



# Odor and Nutrient Management

Summer 2008  
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## ONM Newsletter Will Move to Electronic Distribution

by Angela Rieck-Hinz, Department of Agronomy, Iowa State University

This year marks the eleventh year for the production and distribution of this publication, the Iowa Manure Matters-Odor and Nutrient Management Newsletter (ONM). As we begin this publication year, we will initiate a new delivery format of the newsletter.

Starting with the December 2008 issue we will no longer produce a printed and mailed ONM newsletter. The newsletter will be available in electronic format only. To receive the newsletter electronically, you need to sign up for an email notification that will tell you when the latest edition of the newsletter has been posted to the Web and give you direct access the newsletter articles. To sign up for electronic notification please complete and submit the information form found at: <http://www.agronext.iastate.edu/immag/subscriptions.html>. Choose the button for "ONM Newsletter."

Also at this site, we have included a subscription button to receive the Iowa Manure Management Action Group (IMMAG) monthly email update. If you do not currently receive this email newsletter you may also choose to select this option. You may manage your subscriptions to the ONM newsletter, the IMMAG email update or both by clicking on the links in the email notifications you receive.

You will receive the final printed ONM newsletter by mail in September as we transition from print newsletters to electronic distribution.

It has been a pleasure to offer this newsletter in the print format for the past eleven years and we greatly acknowledge the financial contributions of the Iowa Natural Resources Conservation Service for their past funding support. As we transition to the new electronic format for delivery we hope you continue to find this newsletter to be a valuable source of information.

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## P-Index Manure Management Plans—The Final Push

by Angela Rieck-Hinz, Department of Agronomy, Iowa State University

Senate File 2292, passed by the Iowa Legislature in the spring of 2002, set forth requirements for producers to meet the Phosphorus Index (P-Index) manure management plan requirements if they had more than 500 animal units in confinement. That law also provided a phased implementation schedule for adoption of the P-Index manure management plans. We have now reached the final phase-in period for implementation of the P-Index plans.

Beginning on August 25, 2008, those producers who filed their original manure management plans with the Department of Natural Resources (DNR) prior to April 1, 2002, will need to file their P-Index manure management plan with DNR when their annual update is due. The DNR estimates that nearly 2,500 plans will need to convert to the P-Index sometime between August 25, 2008 and August 2009. We estimate this will be the largest number of plans to make the conversion in a 12-month time frame since the rules were implemented.

### What does this mean to you?

If you are a livestock producer with more than 500 animal units in confinement and your P-Index plan will be coming due, here are the things you should be considering in preparation of your impending deadline.

(Continued on page 2)



(P-Index continued from front page)

1) Know when your P-Index plan is due. The DNR will send you a letter 45 days in advance of when your plan is due. Don't wait until you receive this letter to begin planning for your P-Index plan.

2) With the wet fall last year and the wet spring this year, getting soil sampling done has been challenging. The P-Index requires you to meet minimum soil sampling requirements for existing facilities and the samples must be less than 4 years old. You are required to have these soil samples by the time your plan is due. Take soil samples now for plans due this fall, or plan to sample this fall for plans due this winter and next spring. You can take your own soil samples, but if you plan on having your local co-op or service provider take the samples—get on their schedule now. Make sure they know what is required. For more information on soil sampling requirements see this previous newsletter article (Spring 2006, EDC-129-30, Volume 9, Issue 1) “Sample soil and plan now for fall manure management that includes the P index” at <http://www.extension.iastate.edu/Pages/communications/EPC/Spring06/plannow.html>

3) Have as much data available as possible prior to beginning the development of your P-Index plan. Because the use of the Iowa Phosphorus Index calculator also requires the use of the Revised Universal Soil Loss Equation 2 (RUSLE2) software, there are many pieces of data such as crop rotations, tillage practices, slope length and slope percent, residue amounts, manure applications, and conservation practices that are needed. A data collection worksheet is available to help you determine what is needed and where to find the needed information. Please see Iowa State University Extension fact sheet PM 2021 “Data Collection Worksheet for RUSLE2 and the Iowa Phosphorus Index” available at: <http://www.extension.iastate.edu/Publications/Pm2021.pdf>

