

# Trends in Feed and Manure Phosphorus

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# Acknowledgments

- Laboratory manure and TMR data provided by:
  - Dairyland Laboratories, Inc.
  - Rock River Laboratory , Inc.
- Digester/separator data provided by Gordondale Farms, Nelsonville, WI
- Dairy dietary P information provided by Mark Powell, USDA-ARS

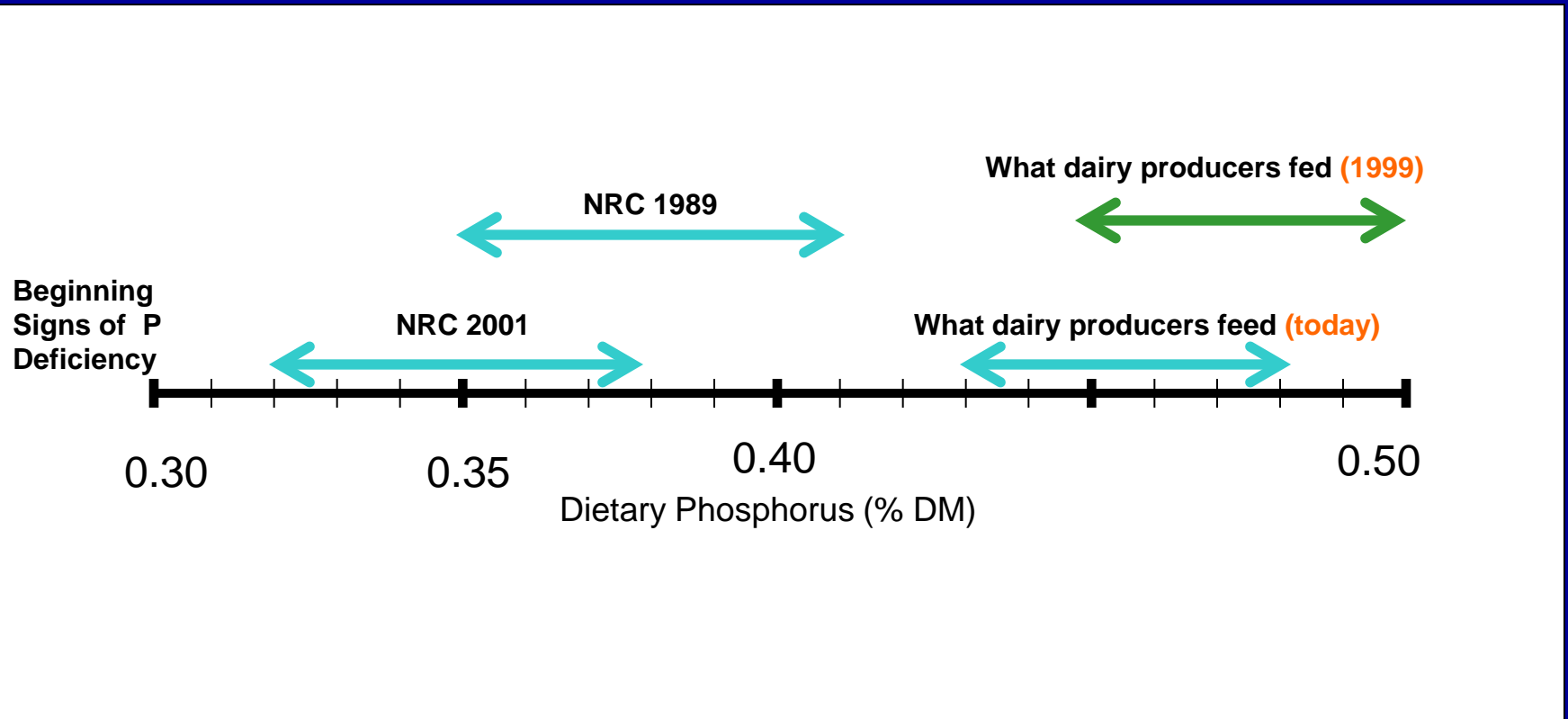
# Phosphorus story

- More than half of Wisconsin dairy farmers feed more P than cows need

According to National Research Council recommendations

*Source: Powell et al., 2002 survey of 93 farms.*

# How much P is being fed?

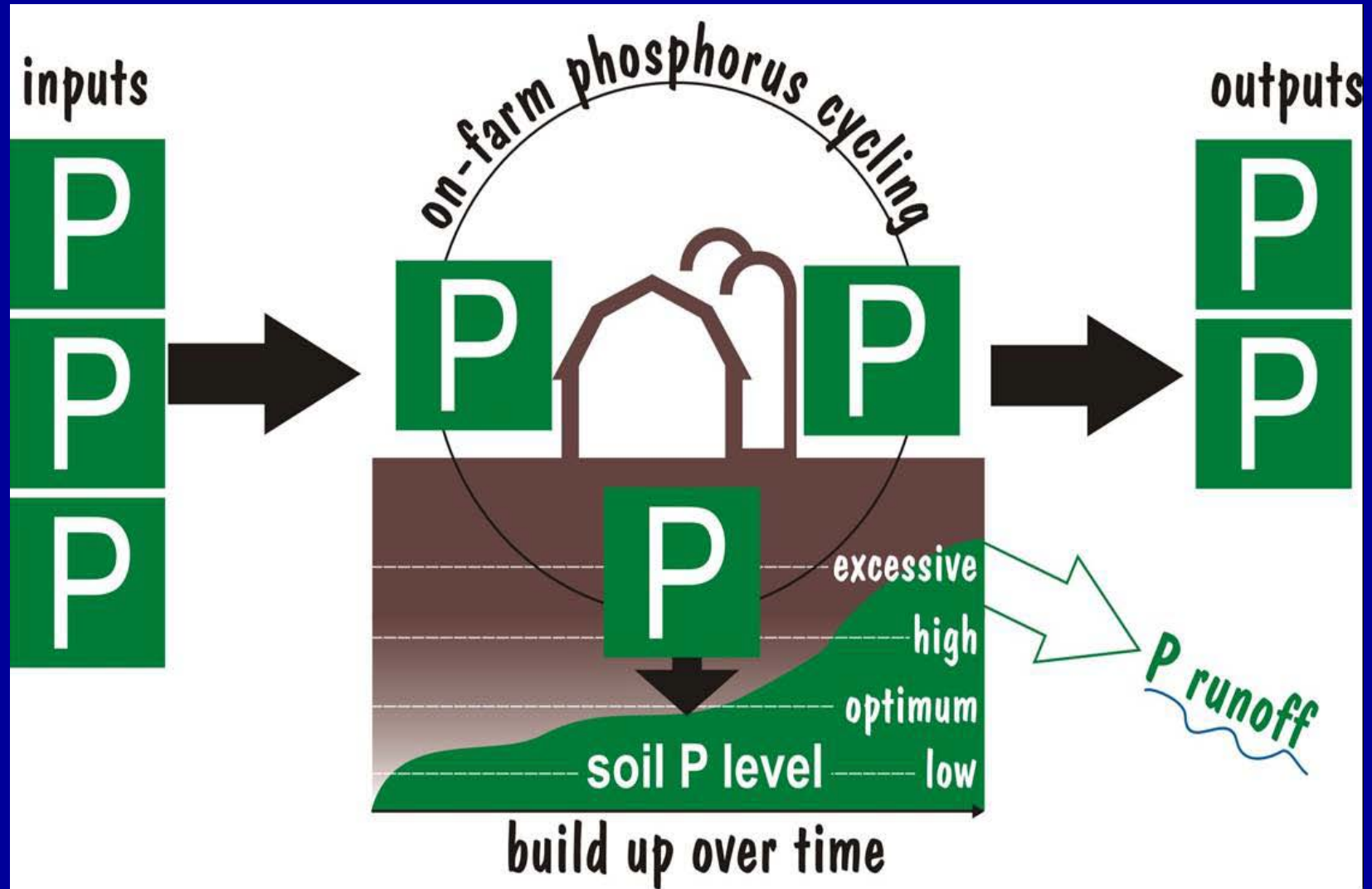


# Potential annual phosphorus inputs and outputs from a 100 cow Wisconsin dairy farm

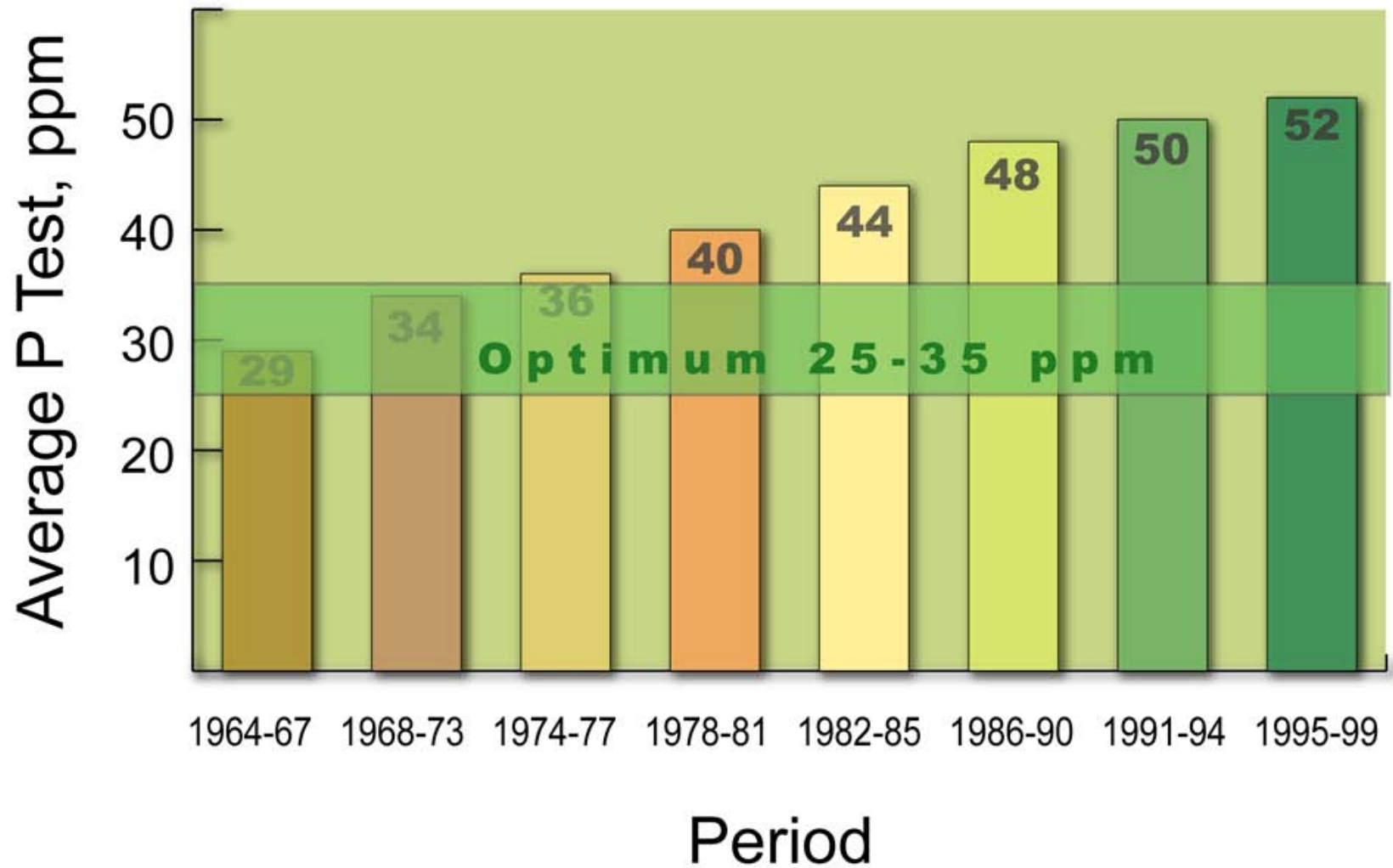
P inputs		P outputs	
	(lb)		(lb)
Protein supplement	1219	Milk	1806
Dicalcium phosphate	1627	Cull cows/calves	300
Grain	0	Surplus Feed	0
Forage	0	Manure	0
Fertilizer	1181	Runoff	201
<b>TOTALS</b>	<b>4027</b>	<b>TOTALS</b>	<b>2307</b>

