Implementing Nutrient Management Practices in Wisconsin

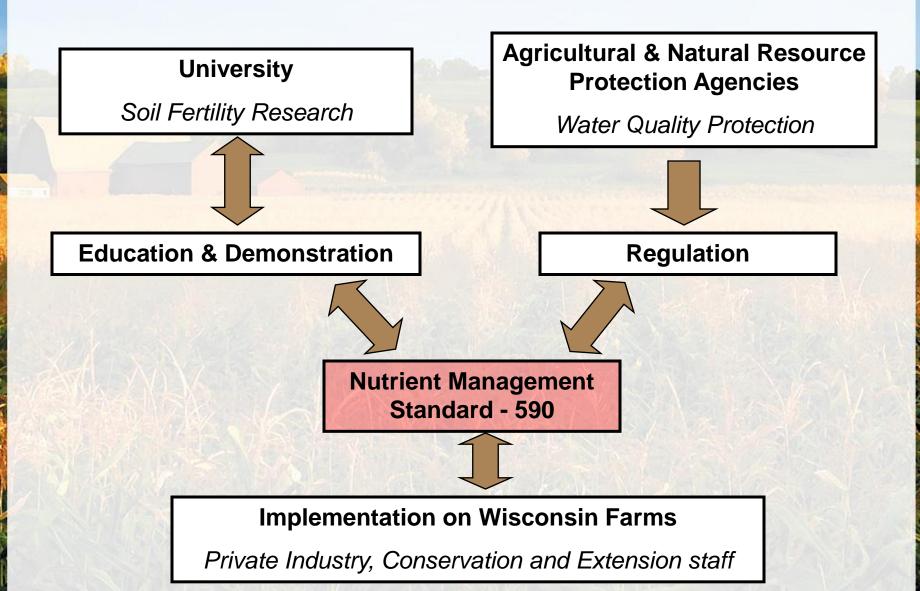
Presentation to the American Society of Agronomy
Division A-4
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Implementing Nutrient Management Planning in Wisconsin



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 multidisciplinary committee.
- Goal was to provide a <u>UNIFORM</u> 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

BMP Publications

Soil Testing Basics

WHY YOU SHOULD SOIL TEST Soil testing is an effective method for reliably predicting fertitiver and time needs before crops are planted. It is a good business practice, one that can provide a high return for the investment of a feer dollars per acce.

Soil testing helps Wiscomin farmers achieve more profits. One common way is by identifying fields where soil nutrient levels are already high, so that only minimal amounts of seritace. If any should be applied Austher is by indicating fields where fertilizer or line applications can increase crop field.

WHAT A SOIL TEST TELLS YOU

provide about your field, your planned crop, and yield goals to make crop-specific fettilizer and lime recommen-

WHEN YOU SHOULD SOIL TEST

Fields should be sampled every three to four years or at lead once in the cropping rotation. The best time for routine soil sampling is in the fall, in order to get results back in time to plat for the east cropping season. Soil tools can also be taken in the early spring other frost has left the consequences.

Although many people have a lew fields sampled every year, there is a real advertage to sampling your form all at once. When you know the lettily status of every field, you can apply fertiles, manner and line on the fields where it will do the most good.



HOW YOU SHOULD SOIL TEST

Most growers have someone else talle soil samples on their land, but you can fo it yourself. For directions, obtain University of Wisconsin Education publication, Sampling Sole for Testing (2020) from your county's Education Olice. You might be able to binnow a soil probe bo. Laboratory analysis for routine soil

Whether you send in the samples or someone else does, there are important things to know so you can get the most out

Accurately sample your fields. Soil samples that are not appreciation of the field should insecurate annest an expression of the field should insecurate annest and the contension of a minimal of one of ownly should be observed for the zero. Leaf sample death for a many leaf should be a minimal of the content of the content of the content of the other sample official for all sample. Directorize, Everylet's should have a set to soil or supple of the field for all sample. Directorize, Everylet's should have a set to soil or supple or so the soil or sample of the state of the sample of t

Ask your soil testing lab or consultant for University of Wisconsin (UW) recommend Some labs provide Inflirer recommendations based on several different "systems." That means that for the same leve of P or K in the soit, the lab rigidit provide different featilizer recommendations. The other systems were developed primarily in other states with different sell and weather confitions. University of Wisconsin recommendations based on field trial research conducted in Wisconsin.

