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
Research-based Recommendations/BMP's

- Corn nitrogen recommendations
- P & K calibration & recommendations
- Legume-nitrogen credits
- Manure credits
- Residual soil nitrate tests
- Starter fertilizer recommendations
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
Education/Implementation Efforts
On-farm Demonstrations

- Promote agricultural management practices that protect water quality while maintaining or improving farm profitability.
- Facilitate information exchange between farmers and researchers.
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
User 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:
  - 1,000+ producers
  - ~ 300,000 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, DNR
- 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, 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.
Nutrient Management Plan Acres
Reported: 1996-2002

4,018 plans reported on 1.3 million acres since 1995.
On-farm Phosphorus Balance

inputs

outputs

excessive
high
optimum
low

build up over time

P runoff

Nutrient and Pest Management Program
University of Wisconsin-Madison  608.265.2669  Browse http://ipcm.wisc.edu
Implementing Phosphorus-based Nutrient Management

- Research-Awareness-Education Model
- Research
Cropland P Budget Findings


Year

P, million lbs


107 119 104 103 70 36 31
Commercial Phosphate Consumption in Wisconsin

Crop Year

Tonnage


50,000 60,000 70,000 80,000 90,000 100,000 110,000 120,000 130,000 140,000 150,000 160,000 170,000 180,000 190,000

88,367 87,556
Average soil P levels of Wisconsin cropland fields over time.

Average P Test, ppm

Period


Non-responsive range

29 34 36 40 44 48 50 52 ppm
Tillage, Manure, & Timing Interactions on P Loss
Relationships of Soil Test P to the P Content of Runoff

Soil Total P = -77.8 + 170 (OM%) + 2.5 (Bray P)

$R^2 = 0.92$

$y = 0.0029x$

$R^2 = 0.48$

$y = 0.01x$

$R^2 = 0.63$

Soil Total P (ppm)
Soil Test P (ppm)
Organic matter %
How Much P is Being Fed?

More than half of Wisconsin dairy farmers over-feed phosphorus relative to National Research Council recommendations.*

* Source: Powell et al, 2002 survey of 93 farms.
Effect of Dietary-P Intake on P Losses in Runoff over Time

- High P Diet
- Low P Diet
- No Manure

Sampling Date:
- 11/11/99
- 1/10/00
- 3/31/00
- 5/2/00
- 5/19/00
- 6/21/00
- 7/12/00

DP load, g/ha
The Wisconsin P Index
L. G. Bundy, L. Ward Good, and W.M. Jarrell
Dept. of Soil Science - University of Wisconsin-Madison

http://wpindex.soils.wisc.edu

PI = PP + SP
Implementing Phosphorus-based Nutrient Management

- Research-Awareness-Education Model
  - Research
  - Awareness
Revised 590 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).
  - 13 topics
- http://www.soils.wisc.edu/extension/p_roundtables/title.htm or link from UW Soil Science Extension website.
Implementing Phosphorus-based Nutrient Management

- Research-Awareness-Education Model
  - Research
  - Awareness
  - Education
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
Understanding Soil P: Spin-offs

- Dietary P Considerations for Dairy Management
- P Management on High Testing Soils
- When & Where to Apply Manure
- 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 algae growth in surface waters, which can reduce water quality of streams and lakes.

**Phosphorus Balancing: Optimizing Dietary P Levels**

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

**DIETARY PHOSPHORUS (P) FACTS:**

- The maximum dietary P level that is needed for high milk production is 0.36% according to the National Research Council.
- Recent surveys indicate that more than one-half of Wisconsin dairy cows are fed over 0.36% 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 compliancy.
- 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 (consulting to new/proposed regulations).

**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)?

**Nutrient and Pest Management Program**

University of Wisconsin-Madison  608.265.2669  Browse [http://ipcm.wisc.edu](http://ipcm.wisc.edu)
Dairy Dietary Curriculum

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

- Released March, 2003