**Farm P balance = +1,720 lb P**

# Phosphorus (P) story



# Average soil P levels of Wisconsin cropland fields over time



# Why is P overfed?

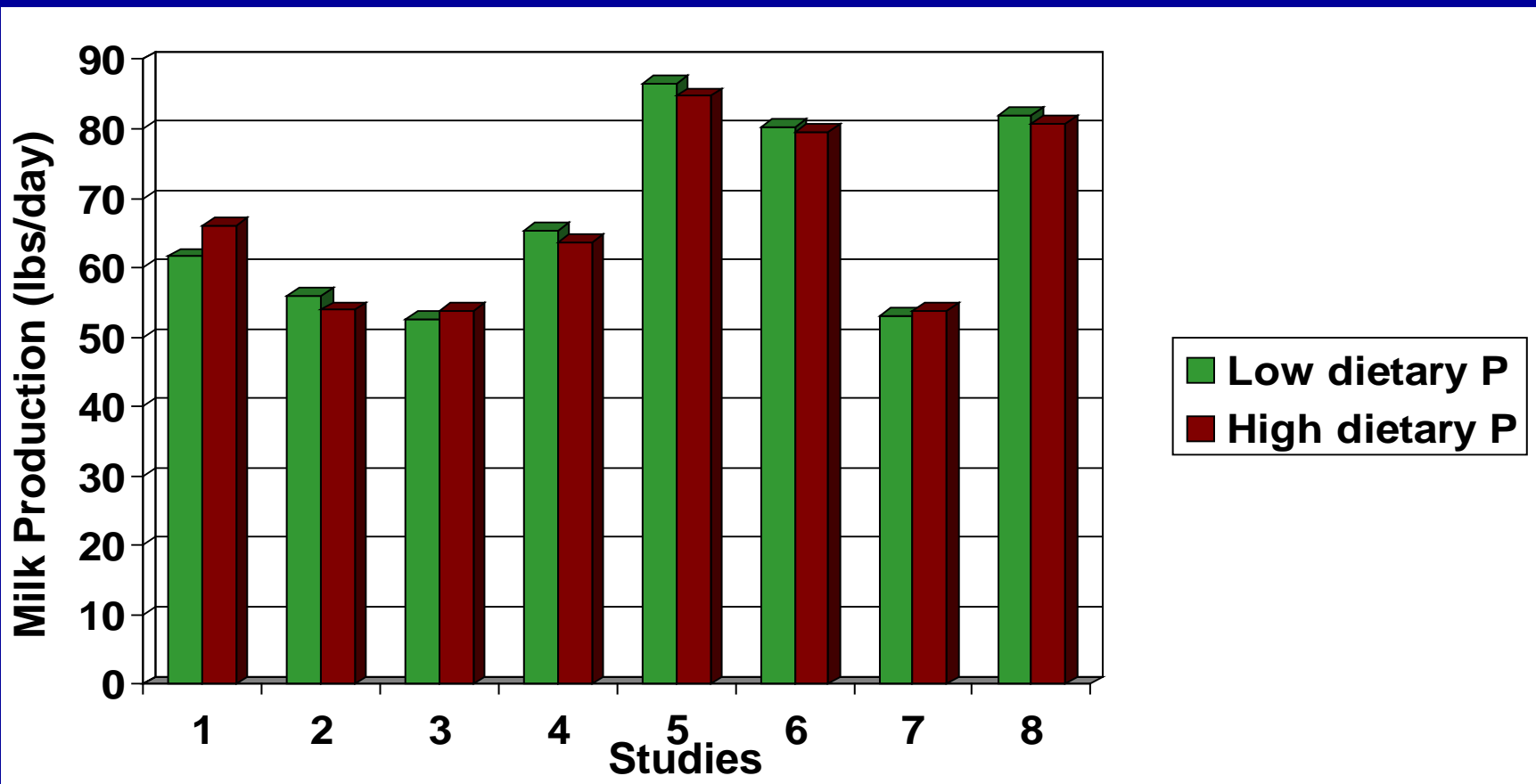
- ‘Myth’ that increasing P improves reproductive performance
- Little research on the absolute minimum P content required to support moderate to high levels of milk production
- Aggressive marketing of P supplements
- Cheap and available protein feed sources that are high in P content



# Debunking the myth:

Milk production is not harmed by lower P diets

Summary of 8 studies



# National Research Council (NRC) feed-P recommendations

Milk Production

(lbs/day)

55

77

99

120

Dietary P Level

(%)

0.32

0.35

0.36

0.38

Adapted from *Nutrient Requirements for Dairy Cattle*, Seventh Revised Edition,  
National Academy Press Washington, D.C., January 2001

