Subaleurone in wheat bran: an overlooked and unexploited source of gluten

Project Name DMP 1S06222N - Subaleurone in wheat bran: an overlooked and unexploited source of gluten

Grant Title 1S06222N

Principal Investigator / Researcher Wisse Hermans

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Description High gluten quantity and quality are required for the production of high-quality bread from flour or wholemeal. Especially for the latter, isolated wheat gluten is frequently added. In wheat, gluten proteins are only present in the starchy endosperm. Some wheat cultivars have the potential to develop subaleurone cells that are very rich in gluten at the periphery of this starchy endosperm, a feature that is mostly overlooked. The potential of this native and vital gluten is largely unexploited as it remains, at least partially, attached to the bran during milling. Most bran, irrespective of its potential, ends up in animal feed, as no selection is performed. This project aims at gaining insight into the opportunities of wheat cultivar and bran selection based on subaleurone protein content towards dry gluten fractionation and clean label wholemeal bread making.

Institution KU Leuven

1. General Information
Name applicant

Wisse Hermans

FWO Project Number & Title

1S06222N - Subaleurone in wheat bran: an overlooked and unexploited

Affiliation

- KU Leuven

2. Data description
Will you generate/collect new data and/or make use of existing data?

- Generate new data

Describe in detail the origin, type and format of the data (per dataset) and its (estimated) volume. This may be easiest in a table (see example) or as a data flow and per WP or objective of the project. If you reuse existing data, specify the source of these data. Distinguish data types (the kind of content) from data formats (the technical format).

Type of data	Format	Volume	How created
Protein contents milled kernels	.xlsx	20 KB	Microdumas
Stitched microscopy images	.tif	15 GB	Transmitted-light microscopy of wheat sections
Protein gradients within the starchy endosperm	.xlsx	1 MB	Using a Python-based toolbox in the ArcGIS-software
Milling yields	.xlsx	20 KB	Weighing Bühler MLU-202 laboratory mill fractions
Protein contents milling fractions	.xlsx	20 KB	Microdumas
Ash content milling fractions	.xlsx	20 KB	Muffle oven

Microscopy images of milling fractions	.tif	1 GB	Transmitted-light microscopy of milling fractions
Protein composition of milling fractions	.txt and .xlsx	0.5 GB	Osborne fractionation + RP-HPLC
Dry gluten fractionation yields	.xlsx	50 KB	Dry fractionation + weighing
Protein content dry fractionation	.xlsx	50 KB	Microdumas
Ash content dry fractionation	.xlsx	50 KB	Muffle oven
phytate content dry fractionation	.xlsx	50 KB	Total phosphorus (Megazyme)
Microscopy dry fractionation	.tif	1 GB	Transmitted-light microscopy
Gluten development data gluten-starch model (Farinograph)	.txt and .xlsx	10 MB	Farinograph analysis
Rheology data gluten-starch model	.xlsx	10 MB	Strain controlled rheometer equipped with an extensional viscosity fixture
Loaf volume gluten-starch model	.txt and .xlsx	10 MB	Volscan
Bubble size distribution gluten-starch model	.tif and .xlsx	10 MB	Scanner + ImageJ
Crumb texture gluten-starch model	.txt and .xlsx	10 MB	Instron
Gluten development data wholemeal (Farinograph)	.txt and .xlsx	10 MB	Farinograph analysis
Loaf volume wholemeal	.txt and .xlsx	10MB	Volscan
Bubble size distribution wholemeal	.tif and .xlsx	10 MB	Scanner + ImageJ
Crumb texture wholemeal	.txt and .xlsx	10 MB	Instron
Micropscopie images wholemeal bread	.tif	10 MB	Transmitted-light microscopy

3. Legal and ethical issues
Will you use personal data? If so, shortly describe the kind of personal data you will use. Add the reference to your file in KU Leuven's Register of Data Processing for Research and Public Service Purposes (PRET application). Be aware that registering

the fact that you process personal data is a legal obligation.

- No

Privacy Registry Reference:
Short description of the kind of personal data that will be used:

Are there any ethical issues concerning the creation and/or use of the data (e.g. experiments on humans or animals, dual use)? If so, add the reference to the formal approval by the relevant ethical review committee(s)

- No

Does your work possibly result in research data with potential for tech transfer and valorisation? Will IP restrictions be claimed for the data you created? If so, for what data and which restrictions will be asserted?

- No

Do existing 3rd party agreements restrict dissemination or exploitation of the data you (re)use? If so, to what data do they relate and what restrictions are in place?

- No

4. Documentation and metadata
What documentation will be provided to enable reuse of the data collected/generated in this project?

