

Mass Balance: Nutrient Accumulations across Dairy Sizes

Kevin Erb
UW-Extension NPM Program
&
Kevin Fermanich
UW-Green Bay

Study Goals

- ◆ Do large farms have a greater potential to pollute (P) than small farms?
- ◆ Where is our P coming from -- -- and will Nutrient Management solve the problem?
 - Mass balance of different farm sizes best way to answer the question.

What is a Mass Balance?

- ◆ Identifying all sources of nutrients entering and leaving the farm
 - Inputs: Feed, Fertilizer, purchased animals
 - Outputs: Milk, Meat, Crops sold.
 - Environmental sources: Legumes, Rain
 - Environmental Losses: Erosion, Leaching
 - Goal is to be near zero.

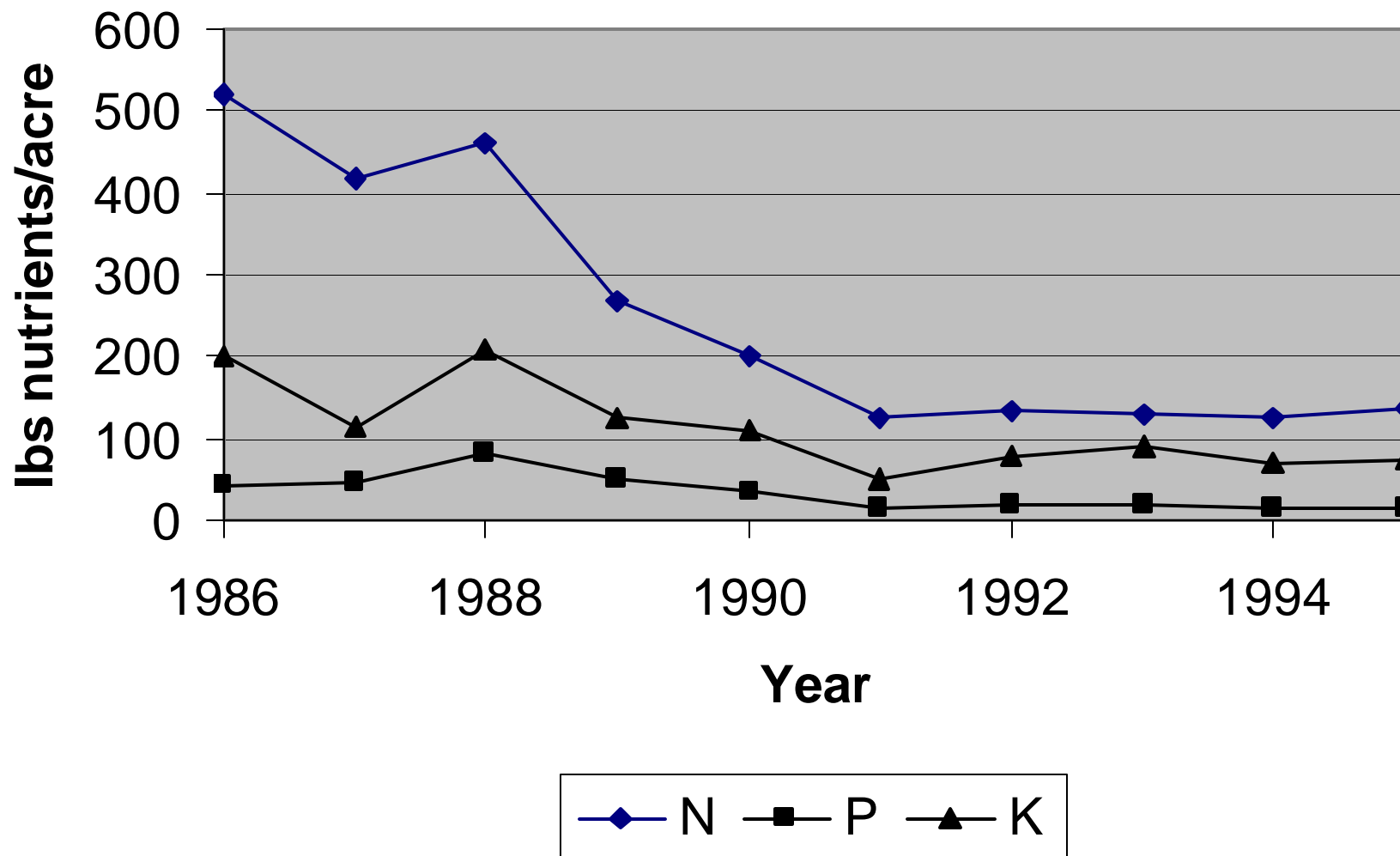
Many tools and methods available

- ◆ Dutch “Yardstick” most used in upper Midwest
 - ◆ Blue Earth Basin (MN)
 - ◆ Apple-Ashwaubenon (WI)
 - ◆ Central Nebraska