# New Assessment Tool:

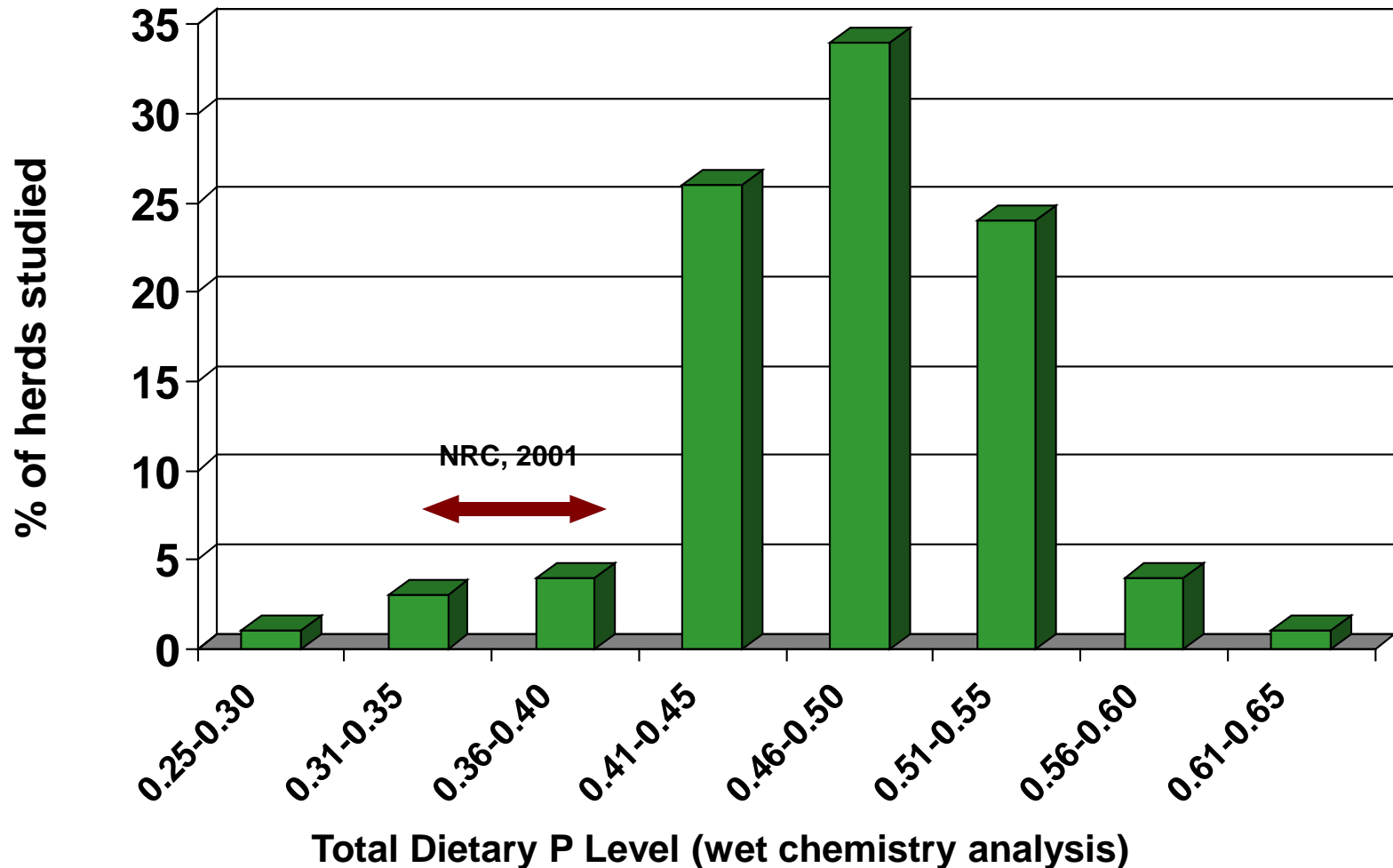
TMR  
Sample



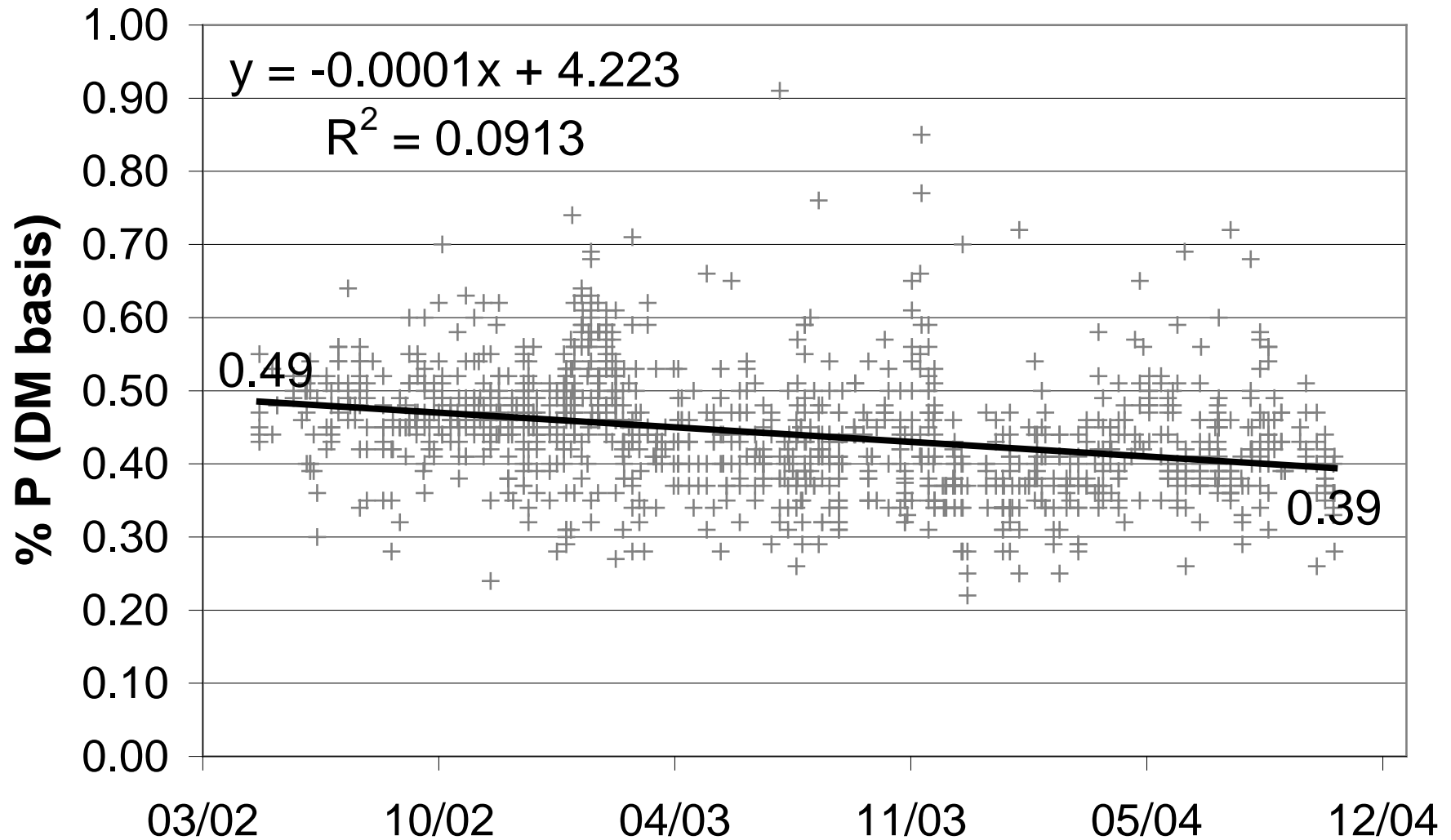
# Dietary P data

from 89 high-producing dairy herds

