Implementing Nutrient Management Practices in Wisconsin

Presentation to the American Society of Agronomy
Division A-4
November 3, 2003

Larry G. Bundy
Dept. of Soil Science
University of Wisconsin-Madison

Scott J. Sturgul
Nutrient & Pest Mgmt. Prog.

Susan M. Porter
Wis. Dept. of Agric. Trade & Consumer Protection
Implementing Nutrient Management Planning in Wisconsin

University
Soil Fertility Research

Agricultural & Natural Resource Protection Agencies
Water Quality Protection

Education & Demonstration

Nutrient Management Standard - 590

Implementation on Wisconsin Farms
Private Industry, Conservation and Extension staff
Research-based Recommendations/BMP’s

- Corn nitrogen recommendations
- Legume N credits
- Manure credits
- P & K calibration and recommendations
- Starter fertilizer recommendations
The “590” Nutrient Management Standard

- Developed by multi-agency and multi-disciplinary committee.
- Goal was to provide a UNIFORM standard for use in various federal, state, and local nutrient management programs.
- Issued in 1991.
Education/Implementation Efforts

- Nutrient and Pest Management Program (NPM)
- Certified Crop Adviser (CCA) Training
- Local Nutrient Management Focus Groups
- Farmer Education Program
- Training for Nutrient Management Planners (TNMP)
- Quality Assurance Team
Nutrient & Pest Management (NPM) Program

- **What we do**
  - Promote agricultural management practices that protect water quality while maintaining or improving farm profitability.
  - Facilitate information exchange between farmers and researchers.

- **Activities**
  - On-farm demonstrations, publications, spreader calibrations, training, one-on-one education

- **Regional & campus-based staff**
What Is a Farm Nutrient Management Plan?

A farm nutrient management plan is a strategy for storing the nutrients that flow from your farm into the environment. It is a plan that protects the quality of nearby water resources. South may enjoy rain, but if the rain comes in the form of fertilizer, it can be a problem. Nutrient management planning involves some unique challenges. As plans require thought and understanding the period developing the plan until the plan is followed, the plan will achieve.

There are three components to any farm nutrient management plan. Remember these three:

- Soil test reports
- Manure application plans
- Crop rotation plans

Soil Test Reports

Complete and accurate soil tests are the starting point of any farm nutrient management plan. All applied fields must be tested or have been tested within the last three years. From the soil test results, the base fertilizer recommendations for each field are given.

Manure Application Plans

Manure applications to fields supply crops with nitrogen, phosphorus, and potassium in addition to soil and organic nitrogen. Legumes can also provide a nitrogen source for crops, including legumes such as alfalfa, cover crops, etc. Supply amounts to these systems, or their combinations, thereby increasing yields and soil health.

Crop Rotation Plans

Crop rotation plans are important to managing nutrients. By alternating crops, you can reduce the risk of nutrient buildup in the soil, which can lead to nutrient deficiencies or imbalances. Crop rotation plans also help to control pests and diseases, which can reduce the need for chemical inputs.
Certified Crop Adviser (CCA) Training

- Annual 2-day pre-test training
- Educational programs to provide CEU's
  - Area fertilizer/soil & water management meetings
  - Wisconsin Fertilizer Conference
  - Research Station Field Days
  - Crop Diagnostic Clinics
- Currently 700+ CCA’s in Wisconsin
  - 463 in 1996
Regional Nutrient Management Focus Groups

- **Intent:** Resolve local nutrient management planning issues.
- **Location:** Six groups regionally distributed across Wisconsin.
- **Composition:** Local (county-based) conservation and Extension, private sector businesses, state and federal agencies.
Nutrient Management Farmer Education Program - Curriculum

- Based on UW soil fertility recommendations and current nut. mgmt. regulations.
- Delivered locally by UWEX, LCD, NRCS, private industry.
- Workshops, on-farm demonstration, etc. with end product being functional nutrient management plans.
- Accomplishments:
  - 800+ producers participated
  - 251,000 acres
  - 28 Wisconsin Counties
Training for Nutrient Management Planners (TNMP) Workshops

- Principles of NM, conservation planning, manure management, NM regulation requirements, mechanics of assembling a plan, plan writing exercise.
- Audience - Certified Crop Advisors (CCAs) and county-based soil conservation staff.
  - Over 400 participants to date
- Presented by: UWEX, NPM, DATCP, NRCS
- Financial support from: WI CCA Program and NRCS
Quality Assurance Team

- **Purpose**: Annual review of the quality and content of nutrient management plans.
- **Composition of Team**: Agencies, university, tech college, ag industry, public and private-sector agronomists, soil testing labs, custom manure haulers.
- **Review process**: 15 plans randomly selected each year. Constructive review of individual plans.
- **Feedback mechanism**: Letter to planner identifying strengths / weaknesses of plan and suggestions for improving future plans.
4,018 plans reported on 1.3 million acres since 1995.
Implementing Phosphorus-based Nutrient Management

- Research-Awareness-Education Model

  • Research:
    - State-wide P budget
    - Management practice effects on P losses
    - Dairy diet effects on P in manure
    - Phosphorus index development

  • Awareness
    - Nutrient management standard revision
    - Phosphorus roundtables

  • Education
    - Programs from Extension/NPM/DATCP
    - Publications/Outreach from Extension &NPM Program
P Budget for Wisconsin Cropland

