Impact of adding wheat arabinoxylan to gluten-starch dough on its rheological properties

Julie Van de Vondel[a], Sara A.K.B. Petit-Jean[a,b], Kurt Gebruers[a], Paula Moldenaers[b] & Jan A. Delcour[a]

[a] KU Leuven, Laboratory of Food Chemistry and Biochemistry and Leuven Food Science and Nutrition Research Centre (LFoRCe), 3001 Leuven, Belgium
[b] KU Leuven, Soft Matter, Rheology and Technology (SMaRT), 3001 Leuven, Belgium

(Aim) The consumption of dietary fibre is associated with many health benefits. While wheat (*Triticum aestivum* L.) in principle is an important source of dietary fibre in our daily diet, most wheat-based food products consumed today are made from white flour that is low in fibre. To provide a basis for increasing the average dietary fibre consumption and fill the so-called "fibre gap", a multidisciplinary research consortium, with the project titled FIBRAXFUN, develops a knowledge base for developing and using novel white wheat flours which are rich in arabinoxylan (AX) dietary fibre. The work presented here aimed to study the impact of water-extractable (WE-)AX on gluten-starch dough rheology. **(Method)** First, large-scale WE-AX isolation from 20 kg of commercial wheat flour was executed. The WE-AX isolate was subsequently analysed for its AX content and arabinose to xylose ratio using gas chromatography, and its molecular size distribution using size exclusion chromatography. In a second part, the impact of WE-AX addition on the rheology of gluten-starch doughs was investigated using a rheometer with extensional viscosity fixture setup. **(Results)** Inclusion of WE-AX isolates in gluten-starch dough recipes clearly increased the transient extensional viscosity both at small and large deformations. The former is mainly dominated by short-range interactions (starch-starch and starch-gluten), and very sensitive to the water content, while the latter is mostly determined by longer-range interactions (gluten-gluten) and less sensitive to water content. Since WE-AX imparts viscosity and binds water, the increase at small strains is very likely caused by a decreased water availability for starch and gluten. However, the increase at large deformations cannot solely be attributed to water availability and thus needs to be further investigated. To what extent these changes in dough rheology relate to the bread making performance will be the area of future research. **(Conclusion)** The insights of this work provide a framework for developing high-quality fibre-enriched breads.