fertilizer application plan. To get full value from your tests and to

Fleid, Vegetable and Fruit Crops Use a separate sheet for each farm Mc of sample Test 304 (0.8) Soybean nutrient recommen

FELD SI	Soil test level of the field						
D N	Yield goal (buls)	Very Low	Low C	optimum	High	Very High	Ex. High
_		L 0 0 / A 0		P,0		4.5	PLY
	15-25		36 45 55	20	10		0
	26-35		35	25	15		ō
	35-45		45	20 25 35 45	20		0
_	49-55		55	46	20		0
	35-45 49-55 58-45 08-75 78-85		15	50 60 70	26 30		0
	79.85		72	60	30		8
_							÷
The man		L B B / A B		к,о	TO	4.5.5	
	15-25		35.60**	20	10		
innets							
inpotan		70.45**	45-70**	30	15	0	0
ROTTE	26-35 36-45	70-85**	55-90**			10	
	26-35 36-45	70-85** 80-95** 90-105**	55-80** 65-90**	40	20	10	0
recomme One way	26-35 36-45	70-85" 80-95" 90-105" 100-115"	55-80** 65-90** 75-100**	40 50 60	20 25 30	10 10 15	0
ROTTE	29-35 39-45 49-55	70-85** 80-95** 90-105**	55-80** 65-90**	40	20	10	0



00-228-8672) Northwest	Alfalfa*
Kevin Erb	7.11.41.11
20-391-4652)	Stand Density
Southeast	Good (70-100% alfalfa, more than 4 plents/H ²)
chard Proost	
00-994-5852)	Fair (30-70% attatts, 1.5 - 4 plants?)
Southwest	Poor (0-20% alfalfa, loss than 1.5 plants/87)
en Talarczyk	FOOT (C-2011 Brains, 1933 1941 1.0 plants)
00-745-9712)	Red Clover or Birdsfoot Trefoil
wah Central	Red Clover of Bildstoot Heloli
evin Shelley	

	"Second year credit in the second cooping year following a fair good stand on a final/medium textured soil, take a 60 ib Nacre o					
	OPS .	GREEN MA	NURE			
	40 lb N/acre No credit on sandy soils.	Alfalfa	60-100 lb Niacre	Use 40 lb Macre credit		
		Sweet Clover	80-120 lb Nacre	less than 6 inches of		
r	20 lb N/acre No credit on sandy soils.	Red Clover	50.50 Ib Nacre	growth befor		

Corn nutrient recommends



Manure info.

What Is A Farm Nutrient Management Plan?

Ideally, a form nutrient management tilan is a strategy for obtaining the maximum return from your on-and off-form fertilizer resources in a manner that protects the quality of nearby water resources. Sounds easy, right? Well in many cases it is. In others, nutrient management planning involves some unique challenges. All plans require thought and understanding between the person developing the plan and the person following the plan-the farmer!



These include the following:

Soil Test Reports

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



Assessment Of On-Farm Nutrient Resources The amount of crop nutrients supplied to your fields from on-farm nutrient resources such as manure, legumes, and organic wastes need to be determined and educted from your base fertilizer recommendations.



phosphorus, and potassium—as well as sulfur and organic matter. Legume crops such as alfalfa, clover, soybean, etc. supply nitrogen to the crops that follow them.

Know How Much You Haul

tient credits. This whole process can take less than a hour! All you need to get started is this sheet, a calculator and



STEP 1. DETERMINE LOAD WEIGHT

Using a typical load size, the tractor with spreader is weighed empty and full.

STEP 2. DETERMINE SPREADING RATE

You can now calculate your tons per acre spreading rate using field records on ion many loads you put on a particular field of known acreage (see equations on oth said. This rate can be considered the "standard" for the farm. Make sure you use

o develop variable rates (such as bids, medium and two) experiment with different eeds and spreader settings. These rates could be useful when dealing with fields that have special fertilizer, tillage or environmental considerations. "Not can get an **extinute** of a per acre rate right may by using a memoring wheel on the area just:

STEP 3. DETERMINE MANURE NUTRIENT CREDITS

exiliable nutrient content per ton of the manure you are spreading. You can also ave your manure analyzed for its specific nutrient content. From either of those

A Step-by-Step Guide to Nutrient Management



Using Legumes as a Nitrogen Source L.G. Bundy, K.A. Kelling and L. Ward Good

Are you taking advantage of all of your on-farm nitrogen?