1. Microscopy images: the procedure and methodology of the sample preparation and microscopy will be described in detail in a 'read-me'-file (in the same file as the microscopy images). The resolution, dimensions, image types, date, ... will be embedded in the image itself.
2. Raw data of the other analyses will be stored as txt-files, in the format of the particular device/software that is used to obtain the data or in Excel depending on the analysis. All generated raw data will be tracebale for myself and other people by adding 'read-me'-files. This 'read me'-file can be a word document or txt file in which sample naming, the variables and the experiment are explained. Data processing will predomenantly be done in Excel. The Excel files will be structured such that they are comprehensible to anyone and will hence contain the following tabs: materials and methods (if there is not yet a 'read-me'-file), processed data, figures and raw data.

Will a metadata standard be used? If so, describe in detail which standard will be used. If no, state in detail which metadata will be created to make the data easy/easier to find and reuse.

- No

The data of one work package will be collected in one folder, which will be placed in my data folder and will be named after the work package itself. That folder, in turn, contains more subfolders named after what is analysed (e.g. protein content, ash content, milling yields, protein composition, ...). Besides these different subfolders, there will also be a Word file providing a summary of the concerning work package, explaining the connection between the different subfolders and containing links to the Excel sheets of the processed data and figures. Each of these subfolders contains the raw data as txt-files, in the format of the particular device/software that was used to obtain the data or in an Excel file. The raw data is accompagnied by a 'read-me'-file, which contains explanation about the names of the samples, the procedure, the date of the analysis, explanation about the variables,... This 'read-me'-file can be a seperate Word or Excel file, or can be embedded in an Excel file also containing the processed data, figures and possibly even the raw data (all in different sheets).

5. Data storage and backup during the FWO project
Where will the data be stored?

All data will be stored on the network drives of the KU Leuven. The J:shared folder will be used for temporary storage (accessible to staff and thesis students) and the J:staff folder will be used for long-term storage of data of ongoing projects, data of finished projects and publication data. When a project ends, the particular project folder in the 'Ongoing Projects'-folder is copied into the 'Finished Projects'-folder. In this way, all data of the project will be stored in an organised and traceable way on the KU Leuven storage facilities for at least 10 years.

For collaborations with researchers from other research units we will also use OneDrive for active use of the data during the project as this is more convenient.

How is backup of the data provided?

The network drives are maintained by the ICTS service of KU Leuven with automatic daily back-up and mirror procedures.

Is there currently sufficient storage & backup capacity during the project? If yes, specify concisely. If no or insufficient storage or backup capacities are available then explain how this will be taken care of.

- Yes

The J:drive has a storage capacity of 0.99 TB, but this can be increased if necessary.

What are the expected costs for data storage and back up during the project? How will these costs be covered?

The cost of the large volume storage and back up is € 156,60 per TB and year. This will be covered by the host group (Laboratory of Food Chemistry and Biochemistry).

Data security: how will you ensure that the data are securely stored and not accessed or modified by unauthorized persons?

The data will be stored on the J:staff folder, which can only be accessed by our research group. Should this lead to any problems, the accessibility of my personal folder can be limited to myself an my promotor.

6. Data preservation after the FWO project
Which data will be retained for the expected 5 year period after the end of the project? In case only a selection of the data can/will be preserved, clearly state the reasons for this (legal or contractual restrictions, physical preservation issues, ...).

All data of the project will be stored in an organised and traceable way on the J:drive for at least 10 years.

Where will the data be archived (= stored for the longer term)?

All data of the project will be stored on the J:drive for at least 10 years. These facilities are maintained by the ICTS service of KU Leuven with automatic daily back-up and mirror procedures.

What are the expected costs for data preservation during the retention period of 5 years? How will the costs be covered?

Costs for data preservation are covered by the host group. The cost of the large volume storage and back up is € 156,60 per TB and year.

7. Data sharing and reuse
Are there any factors restricting or preventing the sharing of (some of) the data (e.g. as defined in an agreement with a 3rd party, legal restrictions)?

- No

Which data will be made available after the end of the project?

All published data (peer-reviewed articles and PhD dissertation) will be available after the end of the project.

Where/how will the data be made available for reuse?

- Upon request by mail
- Other (specify):

The published data will be available for everybody as we intend to publish in 'open access'. As all data will be stored on the shared J:staff folder in the 'Finished Projects' folder, it will be available for all the members of the research group.

When will the data be made available?

The data will be made available after publication.

Who will be able to access the data and under what conditions?

1. Everybody will be able to access the published data as we intend to publish in 'open access'.
2. All data will be available for all the members of the research group, as it will be stored on the shared J:staff folder in the 'Finished Projects' folder.

What are the expected costs for data sharing? How will the costs be covered?
Costs for publication will be covered by FWO funding (bench fee) or the research group.

8. Responsibilities
Who will be responsible for data documentation & metadata?
FWO fellow: Wisse Hermans

Who will be responsible for data storage & back up during the project?
FWO fellow: Wisse Hermans
Promotor: Prof. Christophe Courtin

Who will be responsible for ensuring data preservation and reuse ?
Promotor: Prof. Christophe Courtin

Who bears the end responsibility for updating & implementing this DMP?
FWO fellow: Wisse Hermans