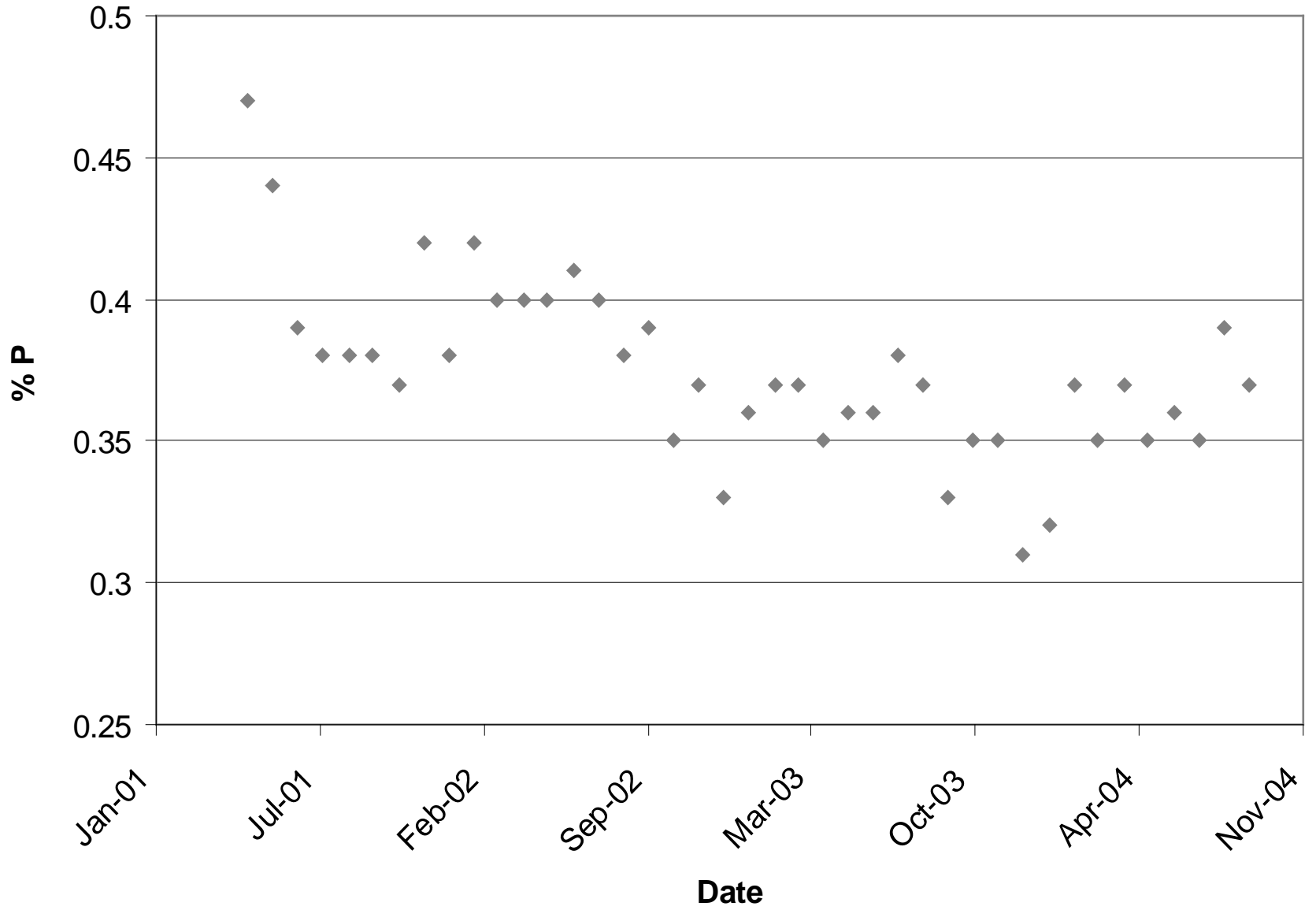
UW Soil & Forage Analysis Lab – Marshfield, WI-2002



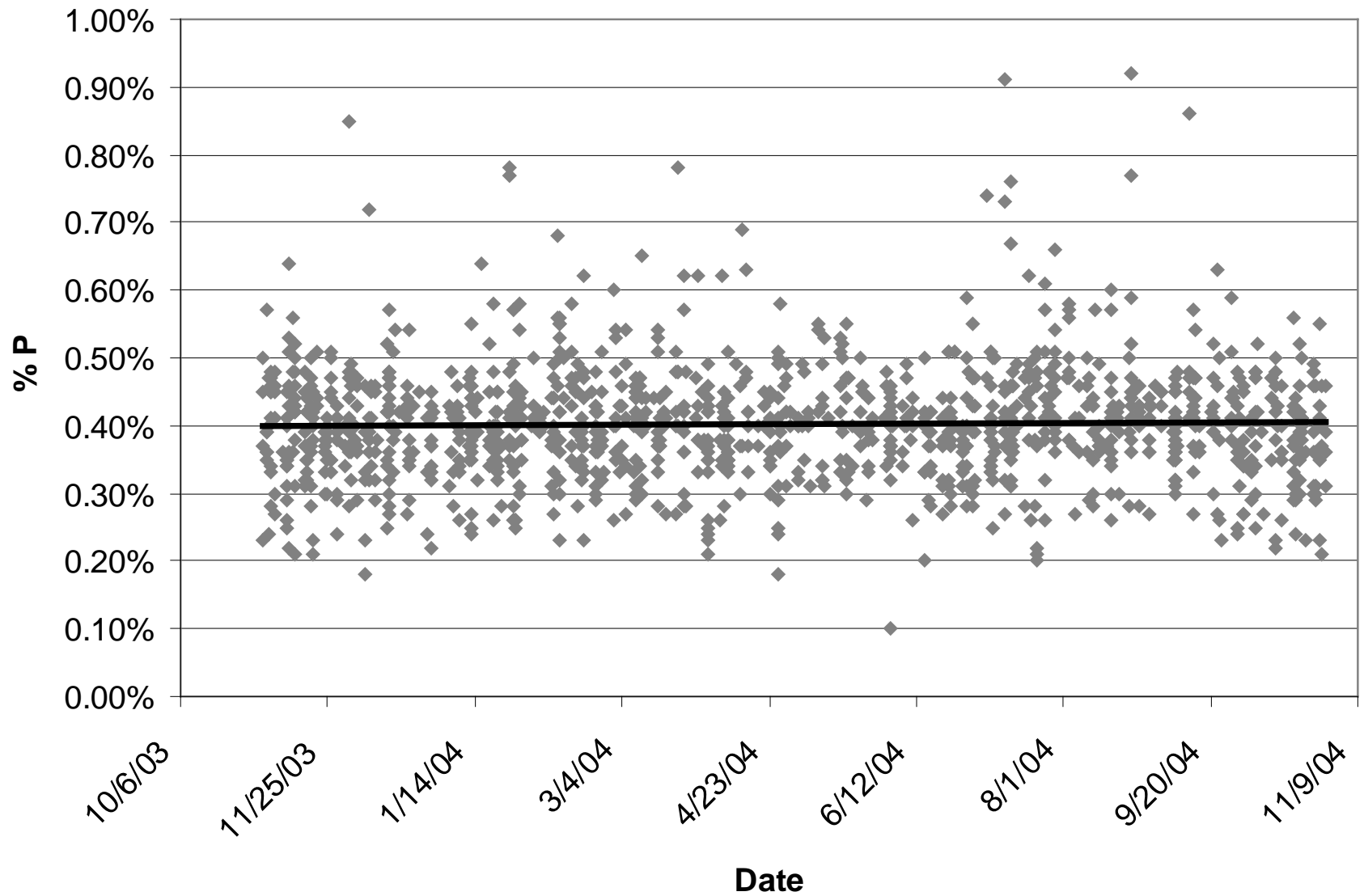
# TMR Quality Control Dietary Phosphorus Results



