

# Implementing Nutrient Management Practices in Wisconsin

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

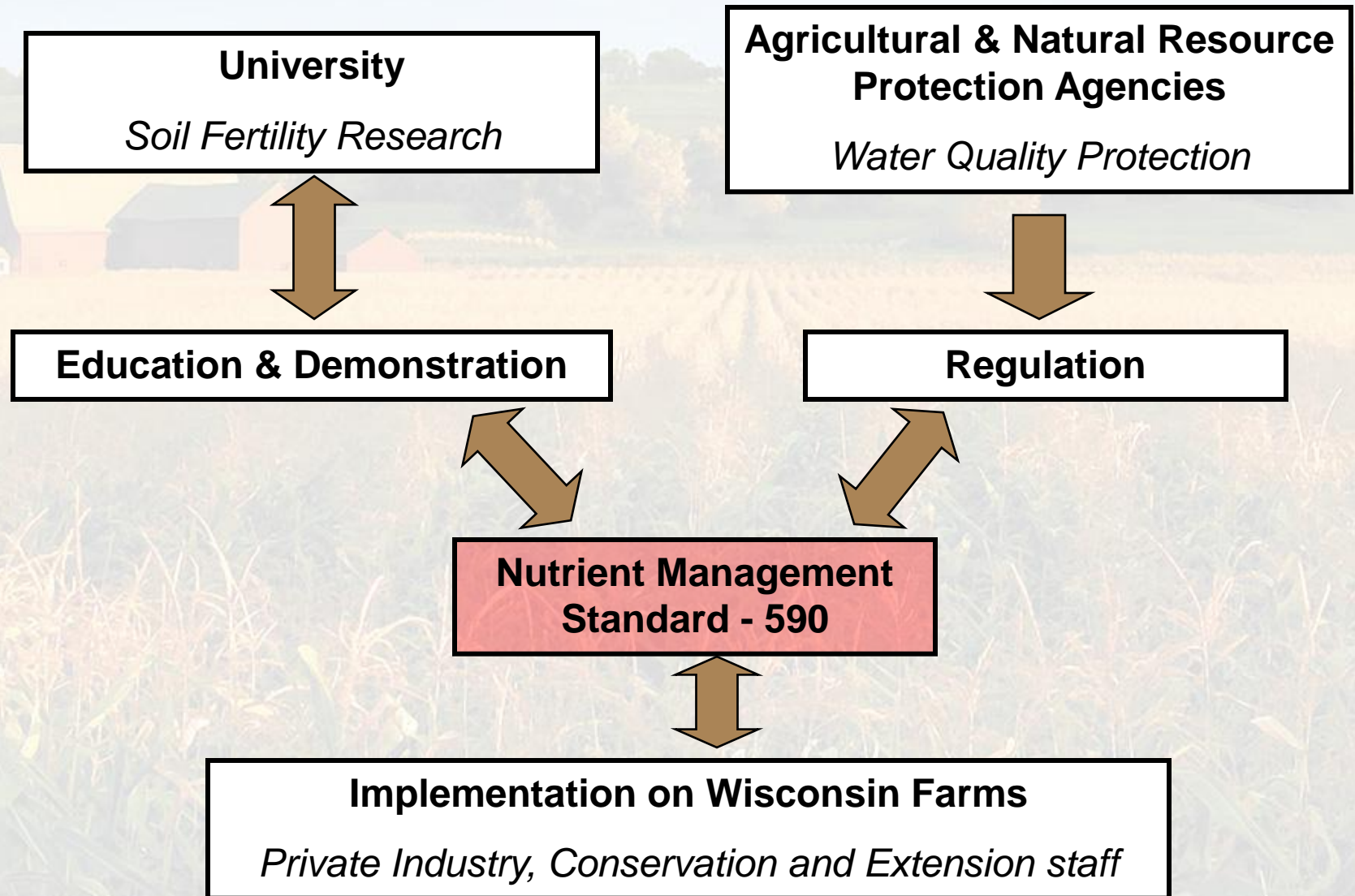
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# Implementing Nutrient Management Planning in Wisconsin



# 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

- USDA-NRCS Technical Guide 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.
- Revised in 1993, 1999, 2002.

# 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





# 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

## Nutrient Management Farmer Education Program

### Curriculum



University of Wisconsin-Extension  
UW-Madison College of Agricultural & Life Sciences

