Iowa Manure Matters




Odor and Nutrient Management

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"Floaters" Impacted in Iowa

by Mona Bond, Agribusiness Association of Iowa

The Iowa Legislature addressed the issue of overweight floaters in the 2007 Transportation Omnibus bill and the Governor signed HF 793 in the last days of the session. The new regulations became effective July 1, 2007 and apply to commercial owner/operators and farmer producers.

The changes came about as a result of operators being stopped by the Iowa Department Of Transportation (IDOT) for various infractions. This lead to the weighing of the equipment that revealed the existing equipment "as built" exceeded the 20,000 lb/axle limitation placed on the equipment. Negotiations with the IDOT and legislators resulted in applicators being able to continue to use their existing equipment but that new equipment will need to come into compliance with current law. Impacted manufacturers have contacted their customers letting them know what they plan to do as a result of the new law. The key provisions of the bill are as follows.

Current regulations that apply to all floater implements:

- All implements will observe a 35 mph speed limit on roadways; (this is current law);
- Operators must continue to comply with all existing bridge embargos;
- Equipment manufacturers state that implements are to be **run laden only in the field**

The following new regulations apply only to implements that exceeds 20,000 lb/axle as "newly manufactured" defined as it comes "new from the factory".

- Implements that "as newly manufactured" exceed 20,000 lb/axle may be operated on non-interstate highways in a county, provided the implement is permitted for that county; **These implements cannot be legally operated over any bridge, even if it is not embargoed.**
- An annual fee of $600/per implement per county not to exceed $3,500/per implement will be paid, with collected fees going to the secondary road fund of the designated county. Each implement can be permitted in no more than 10 counties;
- No implement weighing over 25,000 pounds may operate;
- Only implements purchased or ordered prior to Feb. 1, 2007 may be permitted;
- No new permits will be issued after July 1, 2007; however, subsequent owners of a previously permitted implement are eligible for permits annually;
- Implements subject to this law that are not permitted are thus in violation and are subject to civil penalties of $10,000 in addition to any other penalties that may apply;
- No implements traveling on the roadway may exceed 20,000 pounds unless permitted

For more information, please contact Mona Bond at (515) 202-9222.

Soil and Cover Crop Responses to Liquid Swine Manure Application

by Cynthia A. Cambardella, Jeremy W. Singer, and Thomas B. Moorman, USDA-ARS National Soil Tilth Laboratory, Ames, Iowa

Introduction

Large-scale pork production is a major agricultural enterprise in the Midwest. Large numbers of confined hogs produce about 50 million tons per year of swine manure in Iowa alone. Rapid expansion of concentrated animal feeding operations (CAFOs) has resulted in increased concentrations of manure nutrients in surface waters, which contribute about 15 percent of the total nitrate load in the Mississippi River Basin. Producers are being encouraged to develop manure management practices that fulfill crop production requirements while minimizing the potential for environmental pollution.

The most commonly used manure management practice in the Midwest involves fall application to land where corn will be grown in the subsequent growing season.

(continued on page 2)

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(Soil and Cover Crop continued from front page)

Fall planted annual cover crops can capture manure nutrients and immobilize them in plant biomass, subsequently reducing the potential for nutrient loss through run-off or leaching. Decomposition of cover crop residue the following spring may help synchronize manure nitrogen (N) availability and corn N uptake, improving nutrient-use efficiency within the crop rotation.

Description of Experiments

We conducted experiments to evaluate the effects of integrating a rye/oat cover crop with liquid swine manure application on retention of manure N in a corn-soybean cropping system (Figure 1a and 1b). Our objectives were to compare soil N changes after manure application with and without a cover crop and to evaluate cover crop and soil N response for three manure-N rates (Table 1). Target N rates for manure application were 0, 100, 200, or 300 lb N/ac. Liquid swine manure was injected about six to eight weeks after a 70 percent rye/30 percent oat cover crop mixture was drop-seeded in soybean. Manure was injected to a depth of 5 inches using a narrow-profile knife designed to minimize soil disturbance.

We measured cover crop shoot biomass and N and phosphorus (P) uptake in mid-November and mid-April following manure injection. Surface soil (0-8 in) inorganic N in the manure injection band was quantified every week for up to 6 weeks after manure application and in the following spring before and up to 6 weeks after killing the cover crop prior to corn planting. Soil profile (to 48 inches in 8 inch increments) inorganic N was also quantified before manure application in the fall and before the cover crop was killed the following spring.