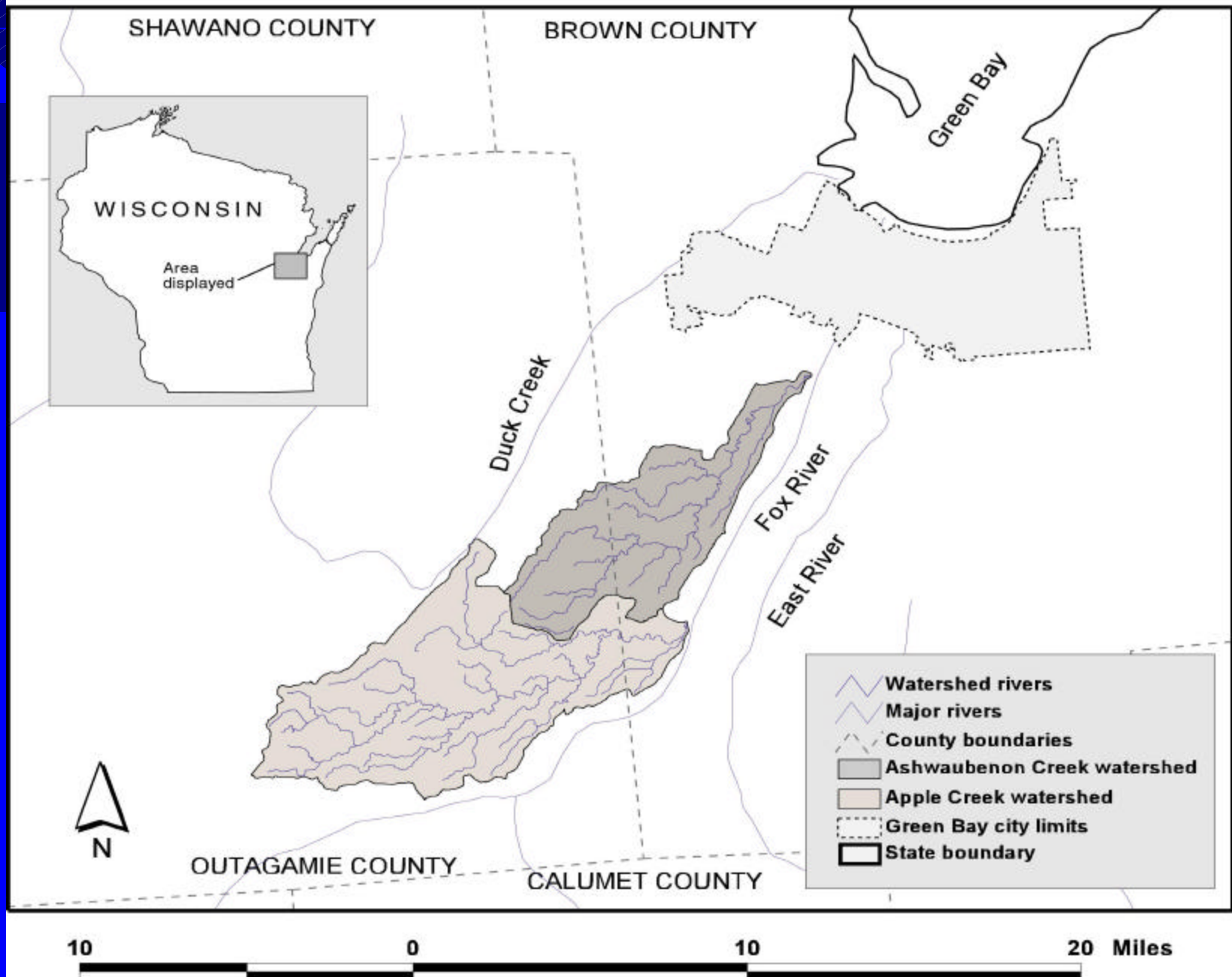
Dutch Yardstick

- ◆ Developed in the Netherlands in '80's.
- ◆ Used as an Environmental Taxation Tool
 - ◆ Import too much: Tax penalty
 - ◆ Below balance: Tax credit