November - 2001

- 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

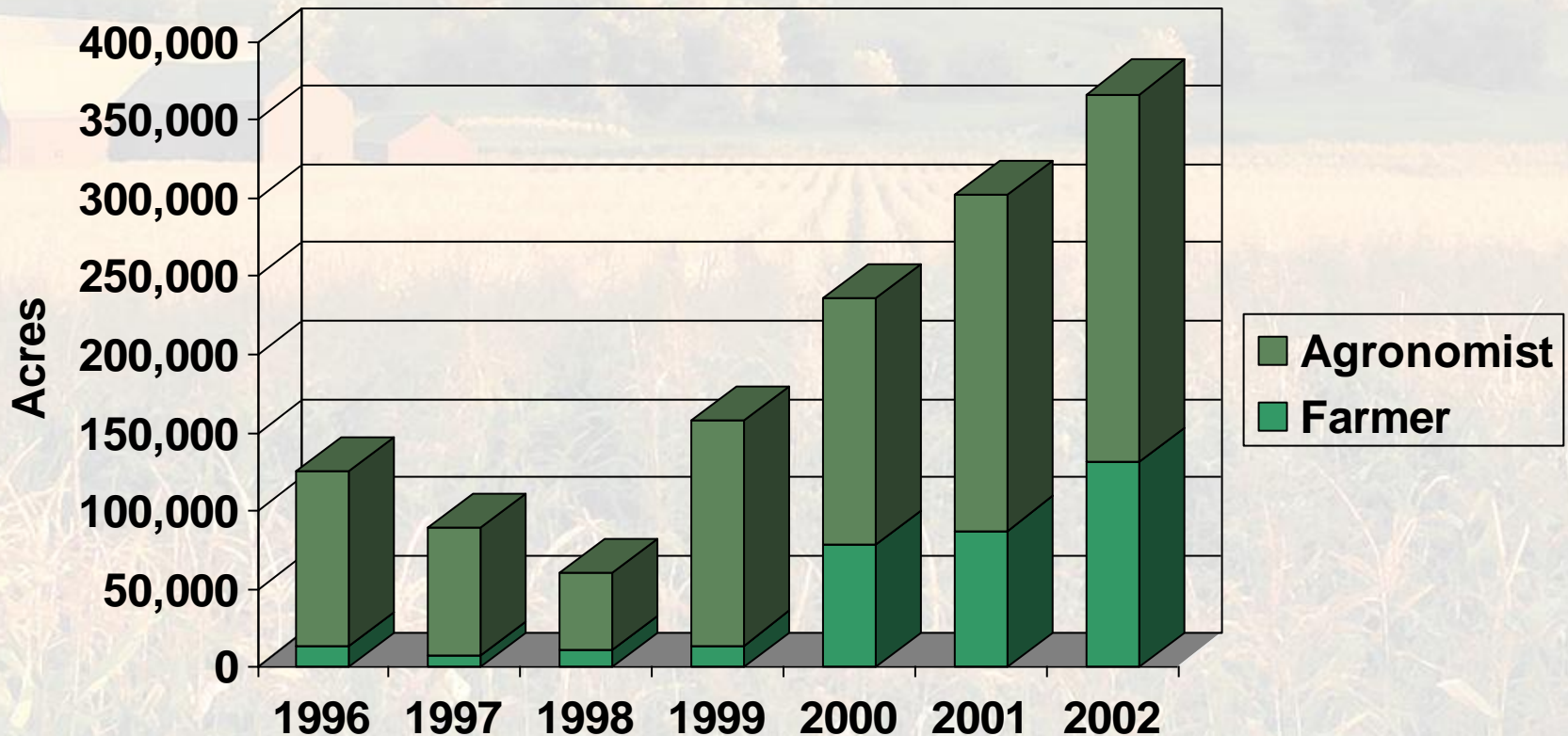
# Training for Nutrient Management Planners (TNMP) Workshops

- 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
- Workshops Completed: 2000 - 3, 2001 - 1, 2003 - 2

# Quality Assurance Team

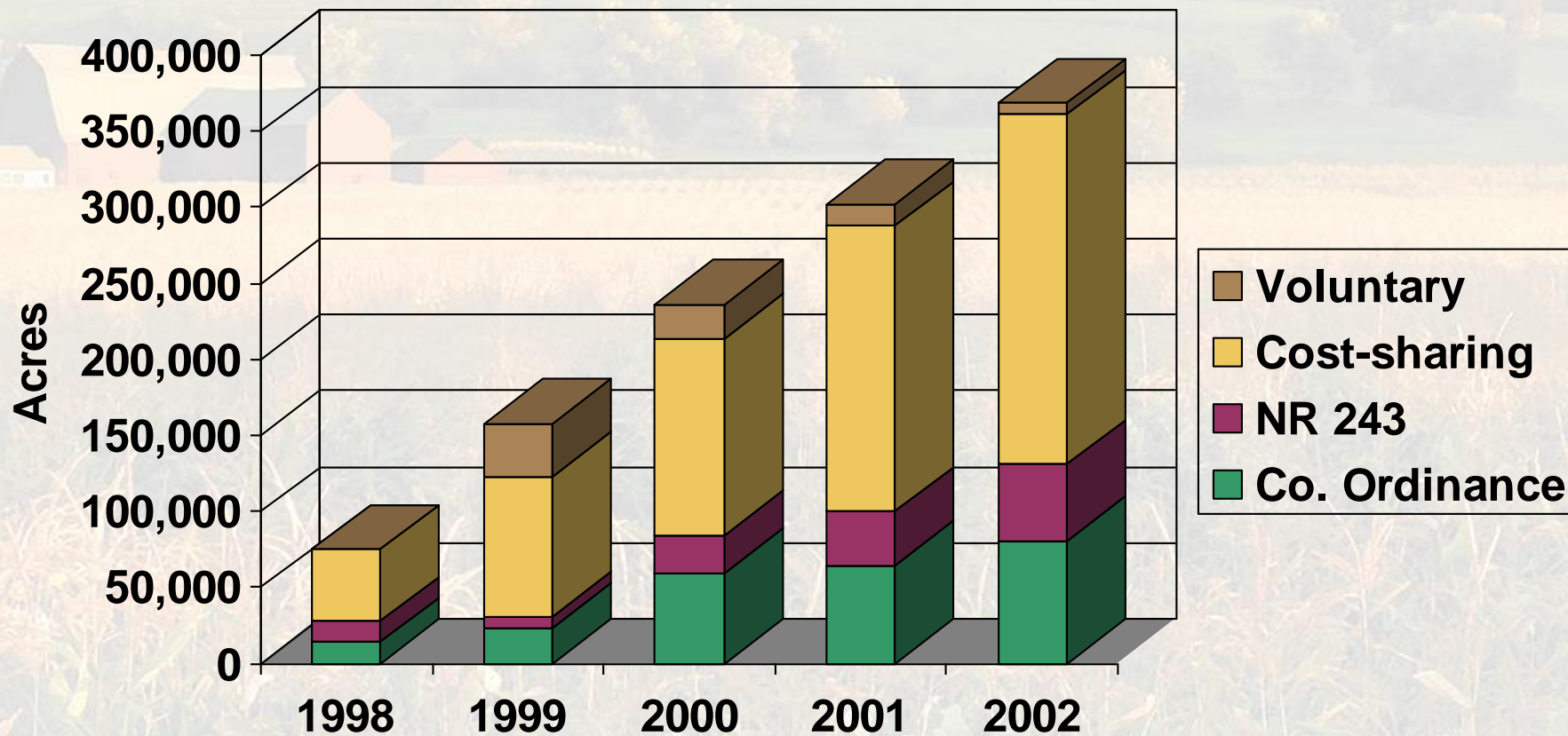
- Purpose: Annual review of the quality and content of nutrient management plans.
- Composition of Team: Agencies, university, tech college, ag industry, public and private-sector agronomists, soil testing labs, custom manure haulers.
- Review process: 15 plans randomly selected each year. Constructive review of individual plans.
- Feedback mechanism: Letter to planner identifying strengths / weaknesses of plan and suggestions for improving future plans.

