Nitrate Levels in Freeze-Damaged Wheat

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April 13, 2007

We submitted several wheat samples to the Kentucky Livestock Disease Diagnostic Center for nitrate testing on April 11, 2007. Five wheat samples were harvested from Spindletop Farm. The three samples were at either Feekes stage 5 or Feekes stage 6. All three samples came from fields that received the second nitrogen application in mid-March. Total fertilizer nitrogen applies ranged from 100 to 135 lbs N/acre.

Four of the five wheat samples had nitrate levels above the "Safe to Feed" levels. One wheat sample reported nitrate levels of 0.51%, another reported 0.61%, a third sample reported 0.68% while the third sample was "off the charts", meaning that nitrate levels were too high to analyze. The lab personnel plan to dilute the fourth sample on Monday and determine what the actual nitrate level was.

Three of the samples were within the range of 0.44 – 0.88% meaning that this wheat should be limited to 50% of the total dry ration for pregnant animals (Table 1). If these wheat samples were ensiled, then nitrate levels should be reduced to levels safe to feed. However, nitrate testing should be conducted after ensiling and before feeding.

Table 1. Nitrate Levels and Feeding Options

Nitrate (NO_3) in dry matter		Feeding Instructions
0.0-0.44%	0 – 4,400 ppm	Safe to Feed
0.44 – 0.88%	4,400 – 8,800 ppm	Limit to 50% of total dry ration for pregnant animals.
0.88 – 1.50%	8,800 – 15,00 ppm	Limit to 25% of total dry ration. Avoid feeding pregnant animals.
Over 1.50%	Over 15,00 ppm	Toxic. Do not feed.

Sample Technique

The following techniques apply to wheat, other small grains, and other forages that you may wish to have tested for nitrate levels.

Harvest at least one (1) pound of fresh weight for each sample. The plants should be cut at the intended harvest height. We would suggest cutting the plants at no less than three (3) inches above the soil surface. Nitrates tend to accumulate in the lower stems. By keeping the cutting height above three inches, nitrate levels in the harvested plant should be reduced.

Collect a representative sample from each field. Usually five or more locations across a field will serve as a representative sample. Plants from the five or more locations in the field should be combined into one sample for nitrate testing.

If multiple fields are in question, wheat or other crops at different growth stages should be submitted as separate samples. Growth stage, the date when fertilizer nitrogen was applied, and the extent of freeze damage all could affect nitrate levels in the plants.

Cut plants should be stored in paper bags and mailed in cardboard boxes overnight to the testing laboratory. The better option is to put the plant samples in a cooler with ice and drive them directly to the laboratories the same day the plants were harvested. If the plant samples will be stored overnight, then they should be stored in a freezer in paper bags.

When collecting the plant samples, DO NOT put them in plastic bags. Plant samples stored in plastic bags at room temperature will lower nitrate levels, resulting in inaccurate results.

During the handling process, nitrate levels could decrease in the plant sample, especially if they are stored overnight at room temperature. If a period of time has occurred between harvesting and testing the samples, then you could expect that nitrate levels reported would be less than nitrate levels in the field.

Testing Laboratories

Breathitt Veterinary Laboratories in Hopkinsville, KY will return an answer within 24 hours. The Kentucky Livestock Disease Diagnostic Center (LDDC) will return an answer within 3 or more days. Both labs charge $10 per sample. Both labs do not require a veterinarian to submit these samples. County ANR Agents and private farmers from Kentucky CAN submit samples directly to either Breathitt or LDDC. Several commercial laboratories may conduct the nitrate testing as well.

Contact Information

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