umbers, you can figure your manure nutrient credits per acre. (If you develop

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

- ➤ <u>Intent</u>: 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 <u>functional</u> nutrient management plans.
- > Accomplishments:
 - 800+ producers participated
 - 251,000 acres
 - 28 Wisconsin Counties

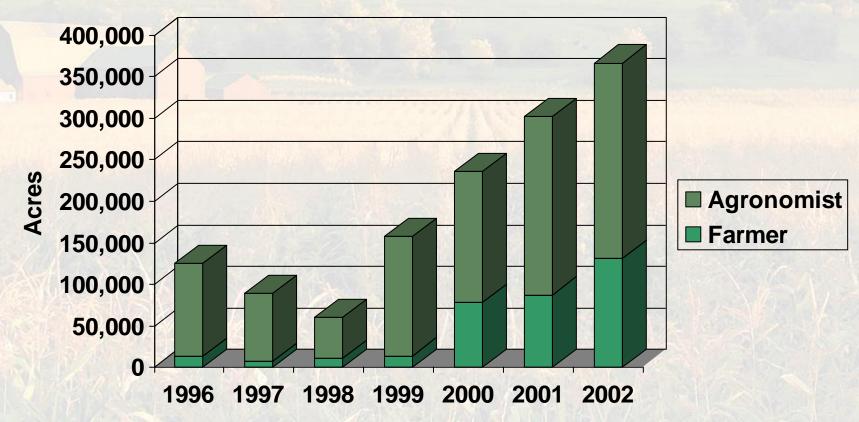
Training for Nutrient Management Planners (TNMP) Workshops

- 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

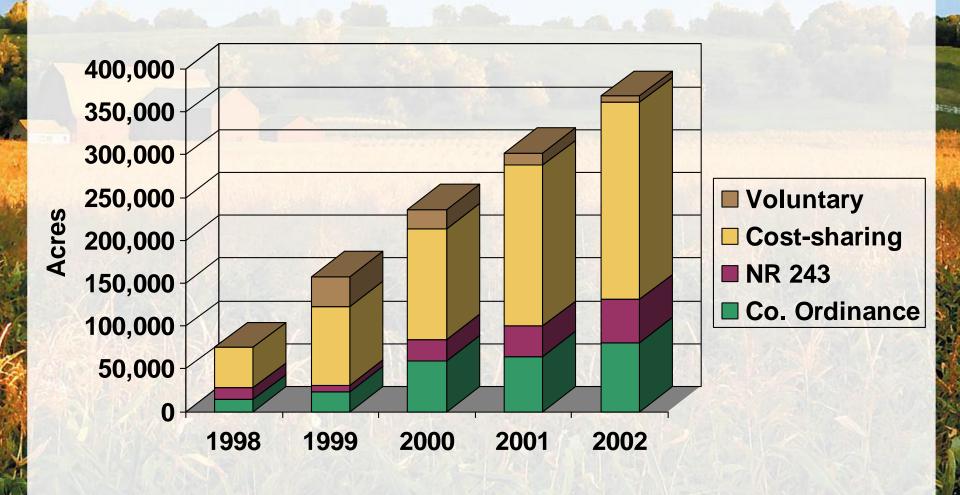
- Purpose: Annual review of the quality and content of nutrient management plans.
- Composition of Team: Agencies, university, tech college, ag industry, public and private-sector agronomists, soil testing labs, custom manure haulers.
- Review process: 15 plans randomly selected each year. Constructive 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.

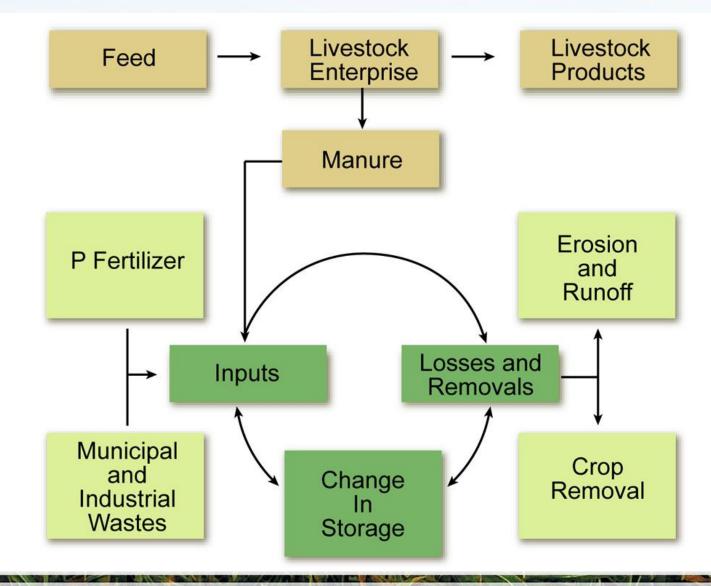
Incentives for Nutrient Management Planning