Yardstick Scores from Dutch Dairy Farm



Apple and Ashwaubenon Creek Watersheds

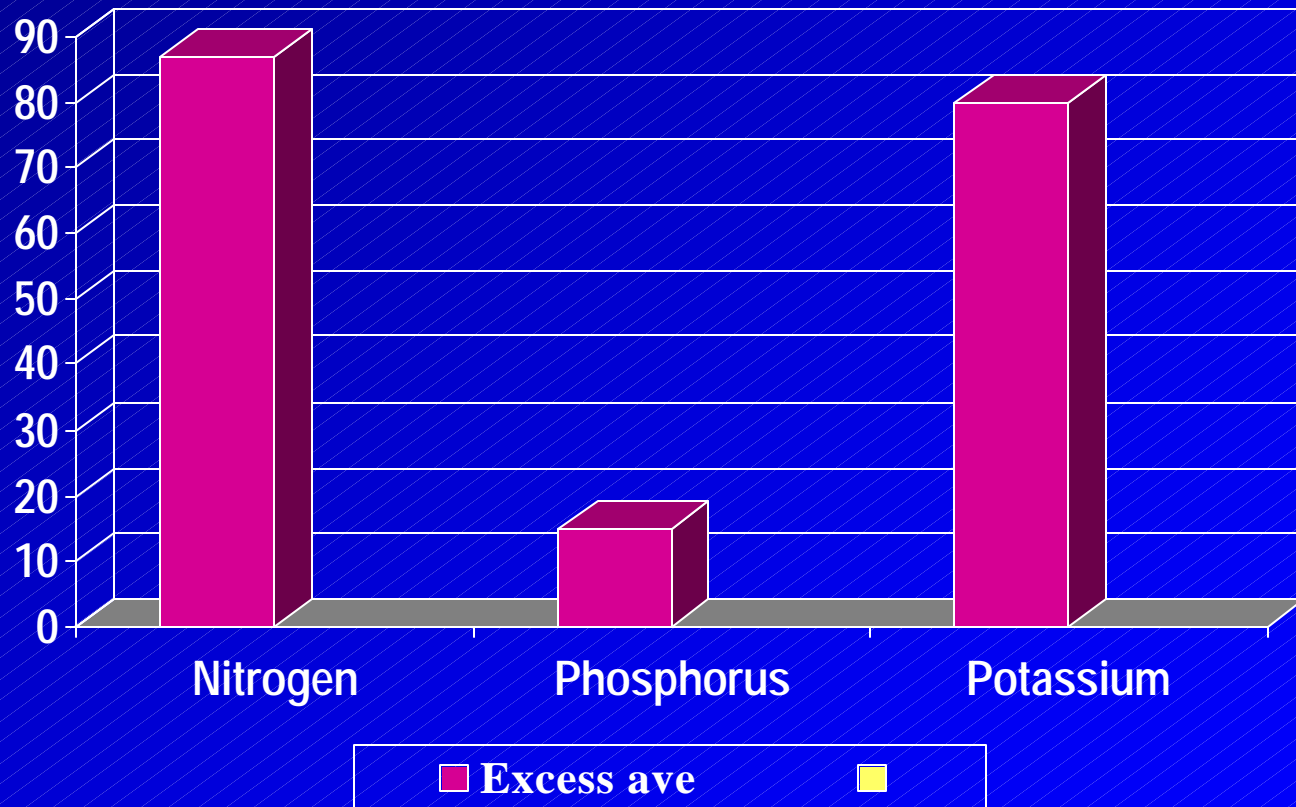