4) If you plan to hire a consultant, contact them now, don't wait. Many of the consultants who are preparing P-Index plans tell us they are busy and it is difficult for them to take on new clients. A link to a list of consultants who develop manure management plans is available in the resource list on this page. In addition to the soil sample requirements, there are many pieces of data that must be collected to implement the P-Index software. The process for completing this requirement can be lengthy depending on how many fields receive manure, if you are distributing manure through manure agreements, and the amount of required information you have on hand. For additional information about hiring a consultant, please see this previous newsletter



article (Spring 2007, EDC-129-35, Volume 10, Issue 1) “Your Phosphorus Index Manure Management Plan” at <http://www.extension.iastate.edu/Pages/communications/EPC/Spring07/pindex.html>.

5) If you are distributing manure from your facility to the neighbors through a manure easement or agreement, the fields receiving that manure, while owned or managed by someone else, will still need to be part of your manure management plan and will still require having the P-Index calculated on those fields. Plan in advance to work with your neighbors to get the necessary information to implement the P-Index.

The message of this article is clear, if your P-Index plan is due sometime in the next 12-13 months, don't delay in developing the requirements of your P-Index plan.

### Manure and Nutrient Management Plan Resources

Manure Management Plan Consultants

<http://www.agronext.iastate.edu/immag/spprivmmp.html>

Iowa P Index Calculator

<ftp://ftp-fc.sc.egov.usda.gov/IA/technical/pindex010307.xls>

The Iowa Phosphorus Index and Manure Management Plans for Confinements

[http://www.iowadnr.com/afo/files/pindex\\_fs.pdf](http://www.iowadnr.com/afo/files/pindex_fs.pdf)

IDNR Forms for Manure and Nutrient Management Plans

<http://www.iowadnr.com/afo/forms.html>

Data Collection Worksheet for RUSLE2 and Iowa Phosphorus Index

<http://www.extension.iastate.edu/Publications/Pm2021.pdf>



### Livestock Water Quality Loan Program Update

by Pattie Cale-Finnegan, Iowa Department of Natural Resources

Since 2006, the Livestock Water Quality Facilities Program has provided low-interest loans for livestock producers. As part of the State Revolving Fund (SRF), the program assists producers who want to prevent or reduce water quality problems. Manure management practices, equipment, and planning are all eligible for loans.

The program has been operated through a partnership between the Iowa Agricultural Development Authority (IADA), the Iowa Finance Authority, and the Iowa Department of Natural Resources.

Beginning in June 2008, local Soil and Water Conservation Districts will assume the IADA's role in processing applications. The Iowa Department of Agriculture and Land Stewardship Division of Soil Conservation (DSC) and the Natural Resources Conservation Service will provide support.

This is not a new role for the districts and the DSC. They have successfully operated the Local Water Protection Program since 2005 to finance soil, sediment and nutrient control practices. The districts will now be a one-stop shop for farmers to apply for technical and financial assistance for both loan programs.

Producers will now have one loan application form, one application process and one Web site to consult when considering a water quality-related improvement on their farm.

For local water protection practices, such as grass waterways, terraces, pasture or hayland planting, streamside forest buffers, and filter strips, the loan term is up to 10 years. Loan amounts can range from \$5,000 to \$50,000.

For manure management projects, including equipment for manure management, developing manure management plans, and construction of manure management structures, the loan term is up to 20 years. Minimum loan amount is \$10,000 and currently there is no maximum loan amount. Livestock producers must have a combined total of less than 1,000 animal units. That is the equivalent of 1,000 beef cattle, 700 mature dairy cattle or 2,500 finishing swine.

Producers can finance up to 100 percent of the project cost with loans starting at \$5,000. The loans can also be used in conjunction with state or federal cost share. Applications are available on the IDALS Web site at <http://www.iowaagriculture.gov/FieldServices/waterQualityLoanFund.asp>

Since the beginning of the livestock water quality loan program, more than \$7 million worth of projects have been financed. The average loan amount for the 109 projects was \$65,000. Another \$8 million worth of project applications have been approved, with construction and financing in progress.

