K-STATE Research and Extension | Meadowlark District

October 24, 2025

David Hallauer
District Extension Agent, Crops & Soils

Fall Anhydrous Tips

The fertilizer price outlook and grain price outlook aren't currently a complementary relationship equaling good profits. With fall anhydrous applications approaching, maximizing the return on that portion of our nitrogen dollar is important.

A good first step is to understand the reactionary properties of anhydrous in the soil. The ammonia form we inject reacts quickly with soil moisture and is converted to a nitrogen form that binds to clay and organic matter in soil. It's typically a fairly stable form and doesn't move much in the soil profile unless applied in more sandy soils, making fall applications a possibility.

The process doesn't take much moisture, but if soils do get dry, we have to be a little more careful. Whether applying in dry soils or soils with adequate moisture, make sure to apply at an appropriate injection depth so gas is in contact with as much soil as possible, helping to reduce ammonia losses back to the surface. If application equipment causes cloddiness or large air pockets in the soil, it's best to wait. On the flip side, applying under wet conditions may cause the knife track to smear resulting in ammonia loss due to inadequate closure of the knife track. If you can smell anhydrous at the surface, you are likely losing product. How much is difficult to quantify without specialized equipment, but any loss is a concern.

Temperature is third key to keeping the product in a stable form. Higher temperatures equal faster conversions to a nitrogen form more favorable to loss. Lower temperatures keep anhydrous in a form that can remain stable for two to three months (it's why we shoot for soil temperatures below 50 degrees at a four-inch depth. The conversion process from a stable form to a less stable form doesn't *stop* below 50 degrees, but colder soil *does* limit the process, keeping conversion to form susceptible to loss to a minimum. If you're planning to run at the higher end of these temperatures or are concerned about warm stretches in the winter causing conversion to more loss prone forms, you might explore the use of a nitrification inhibitor.

There are lots of reasons to apply N as anhydrous in the fall just as there are also lots of reasons to maximize nitrogen use efficiency with tighter margins ahead. Understanding how anhydrous ammonia works can help you make small decisions now that might make big differences later.

As you make decisions about when to start applications, consider the soil moisture and soil temperature resources available via the Kansas Mesonet. Check out the temperature page at https://mesonet.k-state.edu/agriculture/soiltemp/ . With three stations now providing coverage in the Meadowlark Extension District, it provides a great resource about how these factors are trending. For example, while soil temperatures are trending downwards (a good sign) at all three sights, they aren't low enough to warrant considering applications just yet.