# Nutrient Management Plan Acres Reported: 1996-2002



**4,018 plans reported on 1.3 million acres since 1995.**

# Incentives for Nutrient Management Planning

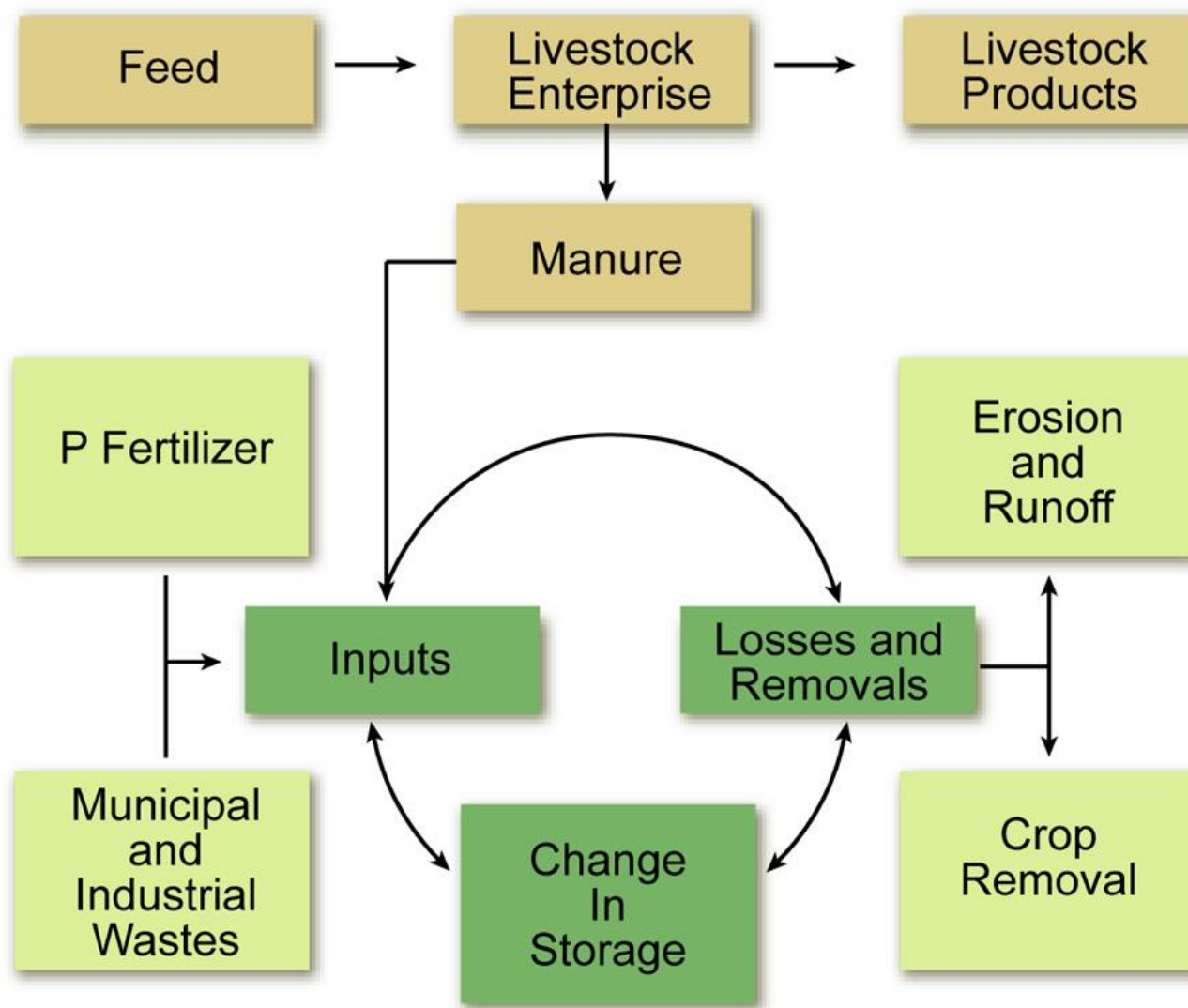


# Implementing Phosphorus-based Nutrient Management

## ➤ Research-Awareness-Education Model

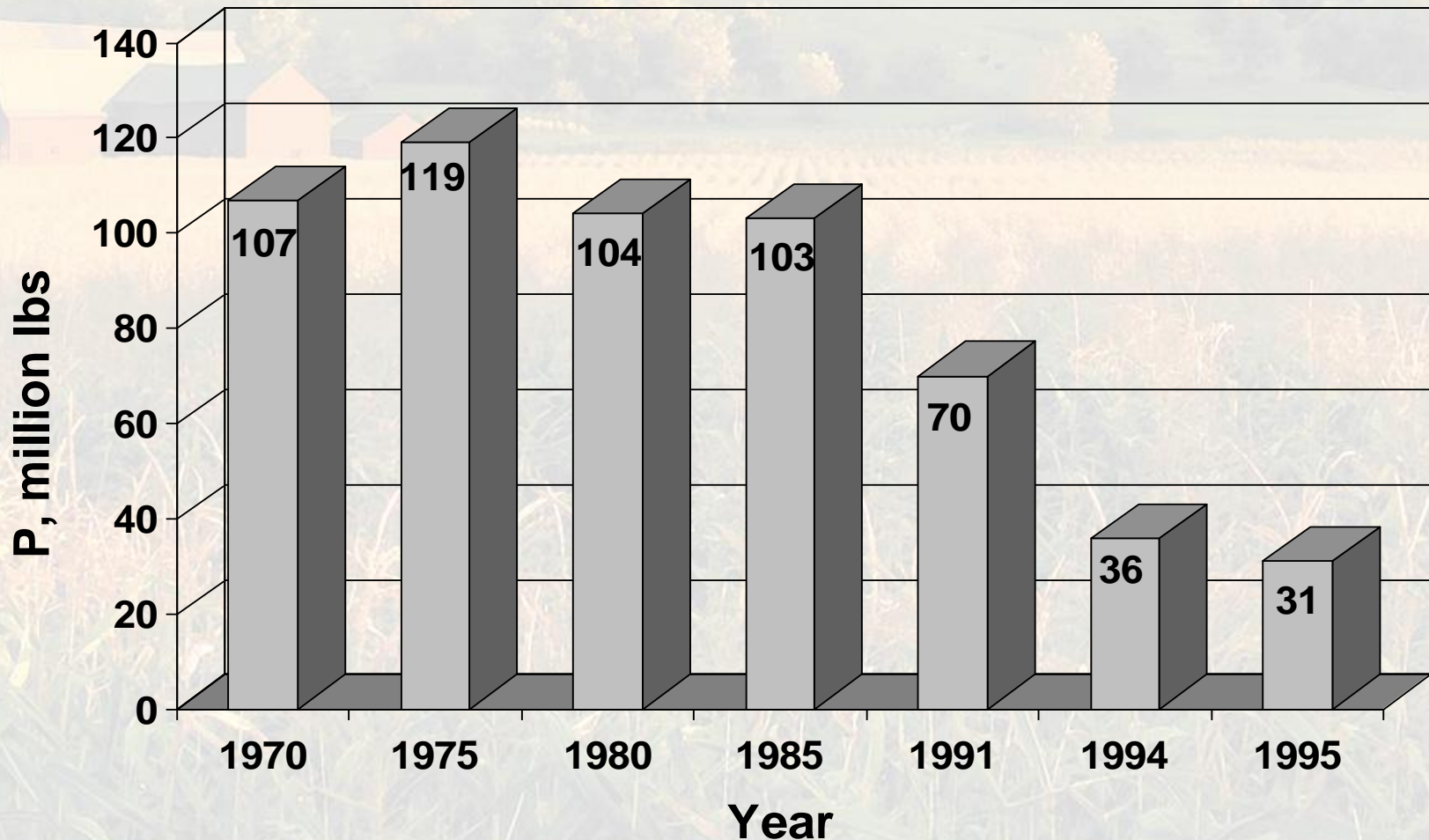
- Research:
  - ◆ State-wide P budget
  - ◆ Management practice effects on P losses
  - ◆ Dairy diet effects on P in manure
  - ◆ Phosphorus index development
- Awareness
  - ◆ Nutrient management standard revision
  - ◆ Phosphorus roundtables
- Education
  - ◆ Programs from Extension/NPM/DATCP
  - ◆ Publications/Outreach from Extension & NPM Program