In October 2007, the program began accepting applications for the construction of deep-bedded confinement buildings primarily to replace existing open feedlots. Since then, 18 applications have been approved. Four of them have been constructed and financed. The average loan amount for completed buildings was \$240,000. Hoop structures and monoslope buildings are eligible. Some projects have also received cost-share funding through the Environmental Quality Incentives Program (EQIP).

The loan programs are part of the Iowa SRF. Under an agreement with the U.S. Environmental Protection Agency, the SRF is administered by the DNR and the Iowa Finance Authority.

#### For more information, contact:

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### Planning Considerations for Livestock & Poultry Mortality Disposal by On-farm Burial

by Tom Glanville, Department of Agricultural and Biosystems Engineering, Iowa State University

While a major portion of livestock mortalities is still handled by the rendering industry, the number of rendering plants has declined significantly in recent years. Some producers say they no longer can obtain rendering service, and others are faced with higher rendering service bills or less frequent service. As a result, a growing number of producers are considering on-farm disposal methods. This article looks at some of the pros and cons of on-farm burial as an alternative to rendering.

One of the first questions that livestock producers often ask is how the costs of burial compare with those for rendering. Since there is no quarterly bill to pay for on-farm burial, the true costs—of the land for the burial site itself; for the time and labor needed to excavate and close trenches; and the capital and operating costs of the equipment needed for burial—can be difficult to assess. Since rendering service fees include all costs associated with that option, a fair cost comparison must also include all costs associated with alternative disposal methods. When all costs associated with burial are carefully reported, some studies have actually shown that burial costs exceed those for rendering. A 2001 Iowa State University survey of mortality disposal costs reported by 300 Iowa swine producers, for example, showed that the total cost of burial was more than twice the cost of rendering.

Beyond the initial concerns related to cost, are additional questions concerning convenience, operational flexibility, and special facilities or equipment that may not be a normal part of livestock production. When properly planned and managed, on-farm burial offers the flexibility of being able to handle mortalities of any size. Burial also is reasonably convenient, and required facilities and equipment—a backhoe for trench or pit excavation and backfilling, and a sufficient amount of well-drained land area for a burial site—are often part of existing operations. Excavation and backfilling can be difficult when the ground is frozen, but this is typically overcome by opening a sufficient length of trench during warm weather to meet anticipated burial needs when the soil is frozen.

The primary disadvantage of burial is its potential to contaminate soil, shallow groundwater, or nearby streams that derive their dry weather flow from shallow groundwater. The burial-related pollutant of greatest concern is nitrogen which can be released as both ammonia, or nitrite and nitrate. Total ammonia-nitrogen concentrations of only 1-2 milligrams per liter (mg/L) can create chronic toxicity problems for young fish, and drinking water containing nitrate-nitrogen concentrations greater than 10 mg/L poses health threats to human infants.

As every crop and livestock producer who has ever developed a nutrient management plan knows, when nitrogen application rates significantly exceed agronomic rates for crop production, the potential for groundwater pollution increases. Unless livestock burial rates are purposely limited, however, the amount of nitrogen contained in carcasses can easily exceed agronomic rates. A thousand pounds of animal carcasses contains about 20 pounds of nitrogen that will be released into the soil as the carcasses degrade. Side-by-side burial of medium sized (150 lb) swine carcasses in a single layer can easily result in carcass loading rates equivalent to more than 1,000,000 lbs per acre, and nitrogen loading rates equivalent to 20,000 pounds per acre. Stacking of carcasses in a deep pit or trench can cause even higher rates. Even if decomposition were to take 10-20 years, this equates to average N releases of 1,000-2,000 pounds per acre per year, rates far in excess of typical agronomic rates. Furthermore, since carcasses are often buried four or more feet below ground, this puts the carcass nitrogen below the root zone for many crops, thereby reducing the potential for beneficial uptake, and further increasing the potential for the N to move into shallow groundwater.

To avoid the nitrogen pollution potential described above, the weight of carcasses buried in a given area must be limited. To accomplish this IOWA DNR rules limits routine on-farm burial to 7 cattle, 44 swine, 73 sheep or lambs, or 400 poultry carcasses on any given acre per year. All other species are limited to 2 carcasses per acre.