Apple-Ashwaubenon 1997-1998

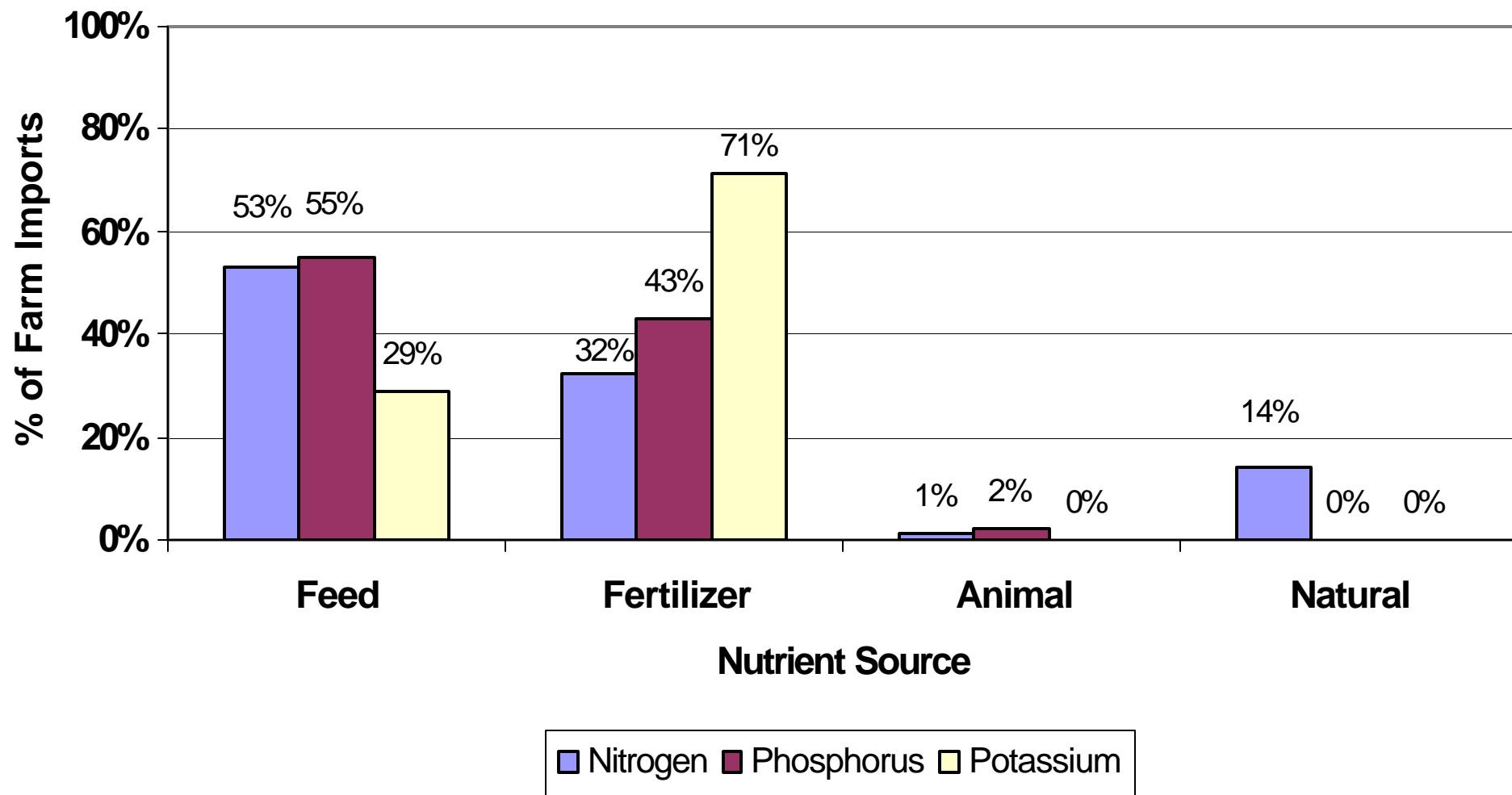
- ◆ 17 farms
 - ◆ 13 dairies from 50 to 500 hd
 - ◆ 4 cash grain operations