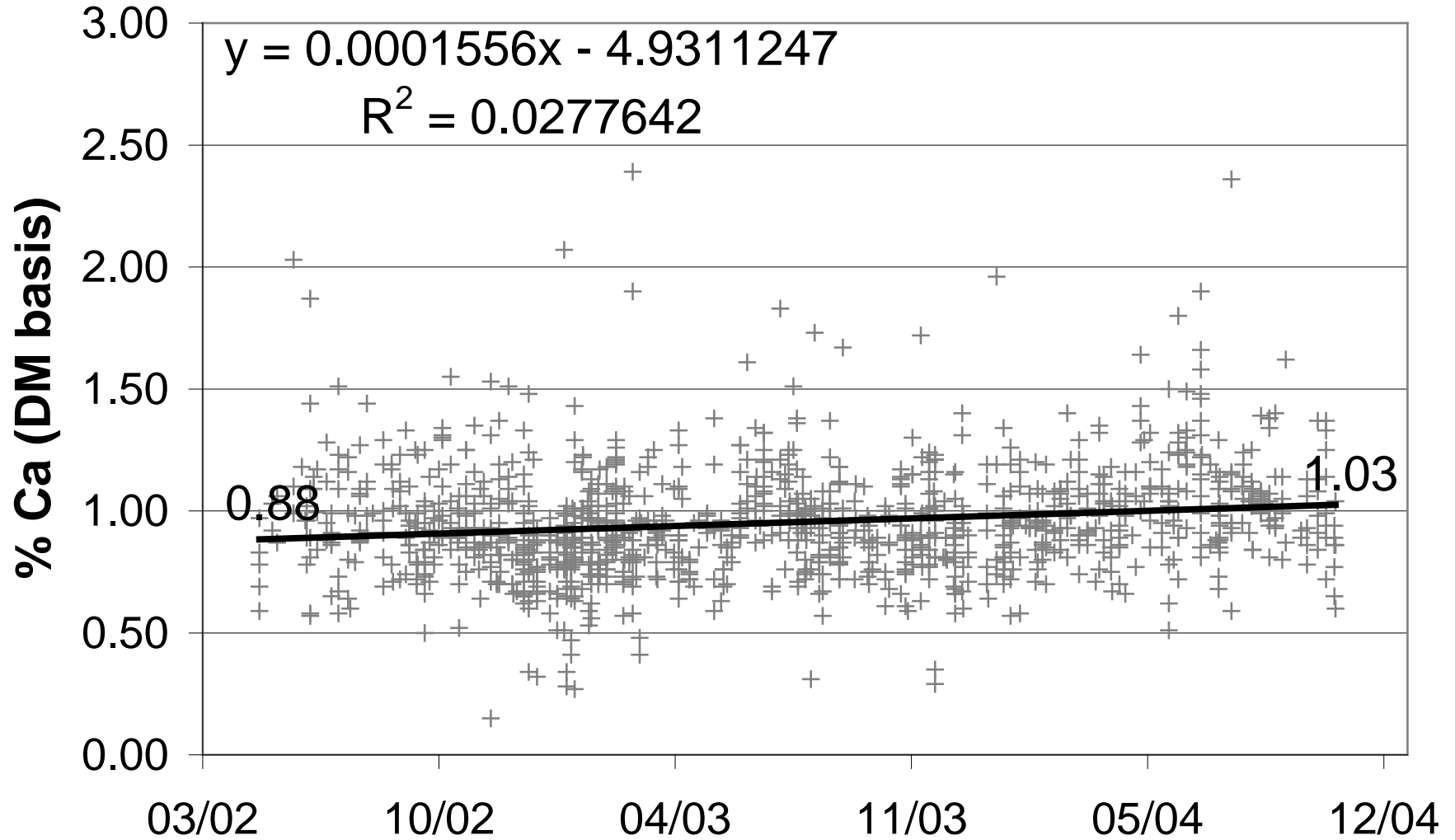
# Rock River Laboratory TMR Data



# Dairyland Labs TMR Data

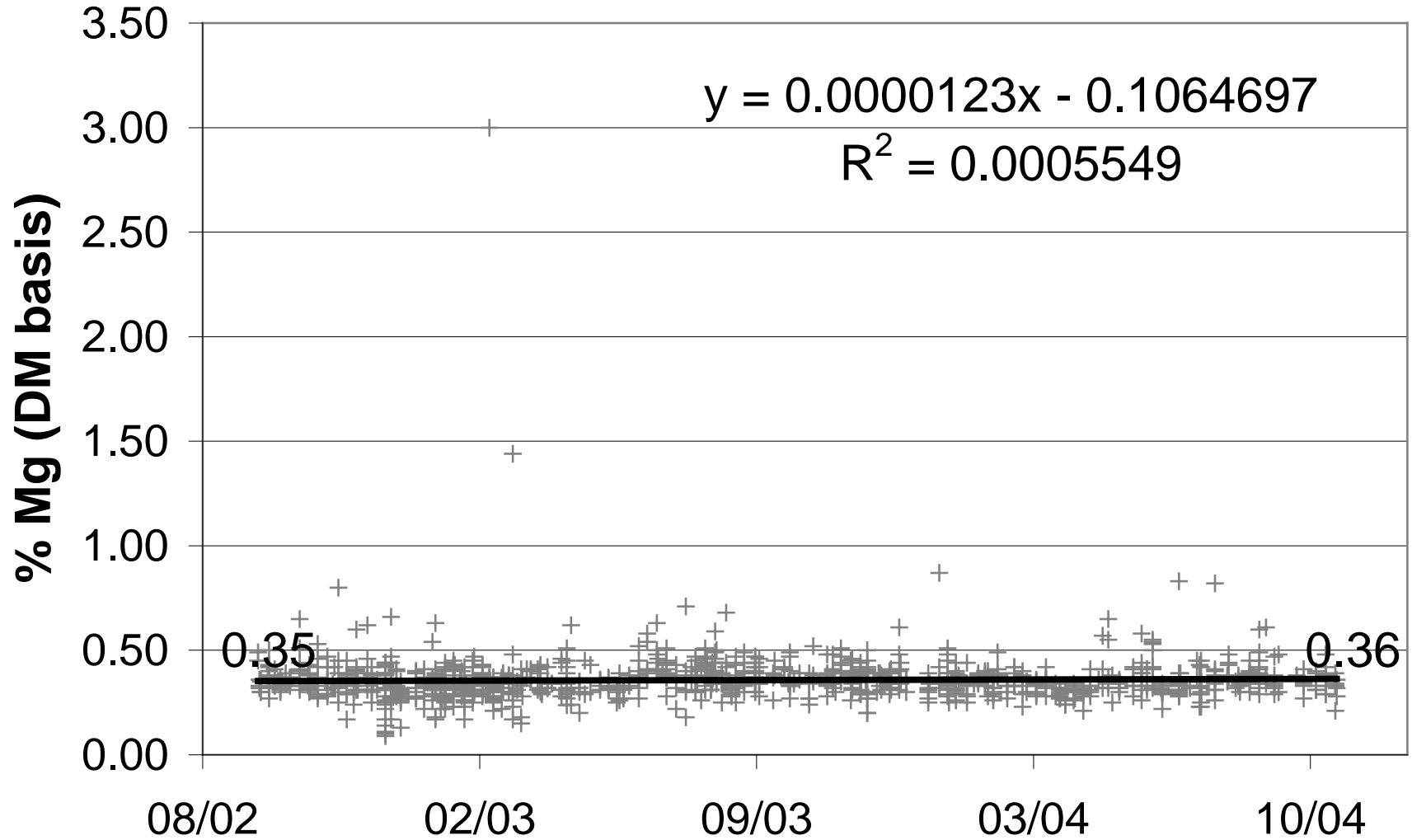


# TMR Quality Control Dietary Calcium Results

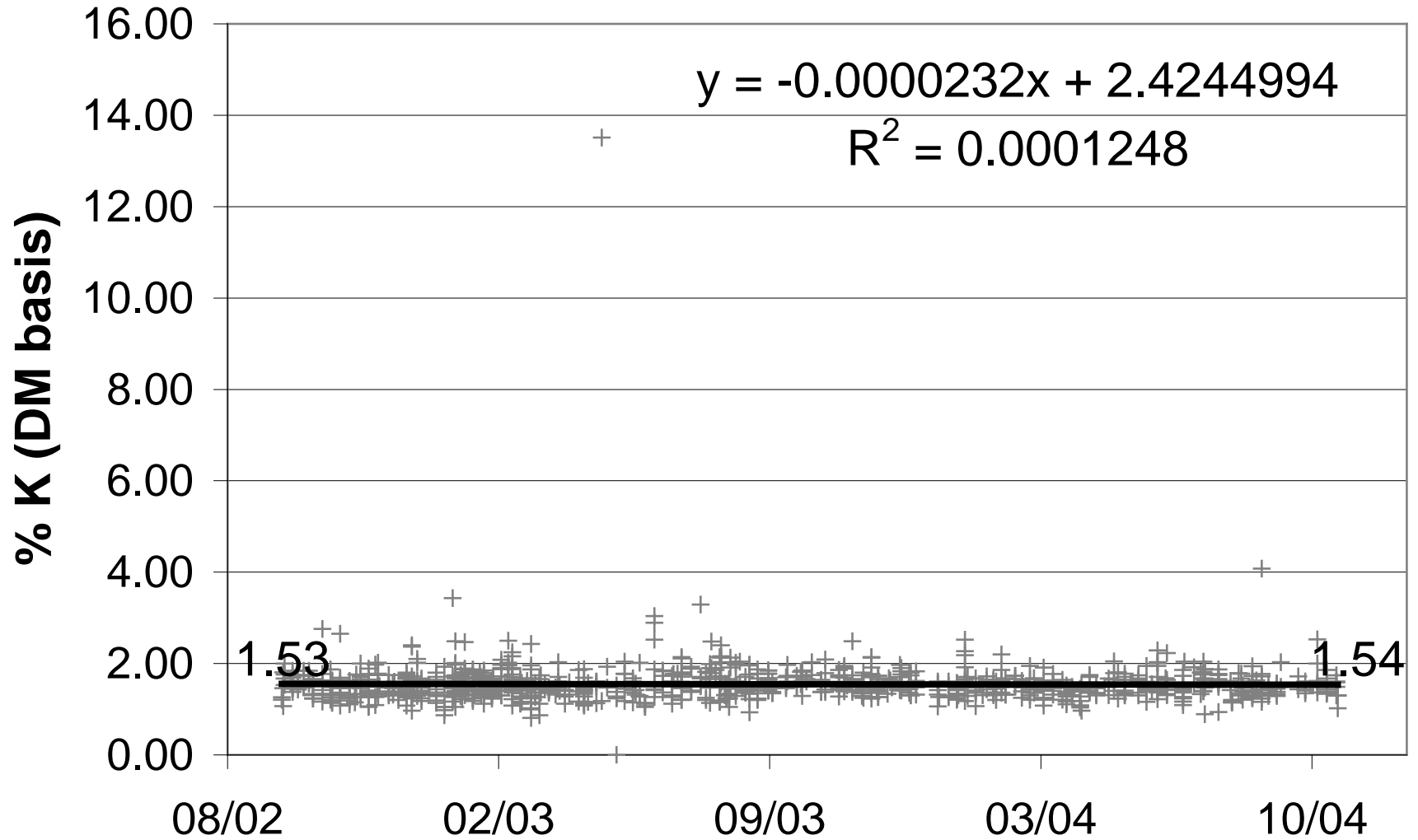




# TMR Quality Control Dietary Magnesium Results



# TMR Quality Control Dietary Potassium Results

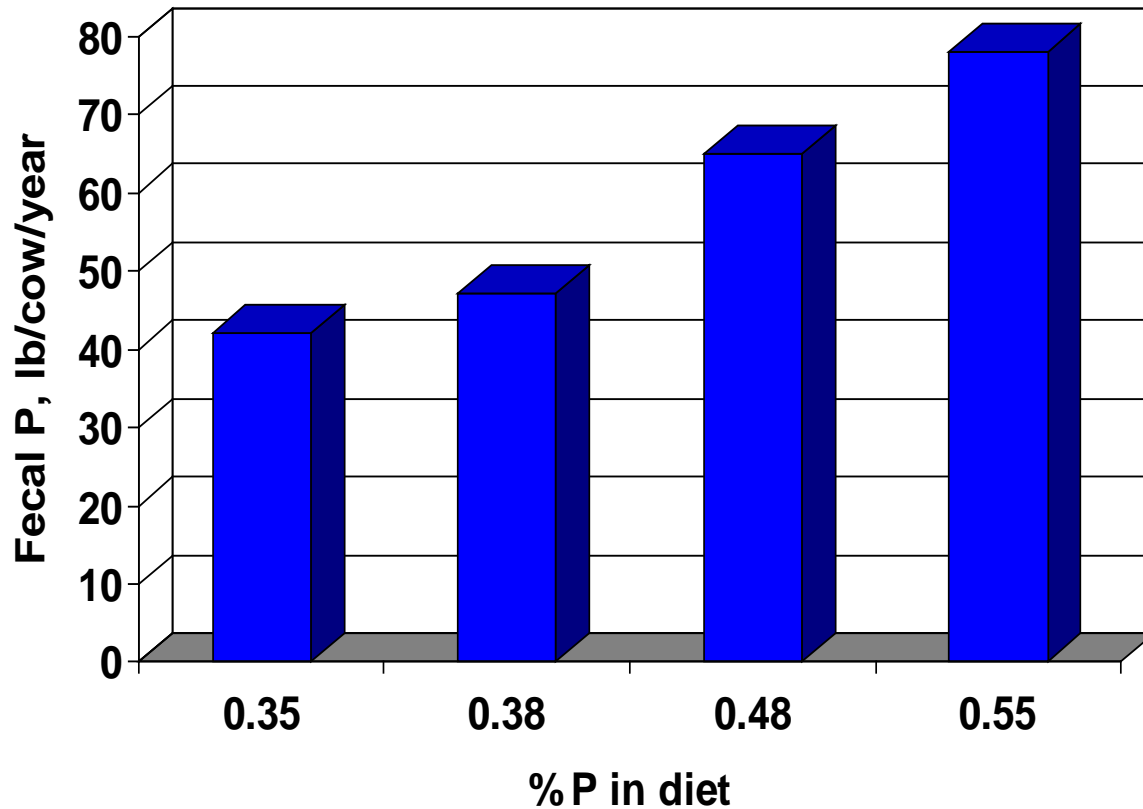


# Dietary P conclusions

- Performance (reproductive efficiency and milk production) is not adversely affected by reducing P to NRC recommendations
- Recent TMR tests indicate a trend toward reduced P levels in dairy rations