When catastrophes cause sudden loss of large numbers of animals, higher loading rates than those listed above are permitted by Iowa DNR on a case-by-case basis if local geology and other conditions are judged to be such that local water resources will not be seriously impaired. Be sure to contact Iowa DNR (emergency phone number is 515/281-8694) for a ruling on emergency burial sites before proceeding with disposal.



For planning purposes, the Iowa DNR interactive Livestock Burial Zones map, which can be accessed on the World Wide Web at <http://csbweb.igsb.uiowa.edu/imsagate/introduction/home.asp> is a useful tool for identifying areas on your property that are suitable for burial of large quantities of carcasses. Using the interactive map, you can view maps and aerial photos of your property that identify potential problem locations for mass burial based on Iowa DNR's geographic information system database.

To further limit the potential for damage to valuable water resources and property, IDNR rules also require that burial sites be located outside of wetlands, floodplains, and shoreline areas. Maximum allowable burial depth is six feet, and burial must also be at least two feet above the highest seasonal groundwater elevation. Required horizontal setbacks are at least: 100 feet from a private well, stream, lake, or pond; 200 feet from a public well; 50 feet from property lines; and 500 feet from a residence.

### New Legislation May Affect Producers with Animals in Open Feedlots and Confinements, Livestock Markets and NPDES Permit Holders

by Karen Grimes and Randy Clark, Iowa Department of Natural Resources

The 2008 General Assembly passed new legislation designed to bring Iowa laws into agreement with federal laws for livestock and poultry operations. These primarily affect animal feeding operations that could be required to apply for a National Pollutant Discharge Elimination System (NPDES) permit. There were three major changes in the law.

The change most likely to affect Iowa producers is one that will require combining and counting all the animals of the same animal type category, as provided in federal law, regardless of housing type for purposes of NPDES permits.



This means, for example, that a producer who has 550 beef cattle in an open feedlot and another 550 in a deep-bedded or other type of confinement (totally roofed) will now have to count all beef cattle together. In this case, the combined animals would be 1,100, more than enough to exceed the 1,000 beef cattle that would make the operation a large concentrated animal feeding operation (CAFO) and potentially subject to NPDES permit requirements.

There are several unanswered questions about the impact of the legislation such as how close the two types of housing need to be in order to be combined as one operation. Another question concerns nutrient management plan (NMP) requirements if a facility previously submitted a manure management plan (MMP) for the animals in confinement. Those answers will become available as the Iowa Department of Natural Resources (DNR) develops rules and seeks public input on those proposed rules.

However, producers are encouraged to review Chapter 3 of EPA's Producer Compliance Guide for CAFOs at <http://cfpub.epa.gov/npdes/afo/compliance.cfm> and then contact the DNR later this summer if they believe an NPDES permit is required for their combined operation. If a permit is required, the producer must submit a complete permit application to the DNR on or before December 31, 2008. A complete application includes developing an NMP and providing public notice through a newspaper of general circulation.

A second change will affect a relatively small number of livestock markets. Livestock markets that confine and feed animals for 45 days or more in a 12-month period could need an NPDES permit if the number of head fall within one of the federal CAFO thresholds.

Finally, if an open feedlot has an NPDES permit and wants to discharge after a large rain event as specified in the permit, the discharge would only be allowed if they are complying with all permit conditions, including the record keeping.

The new legislation can be viewed on the Iowa General Assembly Website, under House File 2700, Division 8, Animal Feeding, Section 143 to 148 or at <http://coolice.legis.state.ia.us/Cool-ICE/default.asp?category=billinfo&service=billbook&GA=82&hbill=HF2700>. Most provisions become effective on December 31, 2008. However, a section requiring the DNR to develop an educational effort becomes effective on July 1.

More information about NPDES permits is available on the DNR Web site at <http://www.iowadnr.com/afo/index.html>.