Implementing Phosphorus-based Nutrient Management

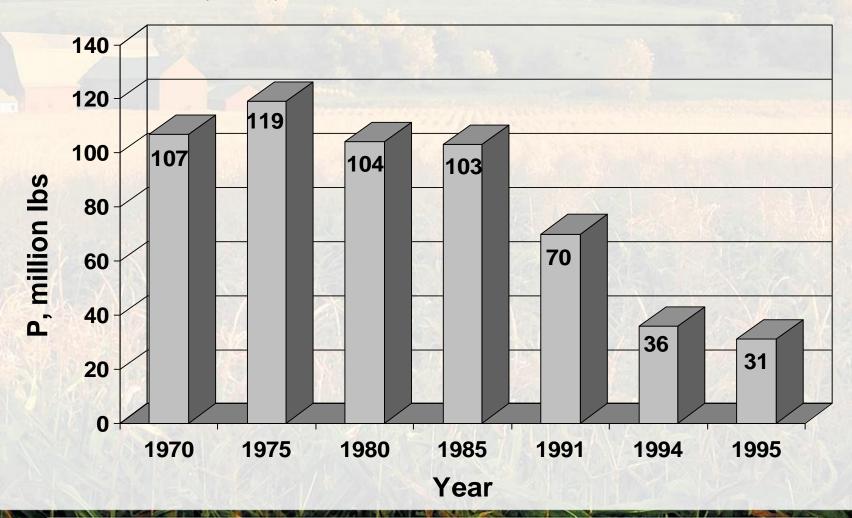
- > Research-Awareness-Education Model
 - · Research:
 - ◆ State-wide P budget
 - Management practice effects on P losses
 - ◆ Dairy diet effects on P in manure
 - ◆ Phosphorus index development
 - Awareness
 - Nutrient management standard revision
 - Phosphorus roundtables
 - Education
 - ◆ Programs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

