

## USE OF NITRIFICATION INHIBITORS WITH MANURE

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### Abstract

A nitrification inhibitor temporarily delays the conversion of ammonium to nitrate. It is used to prevent nitrate losses should weather conditions conducive to N loss occur. Therefore, a nitrification inhibitor should be considered a risk management tool, not a yield enhancement tool. Several recent studies in Wisconsin have evaluated the nitrification inhibitor Instinct or Instinct II with spring or fall applied manure.

Instinct applied with spring injected dairy slurry on sandy soils significantly reduced nitrate leaching at one location but not the other. Contrasting results may have been caused by differences in soil pH and soil organic matter content at the sites. Corn yield was not affected by Instinct application at either location.

In another study, application of Instinct with surface applied dairy slurry in the fall or spring significantly increased corn silage yield, but not grain yield. Application of Instinct with fall applied manure did not affect soil nitrate or ammonium concentrations in the top two feet of soil in mid-November three weeks after application. However, in mid-April soil nitrate concentration in the 1 to 2 foot-depth were significantly lower when Instinct was applied with manure in the fall. Pre-sidedress nitrate results were not impacted by Instinct application with either fall or spring manure application. Where Instinct was applied with manure in the spring or fall, N concentrations in the crop were greater at V8 and VT as evidenced by significantly greater chlorophyll meter readings.

A five site-year study evaluated the impact of Instinct applied with injected digested, separated dairy slurry at several manure application timings {mid-October (early fall), mid-November (late fall), and April (spring)}. The effect of Instinct application on pre-sidedress nitrate concentrations to a two foot-depth were variable.

First, at two locations, Instinct applied with late fall manure significantly increased soil nitrate concentrations, suggesting Instinct was able to delay conversion of N to nitrate until spring time. At these same two locations, nitrate concentrations were lower where Instinct was applied with spring manure because Instinct was delaying conversion to nitrate; and there was no effect of Instinct when applied with manure in early fall likely because temperatures were warm enough to allow degradation of Instinct and subsequent conversion to nitrate before winter.

Second, at another location there was no effect of Instinct on spring soil nitrate concentrations regardless of when manure was applied. Third, at one location late fall applications without Instinct resulted in greater nitrate at pre-sidedress sampling compared to application of Instinct, which is completely opposite of other locations. At this site, there was no other significant effect

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of Instinct on pre-sidedress nitrate. Fourth, at the final site, both early fall and spring application of manure with Instinct increased pre-sidedress soil nitrate, but did not have an effect when applied with manure in late fall.

The variable results in these studies with regard to yield, soil nitrate concentrations, or nitrate leaching are attributed to soil properties and weather conditions. More detailed results from these studies, including impacts on corn yield, will be explored in the presentation. Please contact me for additional information.