## Changing Nutrient Values Mean 'New' Focus on Manure

by John Lawrence and Joe Lally, Iowa Beef Center, Iowa State University

Commercial fertilizer rates continue to increase. Prices for N-P-K booked for the 2009 crop have increased 90, 55, and 160 percent, respectively over the spring 2007 prices used in this exercise. The message is the same. Manure has value and implementing a nutrient management plan is essential to capturing its fullest potential.

Nutrient management planning pays a lot of attention to balancing available nutrients from manure to the nutri-

ent needs of crop production. One perspective looks at whole farm balance which accounts for nutrients entering the livestock farm in the form of purchased feed, fertilizer, animals or as nitrogen (N) fixed by legumes, and the nutrients leaving the farm in the form of animals or crops. Any imbalance between inputs and outputs could be added to soil reserves or lost to the environment. Nutrient planners evaluate this balance at the field level or even within a field. They develop a plan that is often defined by regulations or guidelines set by state or federal agencies.

When it comes to nutrient management most farmers have three objectives. First as stewards of the land and water, they want to do the right thing. Second, if they have a permit or an EQIP contract they are legally bound to

**Table 1. Impact of Changing Commercial Fertilizer Prices on the Value of Manure**

Species	Nutrients per unit		Potential Value per unit of manure		Potential Value per acre applied ahead of corn in a corn-soybean rotation	
			2002	2007	2002	2007
Grow-Finish Hogs (150 lbs)	N	58	\$11.08	\$24.59	Apply every other year	
625,000 gallons	P <sub>2</sub> O <sub>5</sub>	40	\$9.60	\$18.16	212 ac.@ 2930 gal/ac	
Unit = 1,000 gal.	K <sub>2</sub> O	45	\$6.16	\$10.48	\$78.64	\$155.96
			\$26.84	\$53.23		
Dairy Cows (1200+lbs)	N	25	\$4.77	\$10.60	Apply every other year	
4,697,550 gallons	P <sub>2</sub> O <sub>5</sub>	12	\$2.88	\$5.44	533 ac.@ 8800 gal/ac	
Unit = 1,000 gal.	K <sub>2</sub> O	11	\$1.50	\$2.56	\$80.52	\$163.68
			\$9.15	\$18.60		
Beef – Open Lot (1000 lbs)	N	16	\$3.05	\$6.74	Apply every fourth year	
2,000 Tons	P <sub>2</sub> O <sub>5</sub>	16	\$3.84	\$7.26	100 ac.@ 20 ton/ac	
Unit = 1 ton	K <sub>2</sub> O	14	\$1.91	\$3.26	\$176.00	\$345.20
			\$8.80	\$17.26		
Layer, Caged (6 lbs)	N	25	\$4.77	\$10.60	Apply every fourth year	
1,050 Tons	P <sub>2</sub> O <sub>5</sub>	80	\$19.20	\$36.32	262 ac.@ 4 ton/ac	
Unit = 1 ton	K <sub>2</sub> O	50	\$6.85	\$11.65	\$123.28	\$234.28
			\$30.82	\$58.57		
Turkey litter (10 lbs)	N	20	\$3.82	\$8.48	Apply every fourth year	
1,944 Tons	P <sub>2</sub> O <sub>5</sub>	40	\$9.60	\$18.16	243 ac.@ 8 ton/ac	
Unit = 1 ton	K <sub>2</sub> O	25	\$3.42	\$5.82	\$134.72	\$259.68
			\$16.84	\$32.46		

The assumptions used in this table include:

- 1,000 Animal Unit Capacity Farm.
- 2002 Fertilizer Prices per unit N: \$0.19; P<sub>2</sub>O<sub>5</sub>: \$0.24; K<sub>2</sub>O: \$0.14
- 2007 Fertilizer Prices per unit: N: \$0.42; P<sub>2</sub>O<sub>5</sub>: \$0.45; K<sub>2</sub>O: \$0.23
- Corn-Soybean (C-B) rotation, manure applied ahead of corn; 200 bu. Corn; 60 bu. Soybean.
- The land receiving the manure can utilize the nutrients and achieve the yield goal
- Multi-year application of P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O and nutrient applications will stay put until the growing crop demands the nutrients.
- Additional N is added to corn in year three of four year rotations.