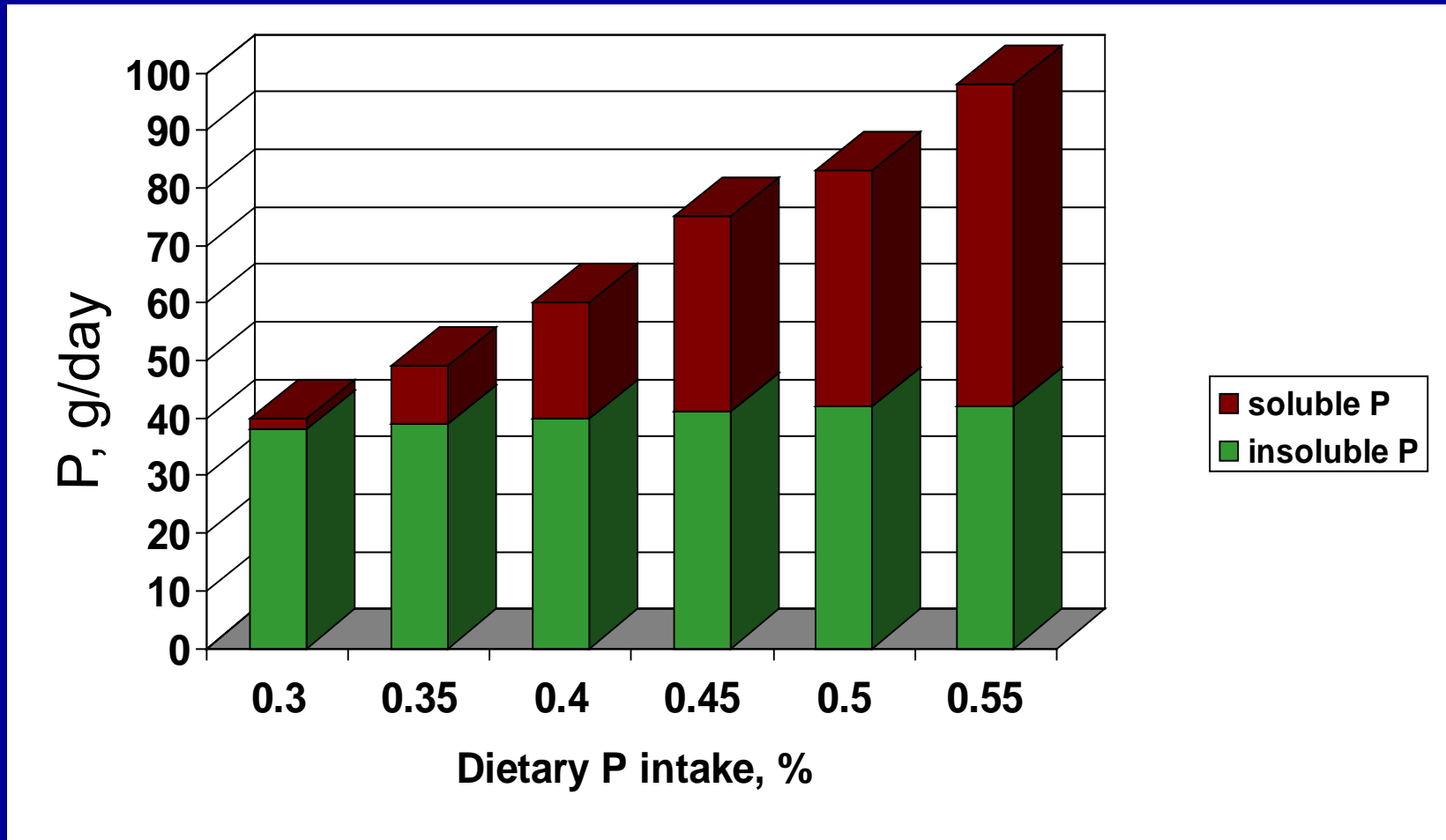


# Effect of P intake on P in manure



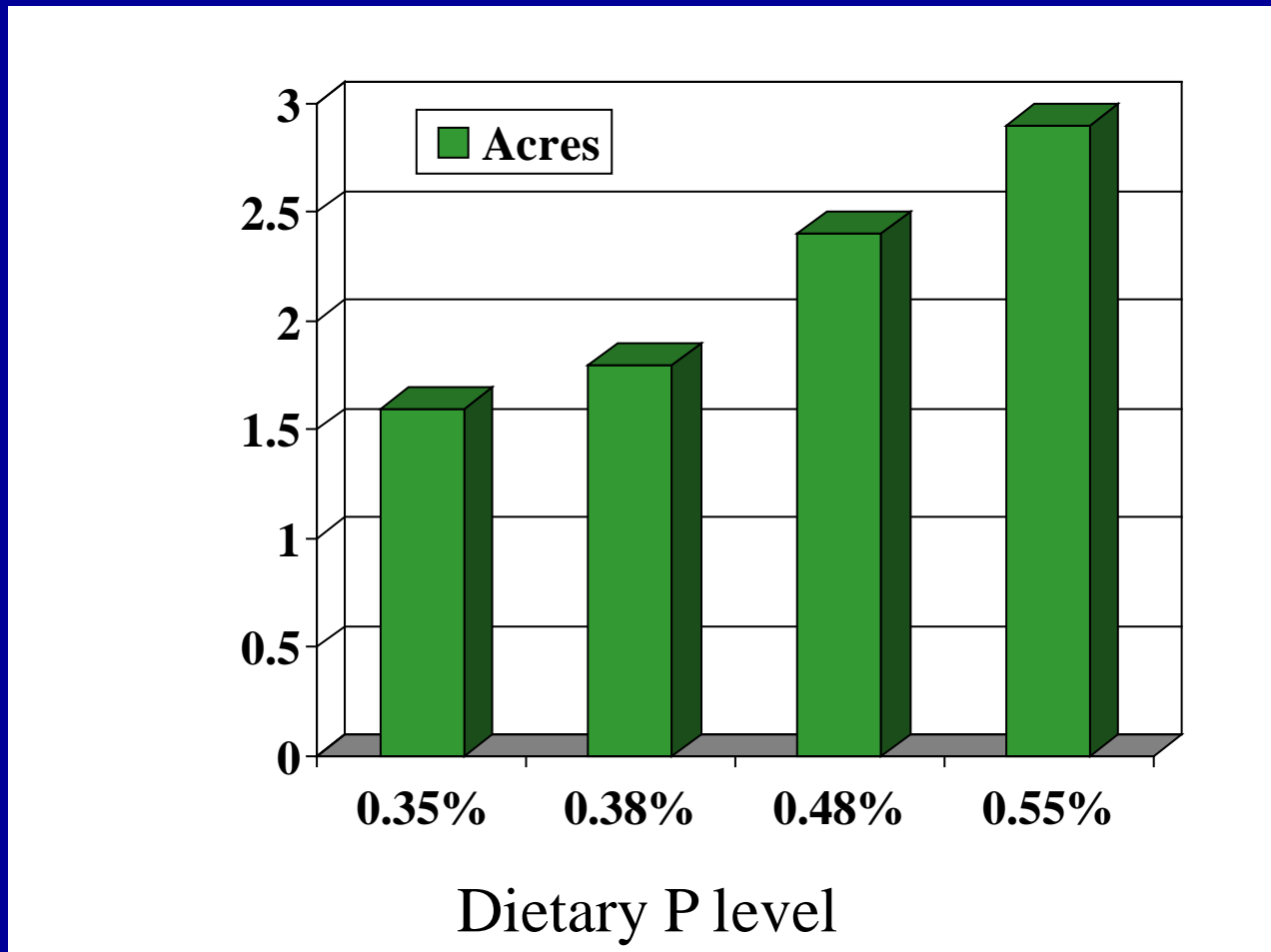
Increasing P content from 0.35% to 0.55% of diet dry matter increases P output from 42 to 78 lbs/cow/year!

# Effect of P intake on form of P in manure



A high P diet produces manure that is more likely to cause environmental problems.

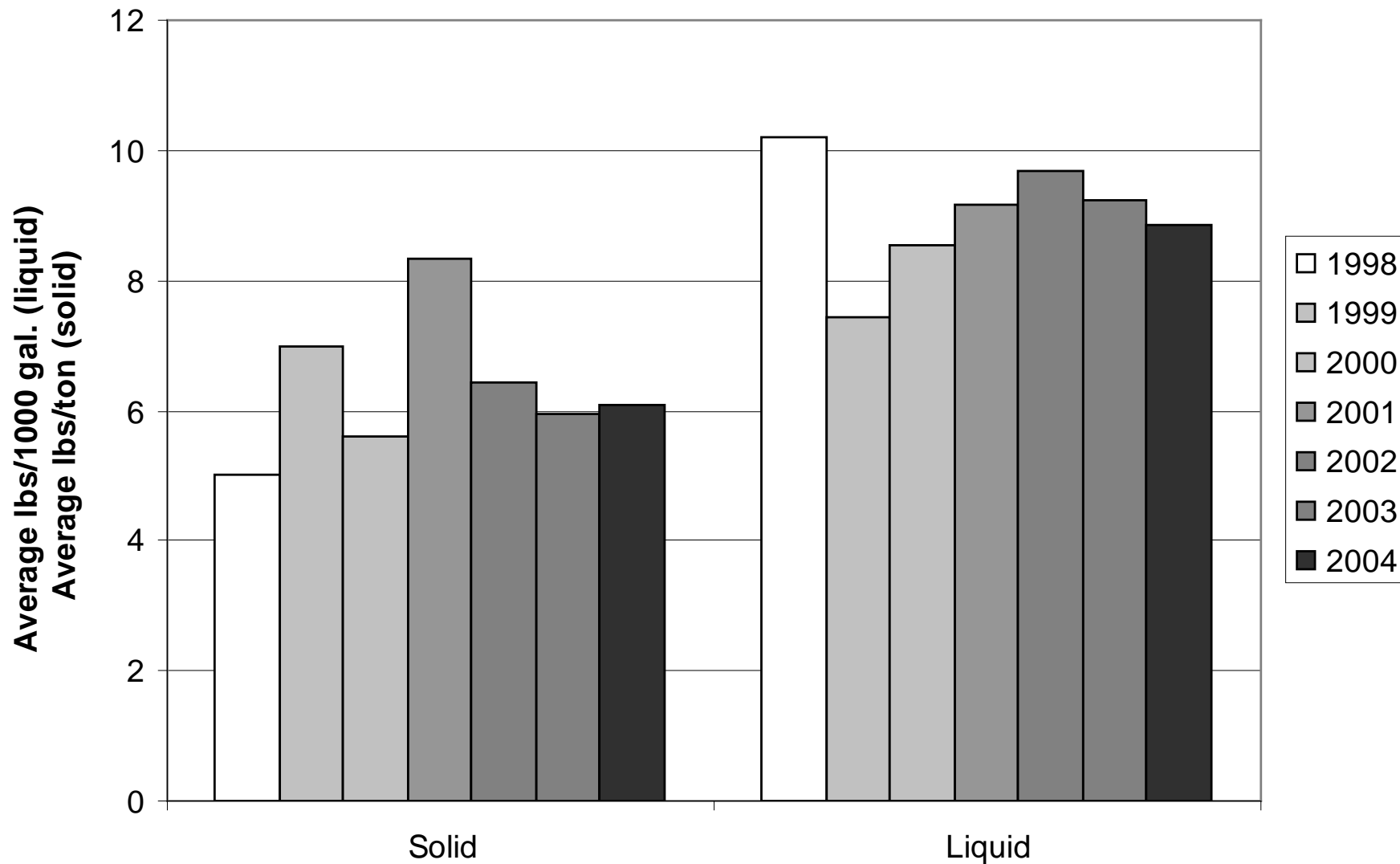
# Land required for recycling fecal P from one cow fed various dietary P levels



