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Wheat grain quality response to tillage and rotation with field pea

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Summary

Preceding spring wheat (*Triticum aestivum* L.) with field pea (*Pisum sativum* L.) can enhance wheat grain yield in a wheat-pea (WP) rotation compared with continuous wheat (WW). The pea-rotation benefits to wheat grain quality are uncertain. A 6-yr study was conducted to determine if: (1) grain protein content, kernel weight, and test weight were enhanced for wheat in a WP rotation compared with WW, and (2) an interaction between cropping and tillage systems existed. The WP and WW systems were maintained in subplots within clean-till (CT), reduced-till (RT), and no-till (NT) whole plots arranged in a randomized complete block as a split plot in southwestern North Dakota, USA. Grain protein content of wheat averaged 160 g kg⁻¹ and was unaffected by cropping system ($P > 0.05$). However, grain protein content was 10 to 30 g kg⁻¹ lower under NT compared with CT, depending on the year. Kernels were heavier in two of six years in the WP rotation compared with WW. No difference in kernel weight was detected between cropping systems in the other four years. A consistent trend in kernel weight was not detected across tillage systems, and interactions between cropping and tillage systems were not observed for either grain protein content or kernel weight. A three-way interaction between cropping systems, tillage systems, and years was detected for grain test weight. These results failed to demonstrate a consistent pea-rotation benefit to wheat grain quality.