*This article originally appeared in the November 2007 Heartland Animal Manure Management Newsletter.*



implement their plan. Third, they are in business to make a profit. Between 2002 and 2007 commercial fertilizer prices have doubled aligning all three objectives are more closely.

Table 1 illustrates how the value of manure has increased as the April price of commercial fertilizer has risen. The price of N rose from \$0.19 / unit in 2002 to \$0.42 / unit in 2007 or a 121% increase. Similarly, the P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O per unit costs have increased by 87% and 77%, respectively. As a result, the value of manure in a corn-soybean rotation has doubled in five years.

The opportunity to utilize manure nutrients will depend on the management activities governing the capture of the nutrient load. Nitrogen, the leakiest element of all three will escape to the environment if given no consideration for its value or volatility. Land treatments, rotations, tillage practices, timing of application, and environmental influences all contribute to successful manure handling and application of this source of natural and essential crop nutrients. The value of manure nutrients is an opportunity to capture value according to specific needs of the crops. Farmers can capture greater value, greater profit, by putting manure nutrients where they are needed. That is where a nutrient management plan is essential. Now that manure has more potential value, producers have greater incentive to manage nutrients more closely by following a nutrient plan that incorporates agronomics and stewardship.

### Upcoming Events

by Angela Rieck-Hinz, Department of Agronomy, Iowa State University

Several manure management events throughout Iowa and the Midwest are being offered by commodity groups, local producers, watershed groups, equipment manufacturers, state agency staff and extension services in 2008.

Some of these events require registration. For more information regarding these events, including directions and registration requirements, please visit the Iowa Manure



Management Action Group (IMMAG) Web page at <http://www.agronext.iastate.edu/immag/> and click the Events button. The list on the IMMAG Web is updated continuously throughout the year.

**The Great Lakes Manure Handling Expo** – will be London, OH, on July 9. The theme of the Great Lakes Manure Handling Expo is “The Economics of Recycling” and will include commercial field demonstrations, educational demonstrations, educational sessions and commercial vendor displays.

**Water Quality and Layer Manure As a Fertilizer** – this conference hosted by Iowa State University and the Egg Industry Center will help producers learn how to use this valuable fertilizer resource to benefit their operations. Presentations will include research information on layer manure and water quality impacts, use of layer manure as fertilizer source, eggshells as a liming source, sampling manure, economics and selling layer manure. The conference will be held on July 10, 2008 from 9 a.m. to 3 p.m. at the Scheman Building on campus at Iowa State University. The program agenda and registration information is located at: <http://www.agronext.iastate.edu/immag/info/wqlayermanure08july10.pdf>. Although there is no cost, registration is requested by July 1 to help organizers plan for refreshments and lunch. For registration information, contact Peg Uthe at (515) 294-6994 or [pluthe@iastate.edu](mailto:pluthe@iastate.edu).

**Fall Commercial Manure Applicator Certification Workshop** – hosted by Iowa State University Extension in cooperation with the Iowa Department of Natural Resources for commercial applicators needing to meet certification requirements for fall. This workshop will be held on August 20, from 9 a.m. to noon in designated county extension offices throughout Iowa. This workshop will offer the same materials presented at the January 2008 training. Contact your local county extension office or visit <http://www.agronext.iastate.edu/immag/mac.html> to determine locations for this workshop.

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## Iowa Manure Matters: Odor and Nutrient Management



(Upcoming Events continued from page 7)

**“Buying and Selling Manure”** – workshops offered by Iowa State University Extension will address the concerns of the buyer and seller, and will discuss crop needs, legal requirements, application issues, pricing manure and manure agreements. The workshops will be held on:

August 22, 2008 at 1:30 p.m. at the Carroll County Extension Office

August 26, 2008 at 9:00 a.m. at the Western Iowa Community College in Cherokee

August 26, 2008 at 1:30 p.m. at the Northwestern Iowa Community College in Sheldon.

Registration is \$25 if postmarked by Monday, August 18, or \$35 payable at the door. Registrations should be sent to Kris Kohl, Buena Vista County Extension Office, PO Box 820, Storm Lake, IA 50588. If you have questions please call Kris Kohl at 712-732-5056.

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