†Alfalfa, corn , soybean rotation with 27 lb P/a removal

# UW Soil & Forage Analysis Laboratory Dairy Manure Summary

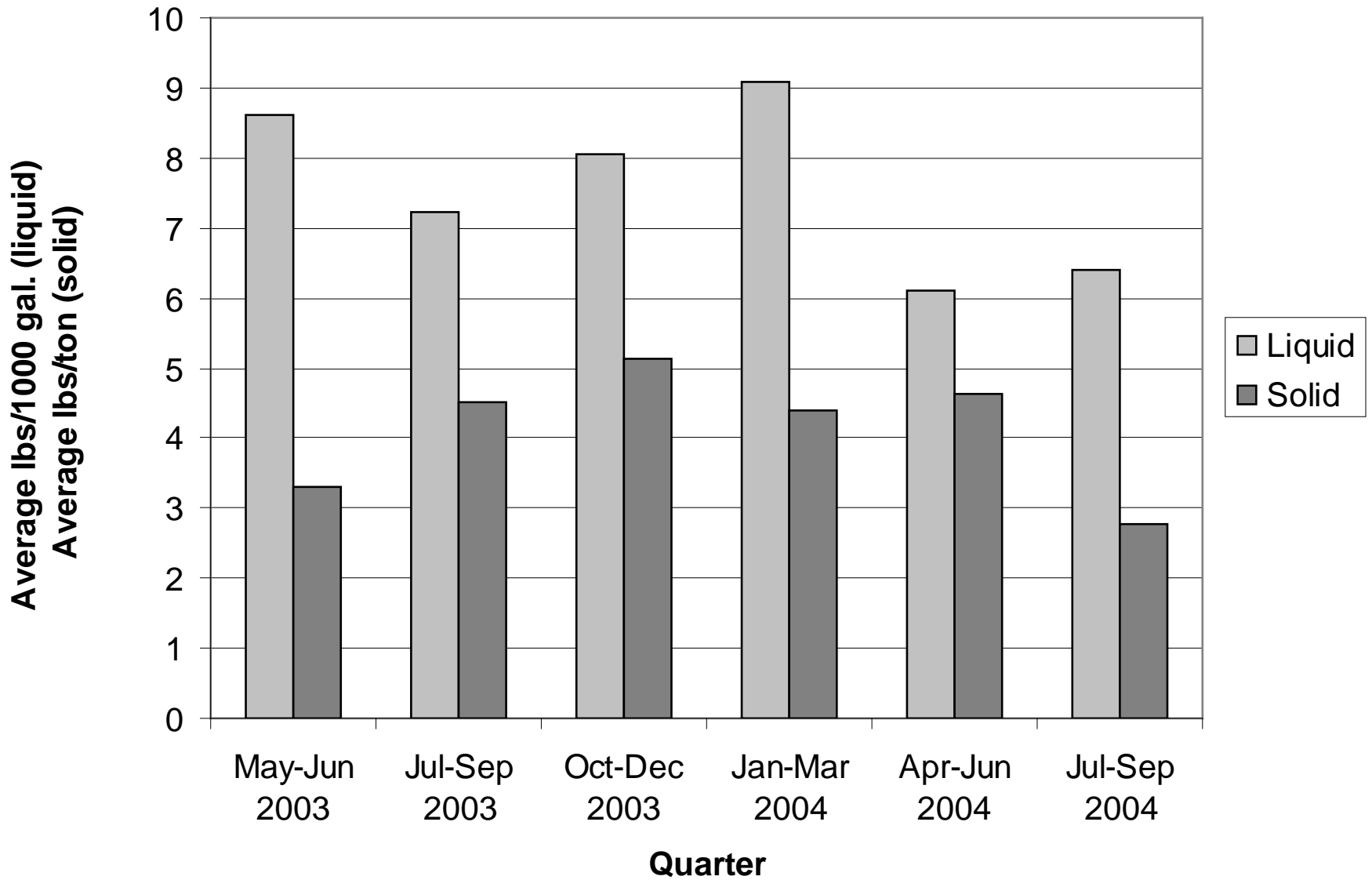
*P as P<sub>2</sub>O<sub>5</sub>*





# Rock River Laboratory Dairy Manure Summary

*P as P<sub>2</sub>O<sub>5</sub>*

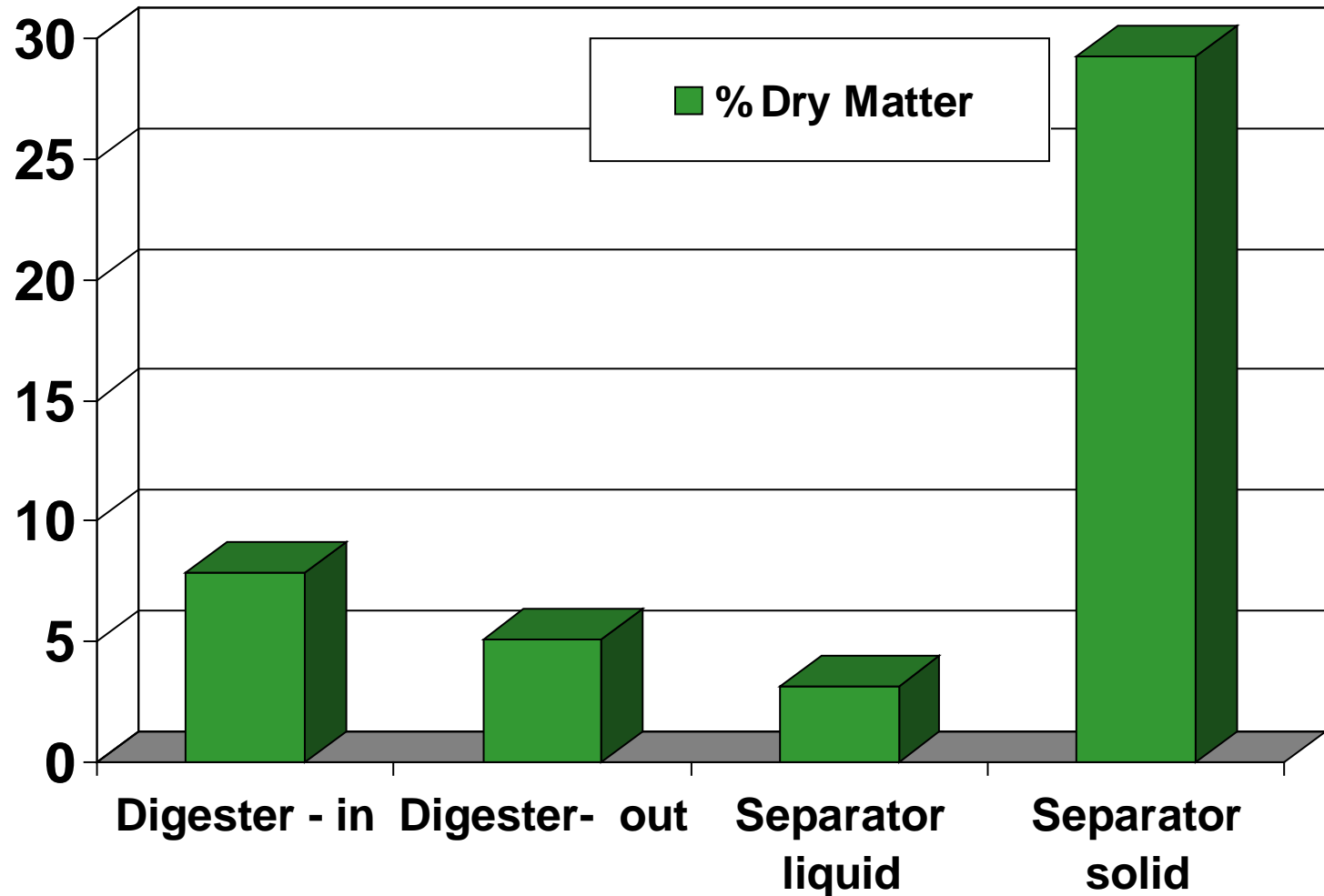




# An Alternative Manure Handling Practice

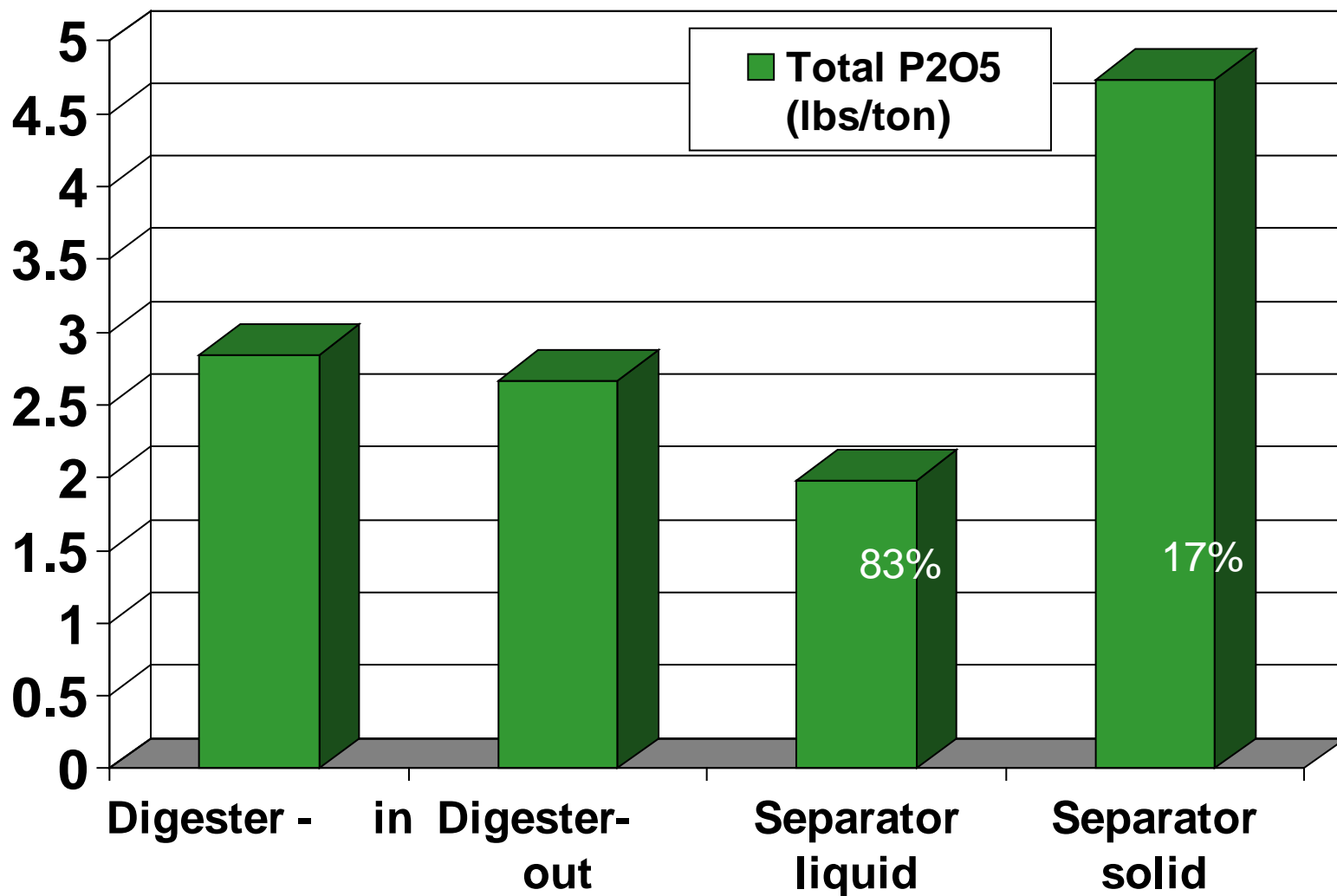
# Digested and Separated Manure

Gordondale Farms, Nelsonville, WI



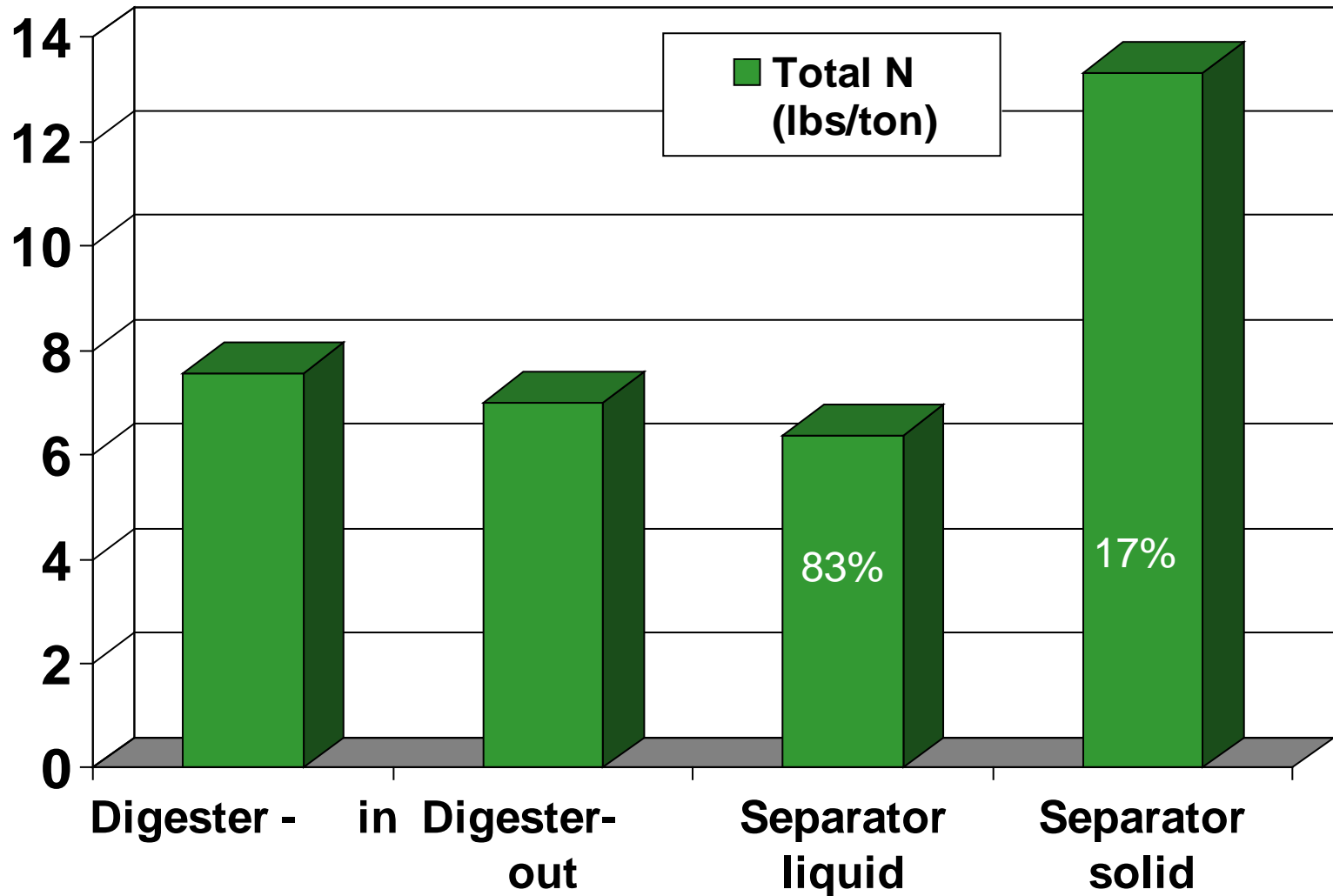
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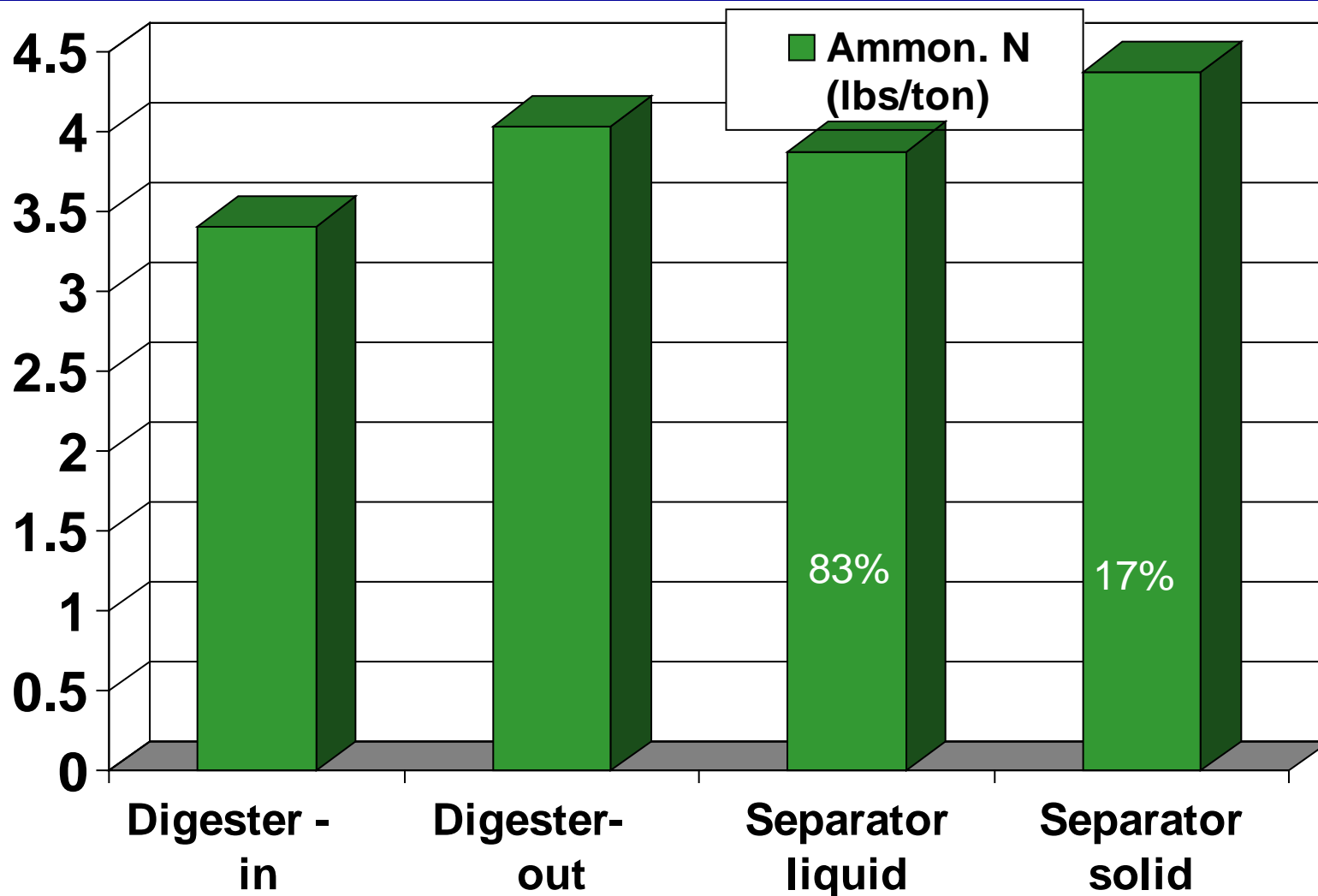