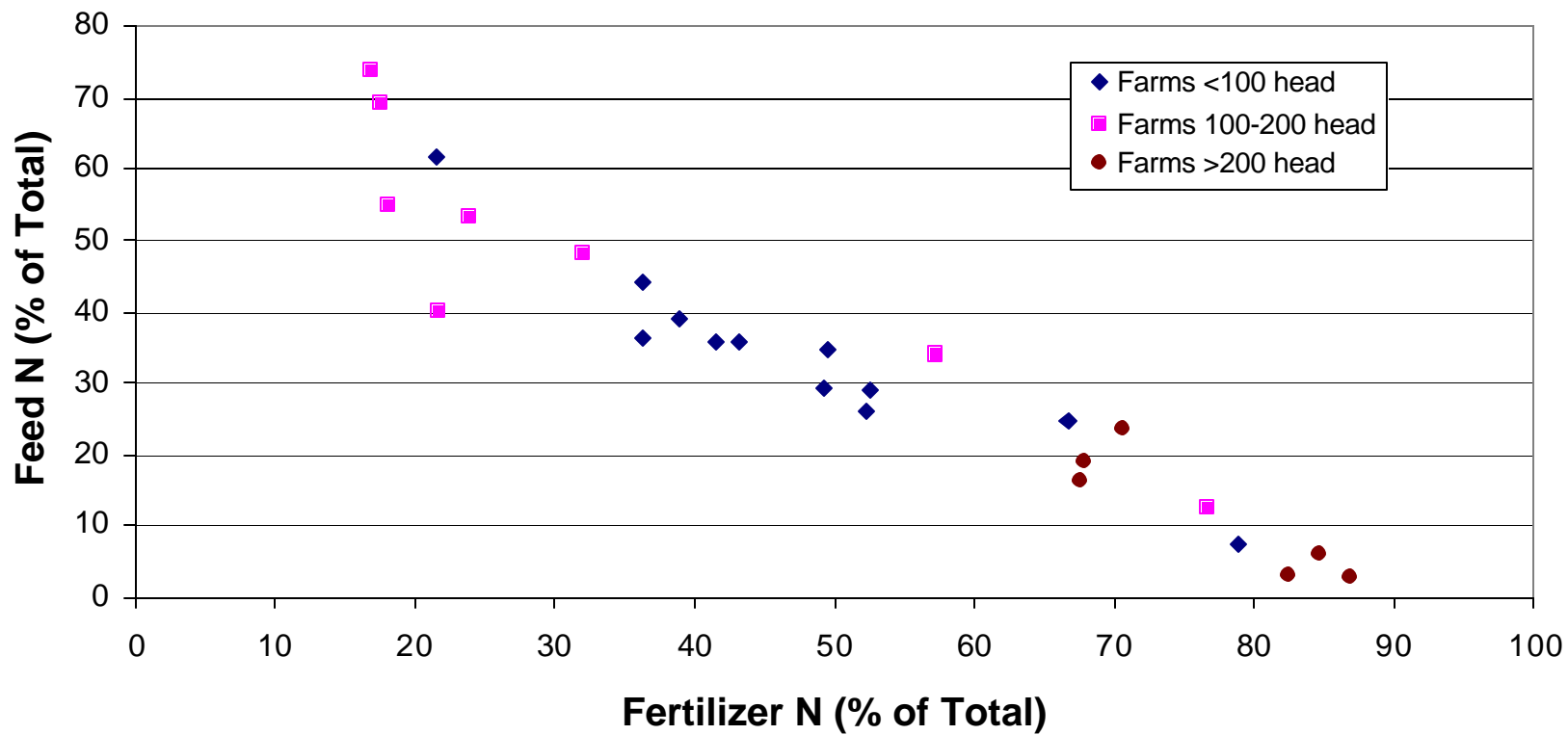
Nutrient Surplus Apple-Ashwaubenon Study