P Budget for Wisconsin Cropland

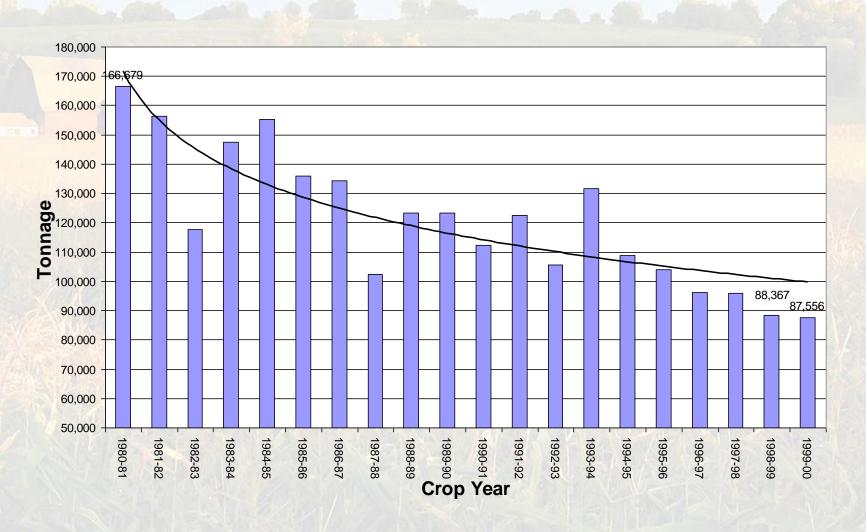


Cropland P Budget Findings

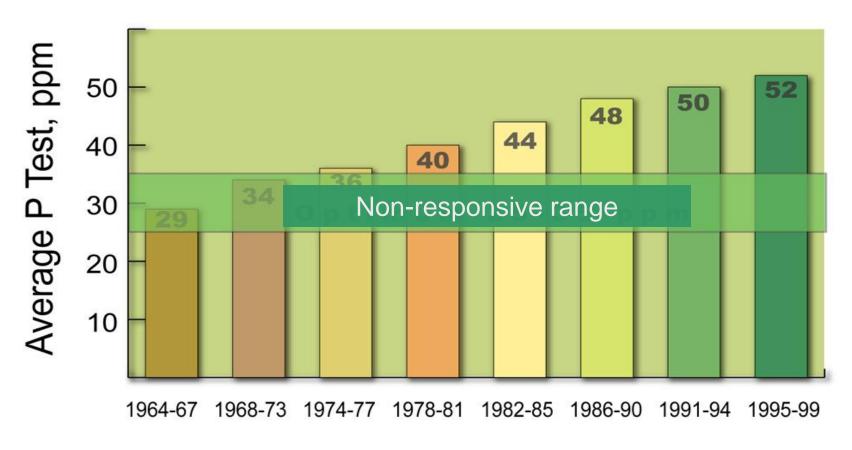
Change in phosphorus soil storage from 1970-1995.



Commercial Phosphate Consumption in Wisconsin

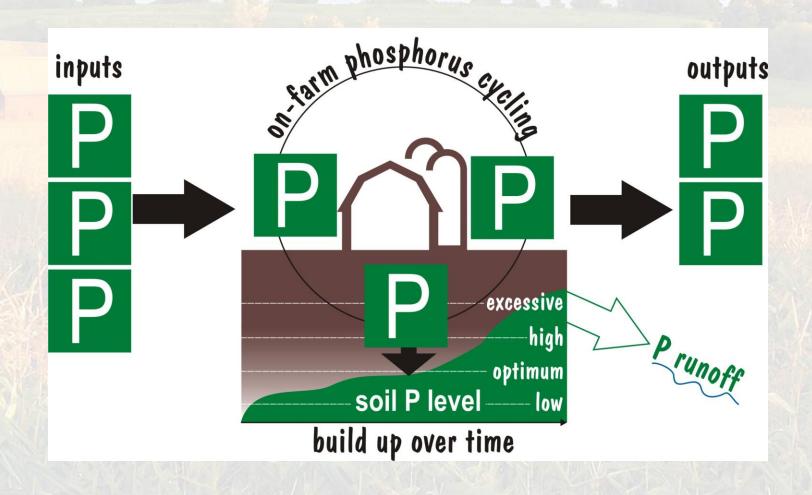


Average soil P levels of Wisconsin cropland fields over time.



Period

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 multidisciplinary 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



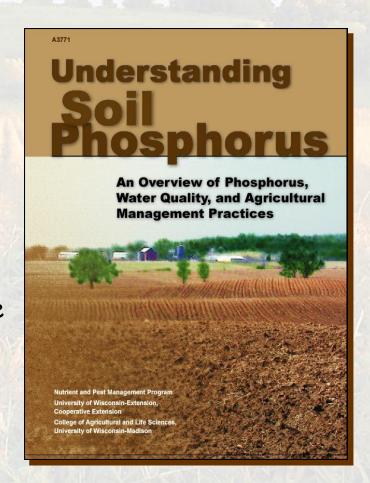
Topics covered:

- Buffers
- · 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

P diets improve animal reproductive performance. While it is true that extremely low dietary P can lower the repro

Phosphorus (P) movin bodies has environmenta of P in lakes and stream oxygen supply, and death producers to be concerne assured that the dietary I keep milk production hi

If a producer is requir management plan, more management plan, more P must be available for spre-level, resulting in greater : will cause soil test P value diet lower in P. Many Wis is needed for crop produc in their choice of feed st them to be informed abo make decisions that are i economically and envi

Producer concerns



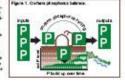
Management Options for Farms with High Soil Test Phosphorus Levels

reigie, including only consultants, regulators, formers, a riverse variables, and the general public. The national plumplanes (P) receives the attention of these people recurse unique depend on it and actuals need it, but when it leaves a farm in marelf, Pross degrade the quality of lakes and streams. Specifically, Publishme into Desirate does and attenue out attacked the eccessive growth of election in the recreational value of lates.

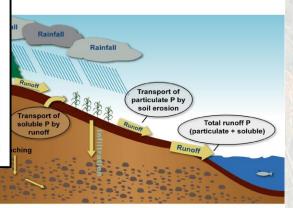
The potential for F leases from forms increases if the nd P breds of fields are excessively high relative to crop-seeds. Not test P brods hashing over time when P additions exceed crop Premoval (Figure 1), in order to brive have been agricultural backungen, the amount of Premoving the soil (from feet-flowr or manure) about the numbers tion the annual of P leaving the out force reasons or asi-ual products. When P input equals P reasons, a face attains P believe. Balancing P inputs with P reservation should be a goal of every producer because soil test lands should seekber moreover nor decrease in soils a system.