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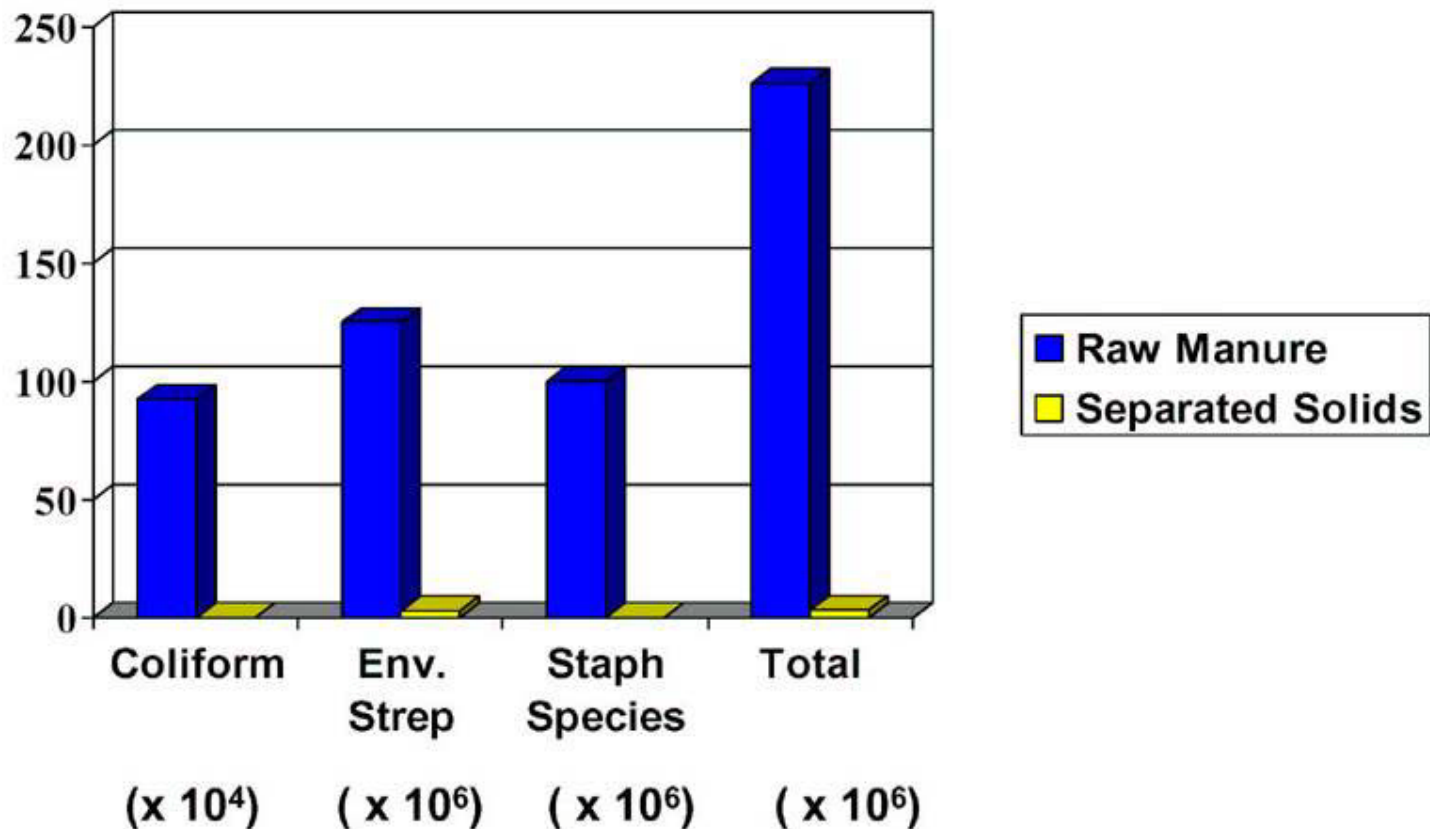
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Gordondale Farms, Nelsonville, WI



# PATHOGEN REDUCTION

## Gordondale Farms





# Summary

- An integrated approach to improving P nutrient management on dairy farms seems to be having an impact.
- TMR samples tested in Wisconsin show a trend toward decreased total P levels, bringing them more in line with NRC guidelines
- It appears that a trend toward reduced dairy dietary feed P levels is being reflected in average manure P levels as well.