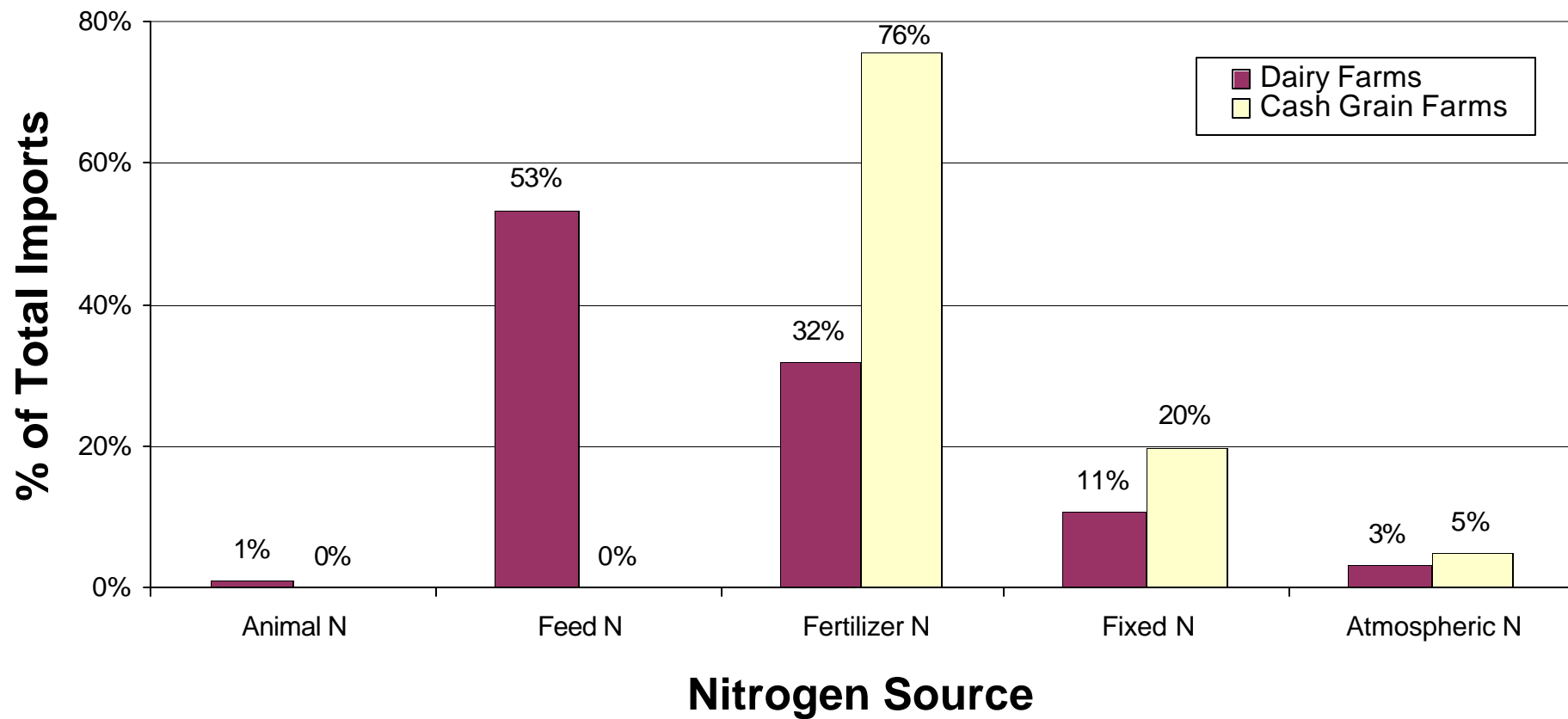
Lb/Acre

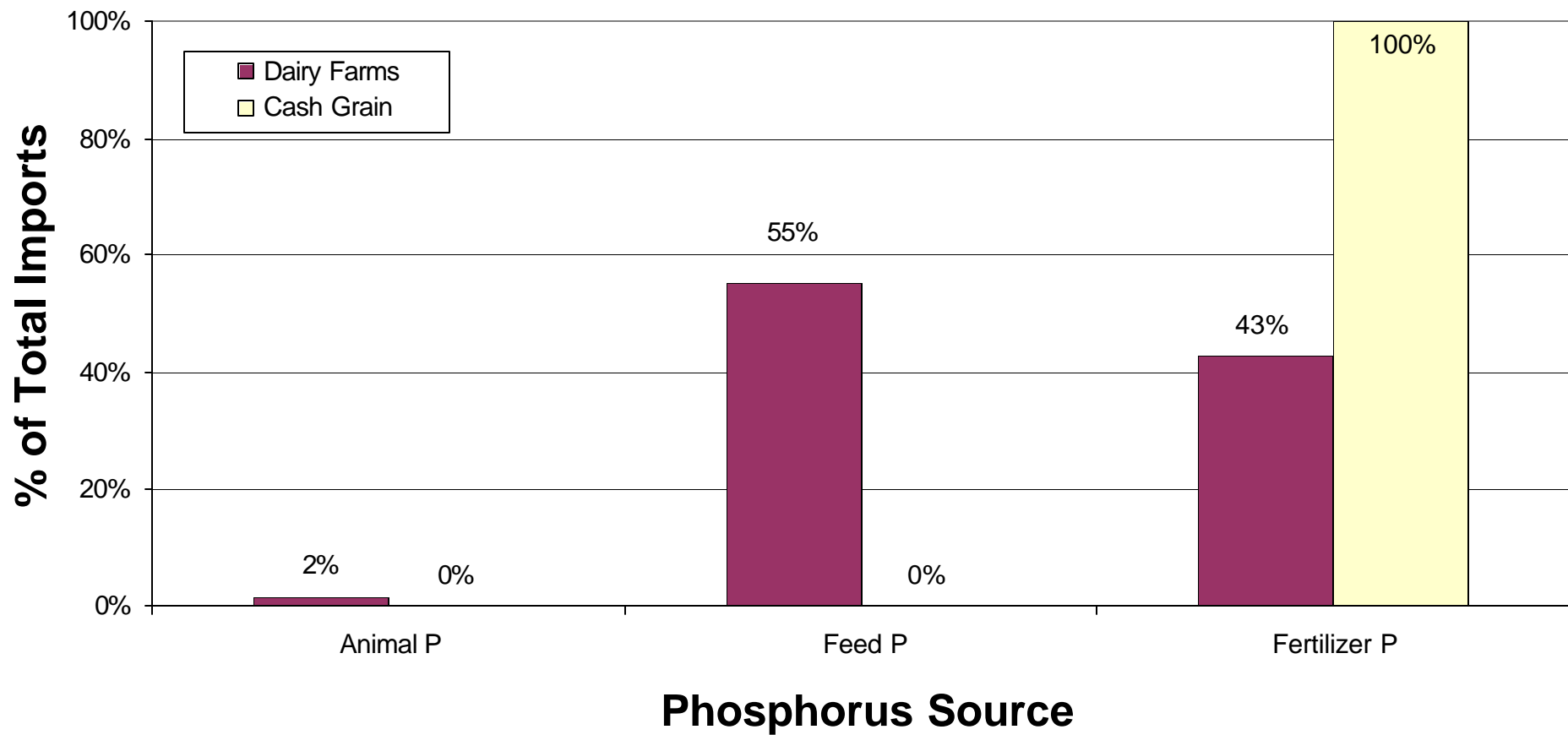


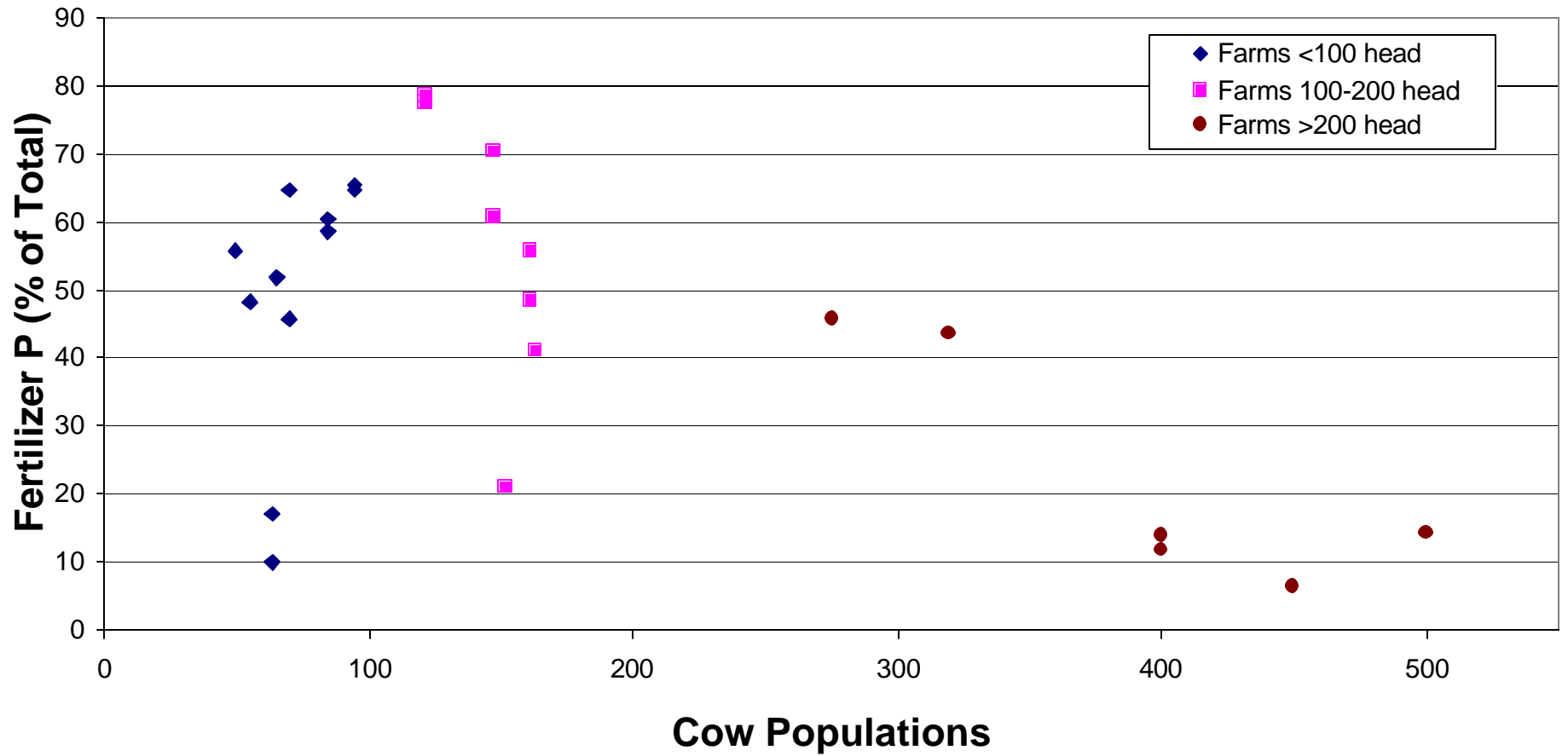
	Farm Years	N Mean (lbs/acre)	P Mean (lbs/acre)	K Mean (lbs/acre)
Cash grain farms	8	-9	3	23
All dairy farms	26	87	15	80
Dairies <100 cows	12	80	16	97
Dairies >100 <300 cows	8	63	10	46
Dairies >300 cows	6	133	21	93
Lb/cow/yr: all dairy farms	26	124# /cow	21# /cow	106# /cow