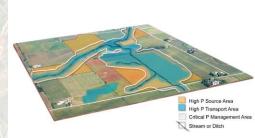
Managing outsions by thinking in terms of P belowe minimizes patiental negative impacts on water spality by supplying cosp and string meats while eliminating street national applications. Flammers dealing only with crops one observe P balance by controlling factificer inputs. Flammer Plauphone behave may not be possible on some forms because the number of animals possent is too large for the hard hore. Monageni err decisions, however, influence P less, thick that are strongly high in P hore from flexible more land for applying manage or reducing the another o

This publication suggests options for farmers and activest management plane on who have said with high and test 2 fermions. Secretary, present greater surriconmental risks. Although the objecte solution is to achieve



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





Balancing Dietary Phosphorus series

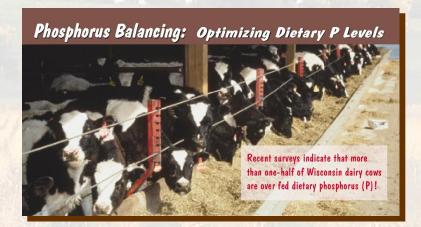
Phosphorus Balancing: The in's and out's

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 algae growth in surface waters, which can reduce water quality of streams and lakes.



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

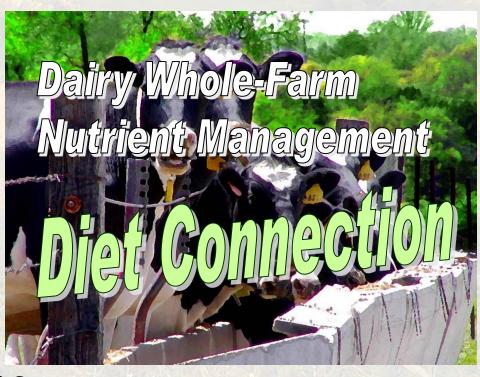


Phosphorus Balancing: Purchasing Supplements You many be purchasing supplements for their protein or energy values, but did you know that they contain varying amounts of phosphorus (P)?



Dairy Dietary Curriculum

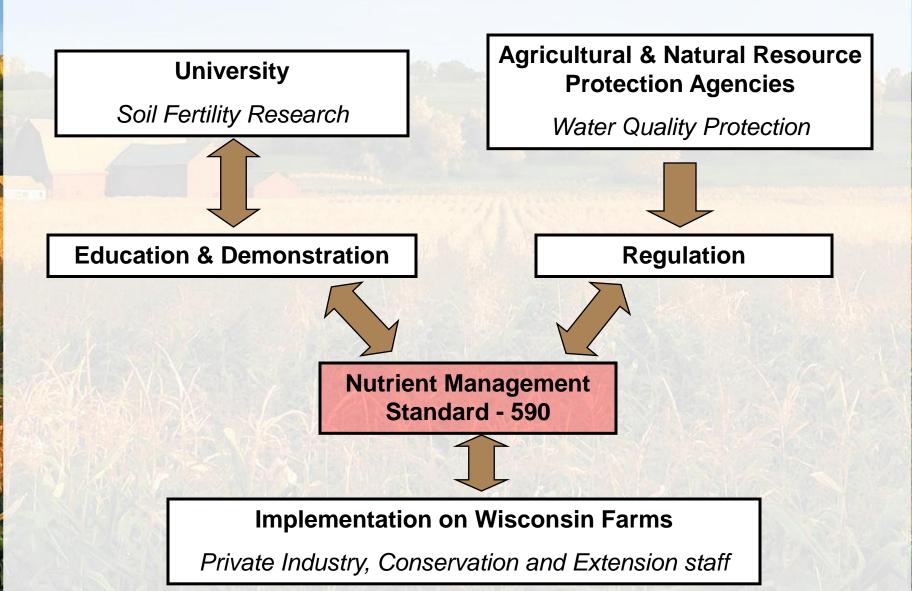
- > Content:
 - Importance
 - Nutrient inputs, outputs, and balance
 - Phosphorus issues
 - Nitrogen issues
 - Potassium issues
 - Case study
- > Released March, 2003



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.

