**The Influences of Methyl Cellulose and Psyllium and Their Applications in a Flour-Water System with Medium Water Content (ca. 55%).**

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Hydrocolloids have a wide application in food industry because of their functions to create structure, stabilise the system, influence texture and sensory perception (Foster, 2010). On the other hand, starch and starch based flours are also popular ingredients for researchers and manufacturers as either additives or main ingredients in products varying from beverages, soup and sauce, to pasta, noodles and bread etc. with a wide range of water content. However, there are some constraints of their applications and qualities of final products due to the properties of starch/flour and/or the absence of some components e.g. proteins. An example of latter cases is gluten free bread, which is investigated and produced to meet gluten intolerance and the “free from” trend. The addition of hydrocolloids is one method to reduce these constraints. Using the example of gluten free bread, hydrocolloids have been investigated and applied as dough stabilisers, structure creators, and moisture controllers. Besides, most hydrocolloids also have certain health benefits such as low-calorie content, blood sugar control, and lowering cholesterol levels. However, though some fundamental understanding and mechanisms are reported based on the system with high moisture content, due to the complexity and variability of systems and limitation of testing methods, fundamental understandings to hydrocolloid-flour/starch system with medium water content are limited.

This study investigates the functionalities of methyl cellulose (MC) and psyllium, as well as their influences on flour-water systems with medium water content (50 to 60% of water).

The thermal gelation properties of MC and water mobility in psyllium solutions were investigated by measuring proton relaxation and the results showed that water mobility in MC solution increases when temperature increases while water molecules are trapped in the MC network after thermal gelation, with a mobility decrease. A stronger water binding ability of psyllium is seen. In terms of rheological properties of flour-water systems at room temperature (20°C), MC increased damping factors (tanδ) while psyllium showed no such effects. The influence of each hydrocolloid on the storage and loss moduli is dependent on the water amount in extragranular spaces. The monitoring of storage modulus (G’) over temperature showed similar results with Keetels et al. (1996) who worked on a higher water content. An increase of G’ with heating, which is possibly due to starch granules swelling, was observed until a maximum was reached where granules became closely packed. With further heating, starch granule softening appeared to happened which leads to a decrease of G’. Starch retrogradation was observed with a G’ increase during cooling. The additions of hydrocolloids had effects on initial G’ values, G’ increase, and maximum values, thought to be due to water availability, space occupation, and the properties of hydrocolloids themselves. There was no obvious reduction in retrogradation rate when psyllium was added. The monitor of proton relaxation showed that hydrocolloids reduced starch hydration, especially the water migration into amorphous areas, by competing for water. It also showed the possibility that hydrocolloids are able to prevent long-term retrogradation.

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