Table 1. Field operations conducted from 2005-2007 within two fields at the Iowa State University Agronomy and Agricultural Engineering Research Farm near Boone, Iowa

Field Activities	Dates
Cover crop seeded	8/31/05 and 9/8/06
Deep soil cores-fall	10/5/05 and 10/13/06
Manure applied	10/11/05 and 10/25/06
Surface soil cores-fall	10/11-11/22/06 and 10/25-11/16/06
Deep soil cores-spring	4/14/06 and 4/18/07
Cover crop killed	4/18/06 and 4/20/07
Surface soil cores-spring	4/27/06 and 5/1-6/7/07

Results

Soil Inorganic Nitrogen

Surface soil nitrate-N concentrations were more than 30 times higher in the fall of 2005 than in 2006. Nitrate-N was significantly lower under the rye/oat cover crop at 22 days after manure application in the fall of 2006 (0.80 ppm with cover crop; 3.22 ppm without cover crop), but in 2005, the difference wasn't apparent until 42 days after manure application (56 ppm with cover crop; 89 ppm without cover crop). September and October were significantly warmer and drier in 2005 than in 2006 (Table 2). Soil nitrate-N production increases with increasing temperature and nitrate-N leaching potential increases with increasing rainfall. Therefore, significant amounts of soil nitrate-N were probably lost from the top 8 inches of soil in 2006 compared to 2005.

The rye/oat cover crop reduced nitrate-N in the surface soil and nitrate-N leaching beneath the manure band measured in April of 2006 (Figure 2). Total soil profile inorganic N content was positively related to manure N application rate and was significantly lower under the rye/oat cover crop (Table 3).

Table 2. Climate data Fall 2005 and 2006†

	2005	2006
September 1-30	F° or inches	F° or inches
Avg. Daily High Air Temp.	81	73
Precipitation	3.4	7.5
October 1-31		
Avg. Daily High Air Temp.	66	60
Precipitation	0.4	2.0
November 1-15		
Avg. Daily High Air Temp.	52	51
Precipitation	1.4	1.6

†NWS COOP site Ames 8SW

Table 3. Soil profile inorganic N in spring of 2006 following liquid swine manure injection

	Inorganic N
Spring 2006	lb N/ac
No CC, No Manure	92
CC, No Manure	47
Manure @ 200 lb N/ac	358
CC+manure @100 lb N/ac	159
CC+manure @200 lb N/ac	202
CC+manure @300 lb N/ac	356

Cover Crop Production and Nutrient Uptake

Aboveground cover crop biomass production was greater in the spring (1201 lb/ac) than in the fall (268 lb/ac) for both years. Increasing the manure N rate from 0 to 300 lb N/ac had no effect on cover crop shoot biomass in the fall (368 lb/ac in 2005; 167 lb/ac in 2006) or spring (1588 lb/ac in 2006; 815 lb/ac in 2007) of either year.

Similarly, aboveground cover crop biomass N and P uptake didn't differ for the three manure N rates and the non-manured control in the fall (11.1 lb N/ac and 1.1 lb P/ac in 2005; 5.7 lb N/ac and 0.3 lb P/ac in 2006), but N and P uptake after application of at least 200 lb N/ac of manure N was significantly greater than the control in the spring (34.7 vs 76.4 lb N/ac and 6.9 vs 12.6 lb P/ac in 2006; 29.0 vs 43.4 lb N/ac in 2007).

Conclusions

We have demonstrated that a rye/oat cover crop reduces soil inorganic N after liquid swine manure injection. Cover crop impacts on soil N are observed within a month after application and persist into the following spring. Cover crop nutrient uptake was higher than the control in the spring when at least 200 lb manure N/ac was applied. These results quantify the potential for cover crops to enhance plant nutrient uptake and reduce N leaching potential in farming systems using manure. Our future research will investigate when cover crop nutrients are released and become available to subsequent crops.

Figure 1a. Rye/oat cover crop in fall 2005 after liquid swine manure injection

Figure 1b. Rye/oat cover crop in spring 2006

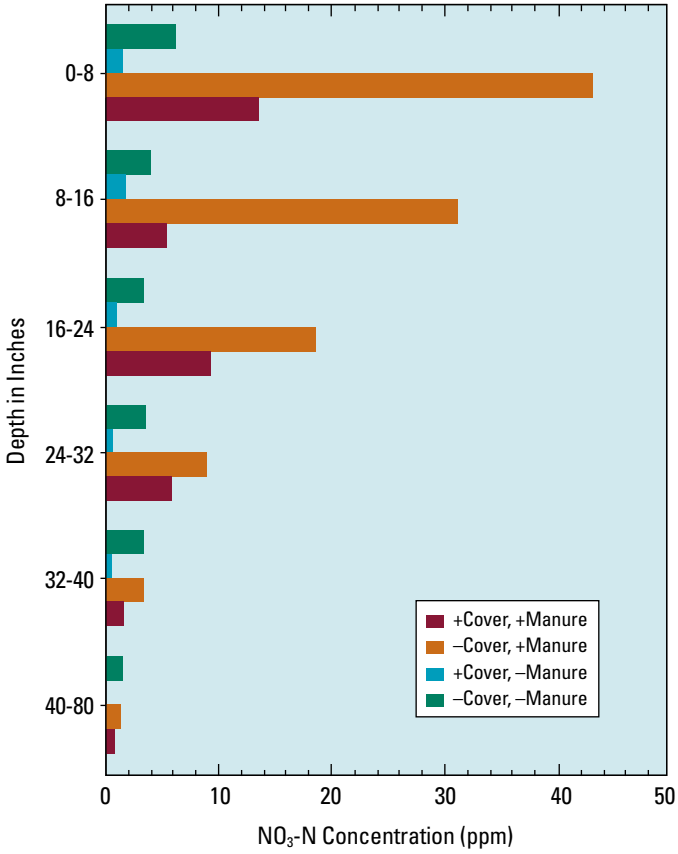

Figure 2. Soil profile nitrate-N concentrations in the spring of 2006 following fall injection of liquid swine manure

