

Changes in soil carbon and soil physical properties in an integrated crop-livestock system

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Abstract: Integrated crop-livestock systems offer opportunities to sustain soil productivity, reduce environmental deterioration and increase profitability of the system; however, research on those systems in the U.S. Corn Belt is limited. Our specific objective is to evaluate changes in soil C and soil physical properties in an integrated crop-livestock system, under no-tillage management, in Ohio – Midwestern USA. Winter cover crop treatments (Italian ryegrass, winter rye + oat, and a no cover crop control) were established after silage corn harvest in late August. Yearling heifers grazed the cover crops in late autumn and early spring. Forage yield, animal performance and soil penetration resistance (SPR) were measured in each treatment. Root measurements and particulate organic matter were conducted in each experimental unit to two depths, 0-5 and 5-15 cm. After one grazing season, the oat + cereal rye treatment provided 213 grazing days per hectare per heifer (143 and 70 for fall and spring respectively) and annual ryegrass provided 174 grazing days per hectare per heifer (126 and 38 for fall and spring respectively). Although there were no significant differences in SPR averaged across depths (0-5, 5-15 and 15-45cm), rye + oat treatment shows higher compaction than ryegrass and control. The mixture of rye + oat had a significant higher quantity of roots, in terms of mass and volume, during fall and spring.