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Precision Ag Technology Savings

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Abstract
The use of precision farming products continues to increase. With increasing input costs, producers are often looking for ways to adopt technology to make farming operations more efficient and productive. Two precision ag products, auto guidance and automatic section control, lead the way in cost savings while also enhancing the productivity of machinery operations.

Guidance systems reduce overlap in fields which leads to less passes across the field, less fuel and product use (i.e. seed, fertilizer, and herbicide), and fewer operator hours. These savings can be directly calculated if the amount of overlap is known. Additionally, swath control products reduce seed and chemical overlap into headlands and field boundaries by automatically shutting off planter or boom sections as they cross into headland areas.

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Precision Ag Technology Savings

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Measuring Production Overlap

To quantify the amount of overlap that occurs in a typical production setting Iowa State University researchers partnered with two Iowa producers in 2011 who did not own any precision ag technologies. Researchers instrumented the planter and spring tillage tools of each producer with high accuracy RTK GPS systems to record the amount of actual overlap that occurred during planting and tillage operations. More than 2,500 acres of field operations were monitored and analyzed to determine typical overlap in central Iowa production systems.

The planters used in this study included both a 16 and 24 row unit. Spring tillage was conducted with a 45 foot field cultivator. Results from these producer tests showed an average 3.3 percent overlap during planting operations. This overlap was due in part to planting point rows, but also had a significant component of overlap into perpendicular headlands. This is associated with a delayed response of the driver to lift the planter out of the ground when entering the headland. For spring tillage, a 7 percent overlap was measured and was mainly associated with pass-to-pass overlap of the outside section of the tillage tool into the previous field pass.

Calculating Return on Investment of Precision Ag Products

Given these overlap levels, the return on investment of autosteering and swath control products can be directly measured. For swath control both the cost of seed production and the loss of yield in double planted headland areas must be considered. Typical cost for corn seed in central Iowa is $113.80 per acre (Estimated Costs of Crop Production in Iowa – 2012, Duffy). A conservative estimate for yield loss in double planted areas is 12 percent based on previous research at Iowa State. For 175 bu/ac average corn yield with a value of $6/bu this results in a production loss of $7.91/ac. Based on this analysis the value of precision ag swath control systems in typical Iowa corn production is $7.91/ac.

Tillage saving when using a lightbar or autosteer system can be calculated in a similar manner. A 7 percent reduction in tillage overlap will result in approximately $1/ac cost savings. The cost savings is less due to a lack of

high cost inputs, but still justifies lightbar systems even on the most basic tillage operations.

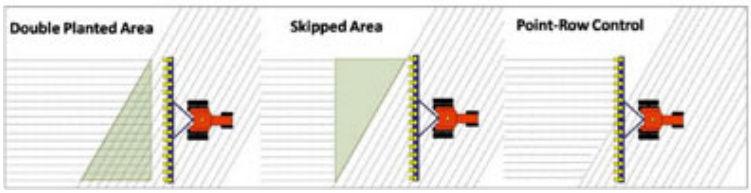

Illustration of automatic section control on a planter to reduce overlap and skipped areas. *(Fulton, J, D Mullenix, A Brooke, A. Winstead and B. Ortiz. "Automatic Section Control (ASC) Technology from Planters." Alabama Cooperative Extension System, Sept. 2011.)*

Matt Darr is an assistant professor in Agricultural and Biosystems Engineering with research responsibilities on the use of embedded systems and advanced instrumentation in crop production. He can be reached at 515-294-8545 or darr@iastate.edu. Agricultural and Biosystems Engineering students contributing to the research were Chris Murphy, Clint Luellen, Cody Van Drie, and Eric Mensen.