- Feed
- Livestock Enterprise
- Livestock Products
- Manure
- P Fertilizer
- Erosion and Runoff
- Municipal and Industrial Wastes
- Crop Removal
- Change in Storage
- Losses and Removals
- Inputs
Cropland P Budget Findings

Commercial Phosphate Consumption in Wisconsin

Crop Year | Tonnage
--- | ---
1980-81 | 166,679
1981-82 | 87,556
1982-83 | 88,367
1983-84 | 50,000
1984-85 | 60,000
1985-86 | 70,000
1986-87 | 80,000
1987-88 | 90,000
1988-89 | 100,000
1989-90 | 110,000
1990-91 | 120,000
1991-92 | 130,000
1992-93 | 140,000
1993-94 | 150,000
1994-95 | 160,000
1995-96 | 170,000
1996-97 | 180,000
1997-98 | 190,000
1998-99 | 200,000
1999-00 | 210,000

Commercial Phosphate Consumption in Wisconsin

Nutrient and Pest Management Program  University of Wisconsin • Madison  608.265.2660  Browse http://ipcm.wisc.edu
Average soil P levels of Wisconsin cropland fields over time.

Non-responsive range
On-farm Phosphorus Balance

inputs: P

on-farm phosphorus cycling

outputs: P

excessive
high
optimum
low

soil P level
build up over time

P runoff
Phosphorus Research Agenda

Accomplishments:

- P losses in runoff
  - Timing of manure applications
  - Tillage and manure interactions
  - Soil test P levels
  - Dairy dietary-P intake
- P Index
  - Development
  - Calibration and Refinement
Revised Nutrient Management Standard -2002

- Developed by multi-agency and multi-disciplinary committee.
- Includes options for P-based nutrient management plans.
  - Soil test P
  - Wisconsin P index
Phosphorus Research Roundtables

- Focused, multi-disciplinary discussions of P and P management
- PowerPoint presentations, abstracts, discussion minutes, summary documents (conclusions, issues to resolve, research/information needs)

http://www.soils.wisc.edu/extension/p_roundtables/title.htm or link from UW Soil Science Extension website

> 40,000 hits
Phosphorus Research Roundtables

Topics covered:

• Buffers - P Losses from Turf
• Wis. P Index - P Mgmt. of Biosolids
• Farmer Behavior & P Mgmt. - Dairy Dietary P Mgmt.
• Winter Manure Applications - P Dynamics in Lake Mendota
• P Availability from Manure
• Forms of P in Water and Bioavailability
• Mgmt. Practice Effects on Runoff P
• P, Water Quality & Ag Policy
Understanding Soil Phosphorus

Summary Publication:
- Water Quality
- P Cycle
- P Sources & Land Use
- P Transport
- P Terminology
- Ag Management Practices

Printed in April, 2002
- Requested and funded by state natural resources and agricultural agencies

28 pages
Spin-offs pubs
Understanding Soil P: Spin-offs

- Dietary P Considerations for Dairy Management
- P Management on High Testing Soils
- The Wisconsin P Index
- Others to follow . . .
Balancing Dietary Phosphorus series

**Phosphorus Balancing: The in’s and out’s**

Recent surveys and research on Wisconsin dairy farms indicate that:

1. Phosphorus (P) inputs are often greater than outputs.
2. When inputs are greater than outputs, P will build up in the soil over time.
3. The potential for P runoff increases when soil P is built up to excessive levels.

Phosphorus in runoff causes excessive algal growth in surface waters, which can reduce water quality of streams and lakes.

**Phosphorus Balancing: Optimizing Dietary P Levels**

Recent surveys indicate that more than one-half of Wisconsin dairy cows are over-fed dietary phosphorus (P).

**Phosphorus Balancing: Dietary P and Spreadable Acres**

**Dietary Phosphorus (P) Facts:**
- The maximum dietary P level that is needed for high milk production is 0.38% according to the National Research Council.
- Recent surveys indicate that more than one-half of Wisconsin dairy cows are fed over 0.38% dietary P.
- High dietary P = high manure P.

**Spreadable Acres Facts:**
- Your land may be subject to new and proposed regulations that target P applications to cropland.
- In general, you will need more spreadable acres if you have a phosphorus-based nutrient management plan.
- High manure P = more acres needed to spread manure (according to new/proposed regulations).

Flip the card to see the relationship between dietary P and spreadable acres.

**Phosphorus Balancing: Purchasing Supplements**

You may be purchasing supplements for their protein or energy values, but did you know that they contain varying amounts of phosphorus (P)?
Dairy Dietary Curriculum

Content:
• Importance
• Nutrient inputs, outputs, and balance
• Phosphorus issues
• Nitrogen issues
• Potassium issues
• Case study

Released March, 2003
Educational Programs

P-based Nutrient Management

- Area meetings - Ag suppliers/consultants
- Wisconsin Fertilizer Conference
- Training for Nutrient Management Planners
- CCA pretest & CEU education
- Farmer Education Program
- In-service training for Extension staff
Implementing Nutrient Management Planning in Wisconsin

- University
  - Soil Fertility Research

- Agricultural & Natural Resource Protection Agencies
  - Water Quality Protection

- Education & Demonstration

- Regulation

- Nutrient Management Standard - 590

- Implementation on Wisconsin Farms
  - Private Industry, Conservation and Extension staff
Nutrient Management

- Combine on-farm nutrient sources, with commercial fertilizer, to meet crop need.

  On-farm nutrient sources (manure, legumes, soil reserves)

  Commercial fertilizer

  Minimize nutrient losses