# P Budget for Wisconsin Cropland

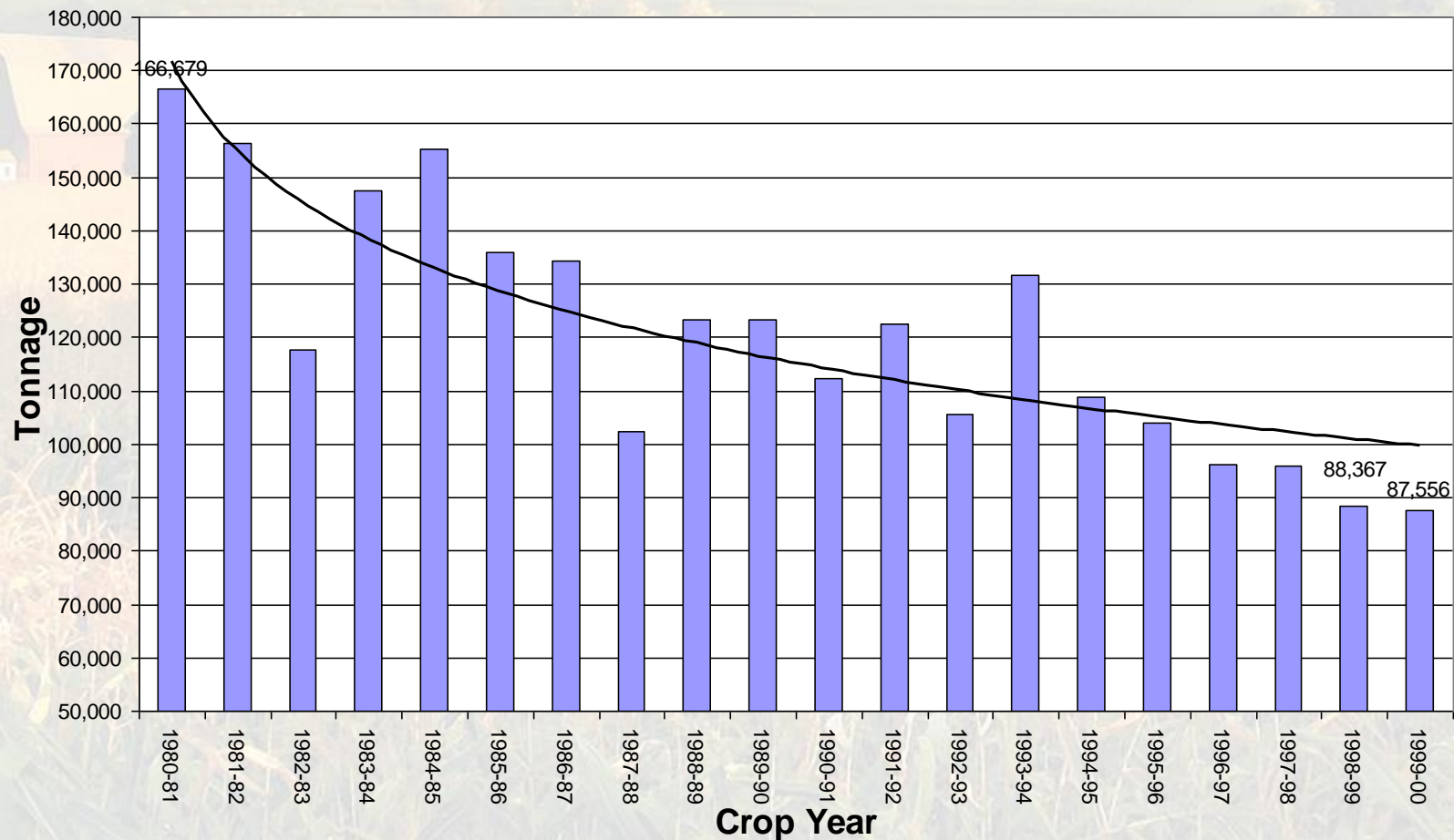


# Cropland P Budget Findings

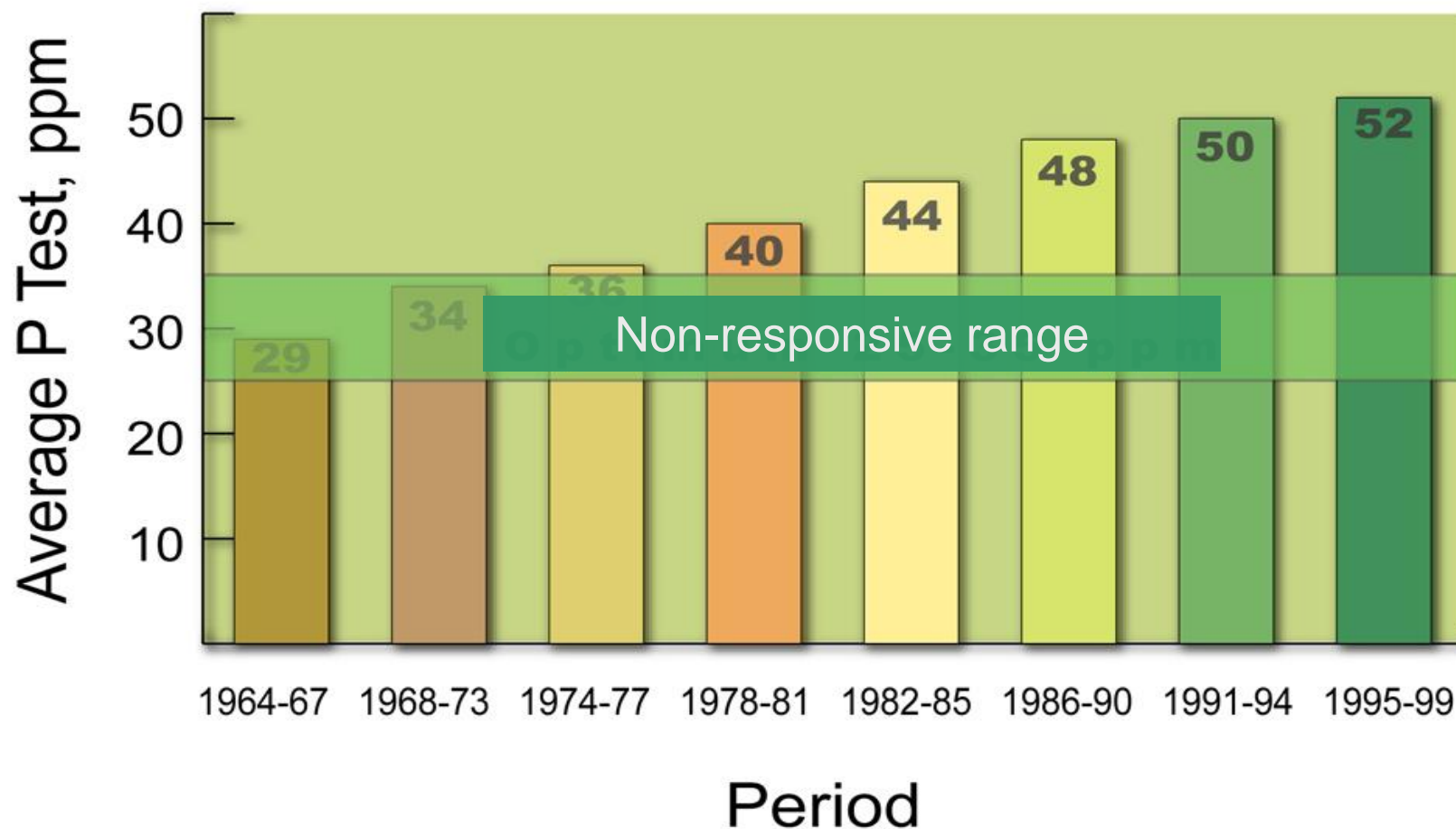
