Techno-functional Properties of Glycolipids in Breadmaking

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Glycolipids in wheat grain are essential "endogenous" surfactants in breadmaking. They influence the volume and crumb structure of wheat flour based bakery products, albeit the decisive mode of action has still not been conclusively revealed. Up to date there is little information on how “exogenous” glycolipids perform as wheat flour improvers and if they have an influence on the rheological properties of dough, bread volume and crumb properties such as structure, softness and staling. Consequently, the aim of this study was to determine the potential of glycolipids isolated from commercial lecithins in breadmaking in comparison to classical surfactants like DATEM (diacetyl tartaric acid esters of mono- and diacylglycerides), SSL (sodium stearoyl-2-lactylate), MG (monoacylglycerides) and two synthetic glycolipids. The most important glycolipid classes in commercial lecithins, such as soybean, rapeseed or sunflower, were found to be sterol glucosides (SG), acylated sterol glucosides (ASG), cerebrosides and digalactosyl diacylglycerides (DGDG). They were isolated from different lecithins and characterized for their techno-functional properties by micro-scale baking and extension tests (10 g of flour). The baking tests revealed the excellent baking potential of all isolated glycolipid classes, with clearly better or equal baking activities than the commercial surfactants. The synthetic monogalactosyl monoglyceride and the isolated digalactosyl diglycerides showed the highest increases in bread volume. Furthermore, the glycolipid classes influenced the crumb structure significantly by improving the crumb softness and the crumb grain. Interestingly all glycolipid classes from lecithin showed no significant antistaling effect. A direct effect on the overall rheological behavior of the dough was only found for the commercial surfactants. However, the rheological effect seen on gluten, isolated from surfactant-containing dough, revealed that the surfactants could be divided into two main groups. One group, this being ASG and SG, only had a significant influence on the resistance to extension of the gluten and the other group, this being all other glycolipid classes and the reference compounds, only had a significant influence on the extensibility of the gluten. This indicates that in wheat dough glycolipids rather seem to have an impact on the dough liquor than on the gluten-starch-matrix and here with different modes of action.