On Predicting Roller Milling Performance VI. Effect of kernel hardness and shape on the particle size distribution from First Break milling of wheat

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Abstract

Models based on the breakage equation for roller milling have been developed to predict the output particle size distribution delivered by First Break roller milling of wheat from distributions of single kernel characteristics. These models allow prediction of the breakage of mixtures of kernels of unknown origin or varieties and varying in size and hardness, based solely on Perten Single Kernel Characterisation System (SKCS) characteristics. Predictions have been developed for both Sharp-to-Sharp and Dull-to-Dull roll dispositions, and show good agreement with independent data. Milling under a Dull-to-Dull disposition is more sensitive to kernel hardness and gives a more pronounced U-shaped distribution of output particle sizes (*i.e.* large proportions of both small and large particles, with few in the mid-size range) than Sharp-to-Sharp milling. Similarly, softer wheats break to give a more U-shaped distribution than harder wheats. These findings also demonstrate that kernel hardness as reported by the SKCS is meaningful in relation to wheat breakage during roller milling. Previous work has shown that single kernel moisture measurements can be included in predictive equations; further work reported here demonstrates the potential to add the fourth SKCS parameter, kernel mass, to predictions in order to allow for the effect of kernel shape on breakage.

Keywords: wheat, flour, hardness, roller milling, breakage equation, single kernel characterisation

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