Change in phosphorus soil storage from 1970-1995.



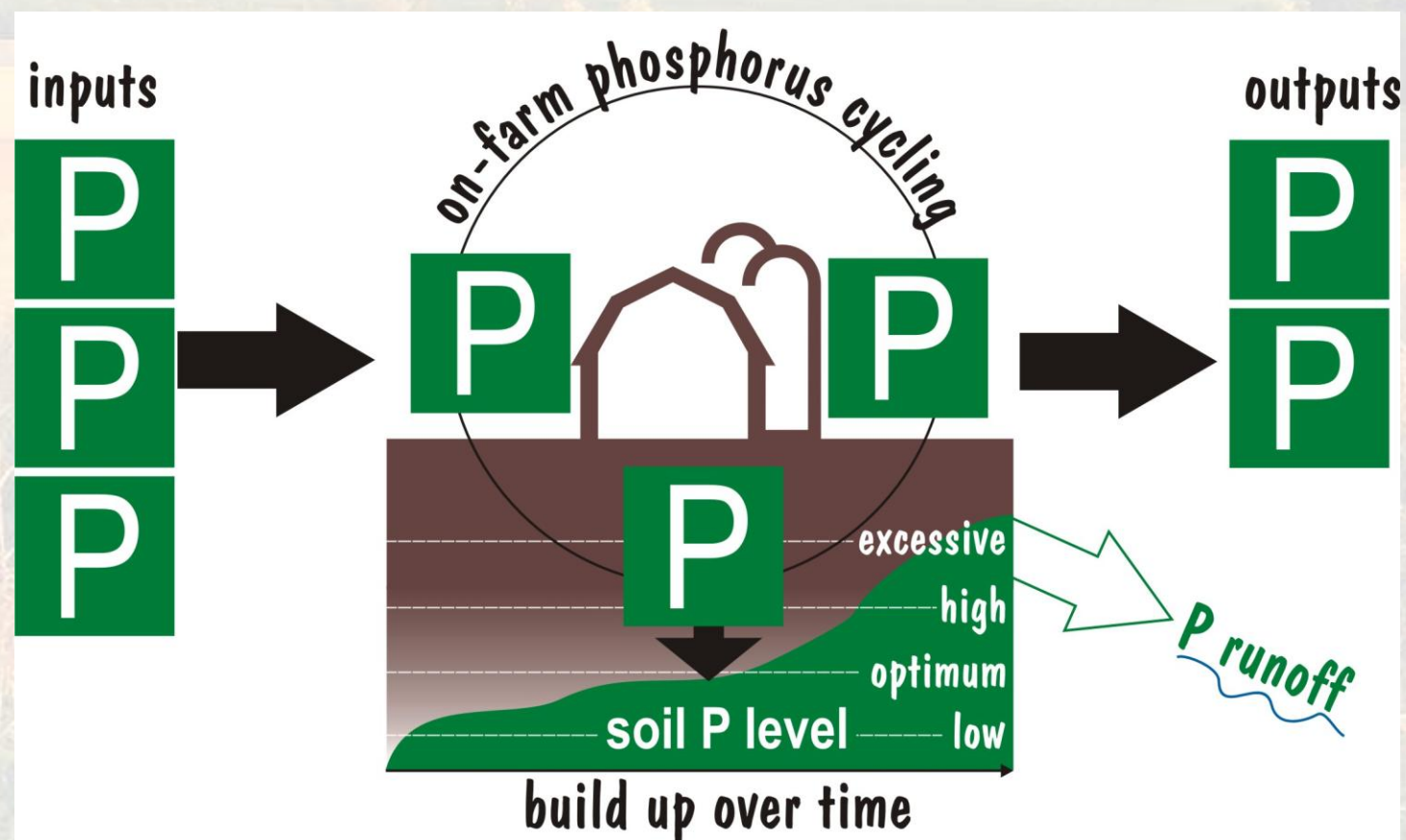
# Commercial Phosphate Consumption in Wisconsin



