemulsion.
   6. WL: Weight loss during baking (%) = dough-biscuit / dough) ×100
   7. Aw: Water activity:
   8. SI: Spreadability index (Diameter/Height)
   9. Fracture strength: The force at break (N) during a three-point bending test
   10. Fracturability: The distance at break (mm) during a three-point bending test
   11. Biscuit texture: fracture strength and fracturability
   12. Red superscripts in tab ‘Figure4\_Sensory profile are superscripts that describe the results of ad hoc tests for multiple means comparisons that were carried out using Fisher’s least significant difference test (LSD) (p > 0.05).
3. ConfocalMicrostructureData.xlsx:
   1. CLSM: Confocal laser scanning microscopy
   2. D: Biscuit doughs
   3. D-Control: Dough made with butter; in D-EVOO
   4. D-EVOO: Dough has 33% of the butter was replaced with Extra Virgin Olive Oil
   5. D-CNE: Dough has 30% less saturated fat by replacing butter with a Complex Nano-Emulsion
   6. D-INE: Dough has 30% less saturated fat by replacing butter with the individual ingredients of the complex nanoemulsion.
   7. B: Biscuit
   8. B-Control: The biscuit made with butter; in D-EVOO
   9. B-EVOO: 33% of the butter was replaced with Extra Virgin Olive Oil
   10. B-CNE: Biscuit has 30% less saturated fat by replacing butter with a Complex Nano-Emulsion
   11. B-INE: Biscuit has 30% less saturated fat by replacing butter with the individual ingredients of the complex nanoemulsion.
   12. Nile Red: "Staining agent used to label fat. Nile Red (Fluka, Sigma-Aldrich) with λex max 488 nm and λem max 515 nm was solubilized in PEG 200 at 0.1 g/L."
   13. 20x: Objective used
   14. nd2.: Files that are editable in the microscope software (EZ-C1 v.3.40, Nikon, Tokyo, Japan)
   15. .jpg.: Image files that were used to create the figures for the manuscript.

5. DATA WITHHELD

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Sensory profile raw data for 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 (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:

Jansuda Kampa, Stephanie P. Bull, Antonio Signorello, Richard Frazier and Julia Rodriguez-Garcia. Effect of fat replacement with HPMC and lecithin stabilised nanoemulsion on the physical characteristics and sensory attributes of short dough biscuits. 2022. npj Science of Food. In preparation.

The section includes materials, reagents and standards, preparation nanoemulsions, dough, biscuits, textural analysis, oil migration analysis, moisture, water activity, spreadability index calculation, weight loss during baking analysis, sensory profiling evaluation, confocal laser scanning microscopy, cryo-scanning electron microscopy, and statistical analysis.