(continued on page 4)

Visual Assessment: Beef Manure Application Rates

Do you know how much manure you apply? The following photos represent five different rates of solid beef manure applied to cornstalk residue. Can you guess the rates? The manure was hand-applied to the plots on Aug. 21, 2006 as part of the field demonstration activities at the 2006 Manure Management Clinic. Answers appear at the bottom of the page 5.

For more information on solid manure calibration and uniformity of distribution please see Iowa State University Extension Publication PM 1941 ***Calibration and Uniformity of Solid Manure Spreaders.*** This publication can be ordered through any ISU Extension county office or online at https://www.extension.iastate.edu/store/.

Application Rate 1

Application Rate 2

Application Rate 3

Application Rate 4

Application Rate 5

How do you know if you have 500 animal units?

Check the table below to see the **animal unit capacity (AUC)** of your facility. To calculate the AUC of the operation, multiply the maximum number of each animal species confined at one time by the appropriate factor indicated below, then add all animal units together:

AUC = (No. of HEAD) × (FACTOR)

Animal Species	(No. HEAD)	× (FACTOR)	= AUC
Slaughter or feeder cattle	_____	1.0	_____
Immature dairy cattle	_____	1.0	_____
Mature dairy cattle	_____	1.4	_____
Swine over 55 lbs.	_____	0.4	_____
Swine 15 lbs. to 55 lbs.	_____	0.1	_____
Sheep and lambs	_____	0.1	_____
Horses	_____	2.0	_____
Turkeys 7 lbs. or more	_____	0.018	_____
Turkeys less than 7 lbs.	_____	0.0085	_____
Broiler or layer chickens 3 lbs. or more	_____	0.01	_____
Broiler or layer chickens less than 3 lbs.	_____	0.0025	_____

Answers

Application Rate 1: 40 tons per acre
Application Rate 2: 10 tons per acre
Application Rate 3: 20 tons per acre
Application Rate 4: 30 tons per acre
Application Rate 5: 50 tons per acre

Proposed DNR Rule Makes Financing Deep-Bedded Buildings Attractive

by Karen Grimes, DNR

Low interest loans for deep-bedded buildings are likely to be available to livestock producers sometime in October as the result of a new rule approved by the Iowa Environmental Protection Commission on Aug. 7.

Only small and mid-size facilities that will total less than 1,000 animal units are eligible because of federal funding sources that limit the loans to facilities that are not concentrated animal feeding operations (CAFOs). The 1,000 animal units are equivalent to 1,000 beef cattle or 700 mature dairy cows.

Although the rules are not yet final, they would allow loans of up to three percent interest to be used for deep-bedded buildings that:

1) replace an existing open feedlot, or
2) expand a facility as an addition to an existing open feedlot, provided the existing open feedlot remains in compliance with all environmental rules.

Producers often spend about $400 to 500 per head on converting to this type of building, so the low interest loan is an attractive option. The loan can be financed for more than 90 percent of the cost. Or, a loan can be used for eligible expenses in addition to items cost-shared through the federal Environmental Quality Incentives Program (EQIP). Total funding cannot exceed 100 percent. Producers have 20 years to pay back the loan.

Funding is available for the buildings because they confine the animals and manure, preventing the possibility of runoff or discharge of the manure. The loans cannot be used for some of the minor costs of the project, such as feed bunks or watering facilities, that don't have a direct benefit to the environment or Iowa's water quality.

Producers may apply for loans through many local lenders. Applications and more information about the program are available on the DNR Web site at www.iowasrf.com. Click on Livestock Water Quality Facilities. Or, contact Patti Cale-Finnegan, DNR State Revolving Fund Coordinator, at (515) 725-0498 or patti.cale-finnegan@dnr.state.ia.us.

The loans are available through the Livestock Water Quality (LWQ) Facilities program, part of the Clean Water State

(continued on page 6)

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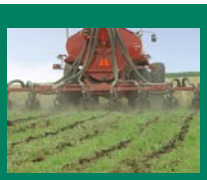

(Proposed DNR Rule continued from page 5)

Revolving Fund (SRF). This ongoing program has provided nearly $3 million to finance eligible manure management structures, equipment and plans.

Federal rules limit the use of SRF loans to publicly owned point sources, such as municipal wastewater treatment facilities. Non-CAFO livestock operations are eligible because they are considered non-point sources. Their non-point source status also allows a simple financing system without many of the other federal requirements affecting point source loans.

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