## Average soil P levels of Wisconsin cropland fields over time.



# On-farm Phosphorus Balance



# 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

- USDA-NRCS Technical Guide Standard.
- 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](http://www.soils.wisc.edu/extension/p_roundtables/title.htm) or link from UW Soil Science Extension website
  - > 40,000 hits

# Phosphorus Research Roundtables

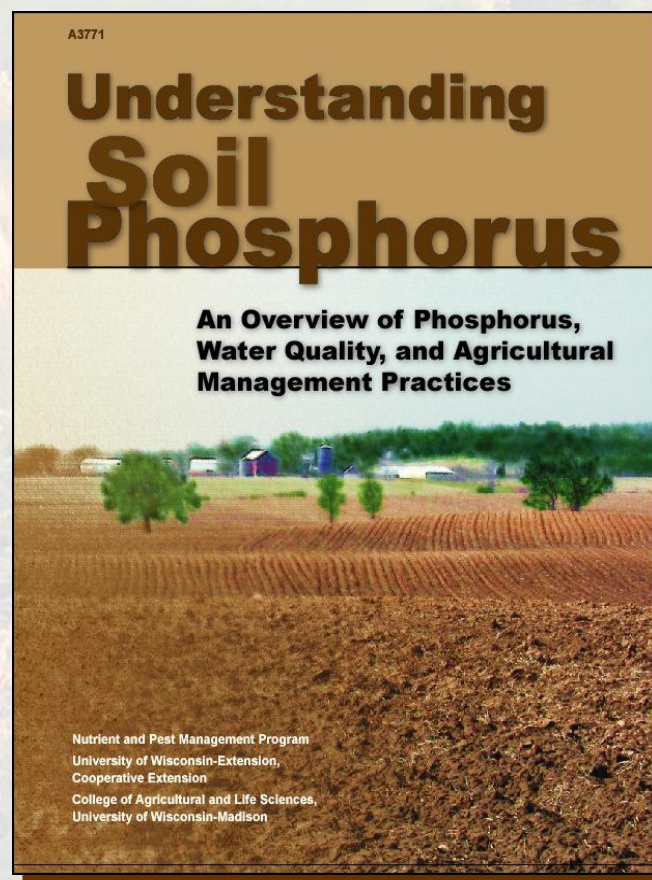


## Topics covered:

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

# *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 Phosphorus Considerations in Dairy Management

## Why be concerned about Phosphorus?

### Background

Phosphorus (P) moving below the soil surface has environmental impacts on oxygen supply, and death of fish and other aquatic life. Phosphorus is a nutrient that the dairy P management program should be concerned about.

It is a nutrient that is required for crop production. If a nutrient is required for crop production, more P must be available for crop level, resulting in greater yield. But, if a nutrient is not needed for crop production, it will cause soil test P values to rise in P. Many Wis. dairy farmers are needed for crop production. If a nutrient is required for crop production, more P must be available for crop level, resulting in greater yield. But, if a nutrient is not needed for crop production, it will cause soil test P values to rise in P. Many Wis. dairy farmers are needed for crop production.

**Producer concern:**  
The common practice of dairy dairy cattle, some of

P diets improve animal reproductive performance. While it is true that extremely low dietary P can lower the reproductive function of dairy cattle, studies show that this does



## Management Options for Farms with High Soil Test Phosphorus Levels

### Introduction

Agricultural nutrient management is a concern of many people, including crop consultants, regulators, farmers, environmentalists, and the general public. The nutrient phosphorus (P) receives the attention of these people because crops depend on it and its availability is limited. It is a nutrient that is required for crop production. If a nutrient is required for crop production, more P must be available for crop level, resulting in greater yield. But, if a nutrient is not needed for crop production, it will cause soil test P values to rise in P. Many Wis. dairy farmers are needed for crop production.

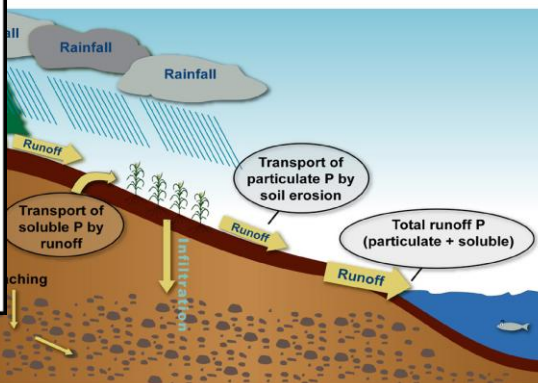
The potential for P losses from farms increases if the soil P levels of fields are excessively high relative to crop needs. Soil test P levels build up over time when P additions exceed crop P removal (Figure 1). In order to lower P levels on agricultural land, the amount of P entering the soil (from fertilizer or manure) should be no more than the amount of P leaving the soil (crop removal or soil erosion). When P inputs equal P outputs, a farm achieves P balance. Reducing P inputs with P removal should be a goal of every producer because soil test levels should continue to decrease as well as crop yields.

