444c Relating Extensional Rheological Behaviour of Wheat Flour Dough with Bread Baking Performance

Valentina Stojceska, Anastasia Ktenioudaki, Francis Butler, and Emer Gallagher

The biaxial extensional viscosity behaviour of doughs from 20 flour types was measured using an Instron Universal Testing Machine which compressed cylindrical dough samples at constant displacement speed between two parallel plates. Measurements were done at two different displacement speeds. From this, Hencky strain, extensional strain rate, compressive stress and apparent biaxial extensional viscosity were calculated at each of two displacement speeds. Results from Farinograph, Extensiograph and flour analyses were included for correlation. Apparent biaxial extensional viscosity increased at both cross head speeds as strain rate increased. The presence of a distinct bend in the apparent biaxial extensional viscosity - strain rate curve indicated extensive (microscopic) breakdown of the network structure forming the dough during compression. In addition, at a given biaxial strain rate, the apparent biaxial extensional viscosity was higher in the sample compressed at lower cross head speeds. Extensional viscosity (at maximum strain rate) did not correlate with flour protein, any of the farinograph or extensograph parameters or with loaf volume. farinograph or extensograph parameters also did not corrolate with loaf volume. All flours tested would be considered adequate for bread making. Protein content of the flours varied between 11 and 14%. From a quality control perspective in the bread baking industry, where protein content of the incoming flours vary by a relatively small amount, biaxial extensional viscosity measurements can not be used to predict subsequent baking behaviour.