**Towards an understanding of the structuring mechanisms of 3D printed flour-based matrices**

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3D food printing has been more and more developed in the world for the past 20 years and is used on a wide variety of foods. However, if it seems relatively easy to print a food matrix, there is still a lack of understanding regarding the effects of its rheological and structural characteristics on its capacity to be extruded, shaped according to a model and to maintain its shape after printing. The objective of this work was to investigate the impact of the composition in starch, fibers and proteins of 6 different flours on the rheological and structural properties of flour-based matrices and their printing quality. Wheat, rye, rice, kidney bean, lupin and chia seed flours were used to formulate matrices with a constant dry matter content, obtained through a mechanical and thermomechanical process. These matrices were characterized through a multiscale approach, using texturometry, rheometry, differential scanning calorimetry (DSC) and microscopy, and the pictures of the printed products were analysed through image analysis. The results show the link between the biochemical composition of the flours, the rheological properties of the matrices and their printing quality. More specifically, there is a significant correlation between the stickiness of the matrices and their printing quality, the latter also being highly correlated to the starch composition of the flours and to their hydration level at room temperature (in relation to their water holding capacity). This highlights the importance of a sufficient hydration of the flours to obtain extrudable and well printed matrices and underlines the fact that their printing quality probably results from a combination of factors. We thus formulated hypotheses about the structuring mechanisms of the matrices studied, and now possess hints to further investigate them.