Managing nutrients by thinking in terms of P balance will have potential negative impacts on water quality by applying crop and animal waste while eliminating excess nutrient applications. Farmers seeking only to crop can achieve P balance by controlling fertilizer inputs. Farmers with livestock must consider manure management.

Phosphorus balance may not be possible on some farms because the amount of manure present is too large for the land base. Management decisions, however, reduce P loss. Fields that are already high in P have less fertilizer management options than those with low soil test P levels. But carefully thought-out decisions can provide options for the producer that do not require either buying more land for applying manure or reducing the number of livestock.

This publication suggests options for farmers and nutrient management planners who have soils with high soil test P levels and, therefore, present greater nutrient management risks. Although the ultimate solution is to achieve phosphorus balance, we have attempted to identify least costly alternatives for farms still working toward P balance.

Figure 1. Certain phosphorus balance.

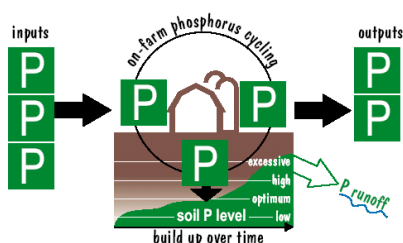


# Balancing Dietary Phosphorus series

## 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



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

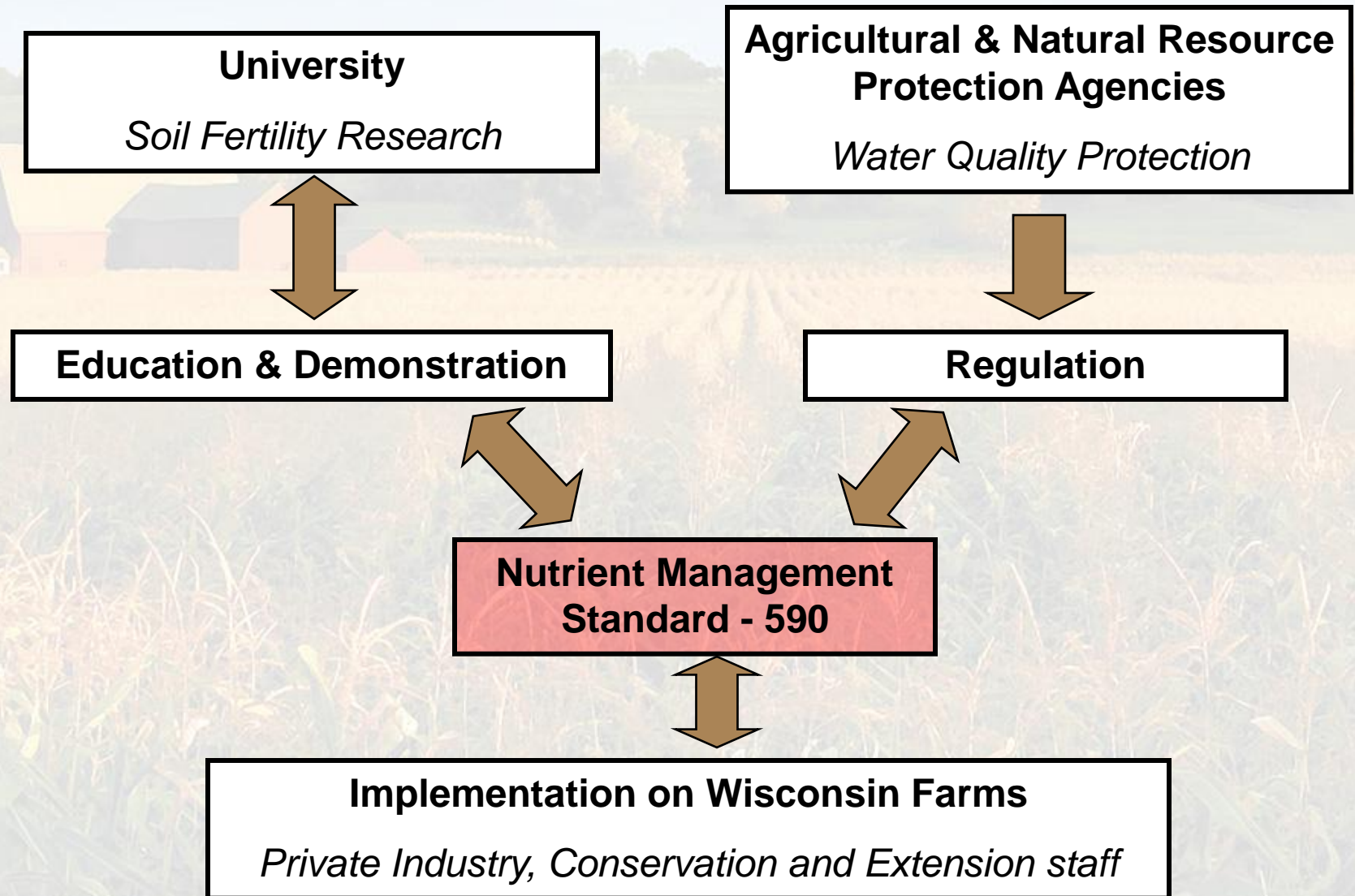


# Educational Programs

## 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



# 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