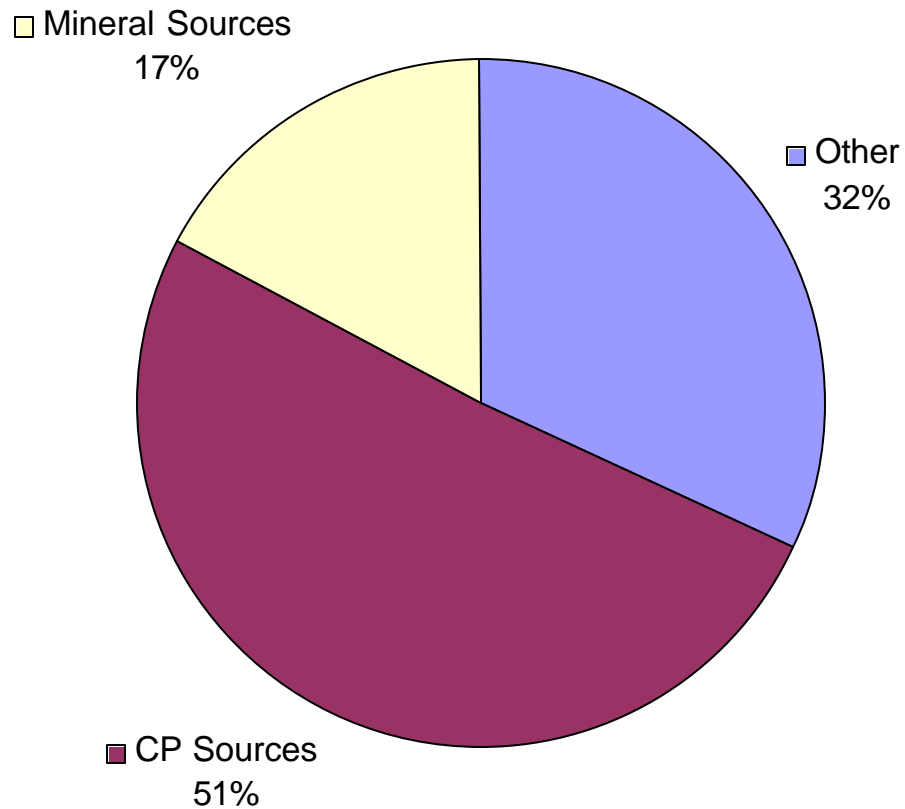


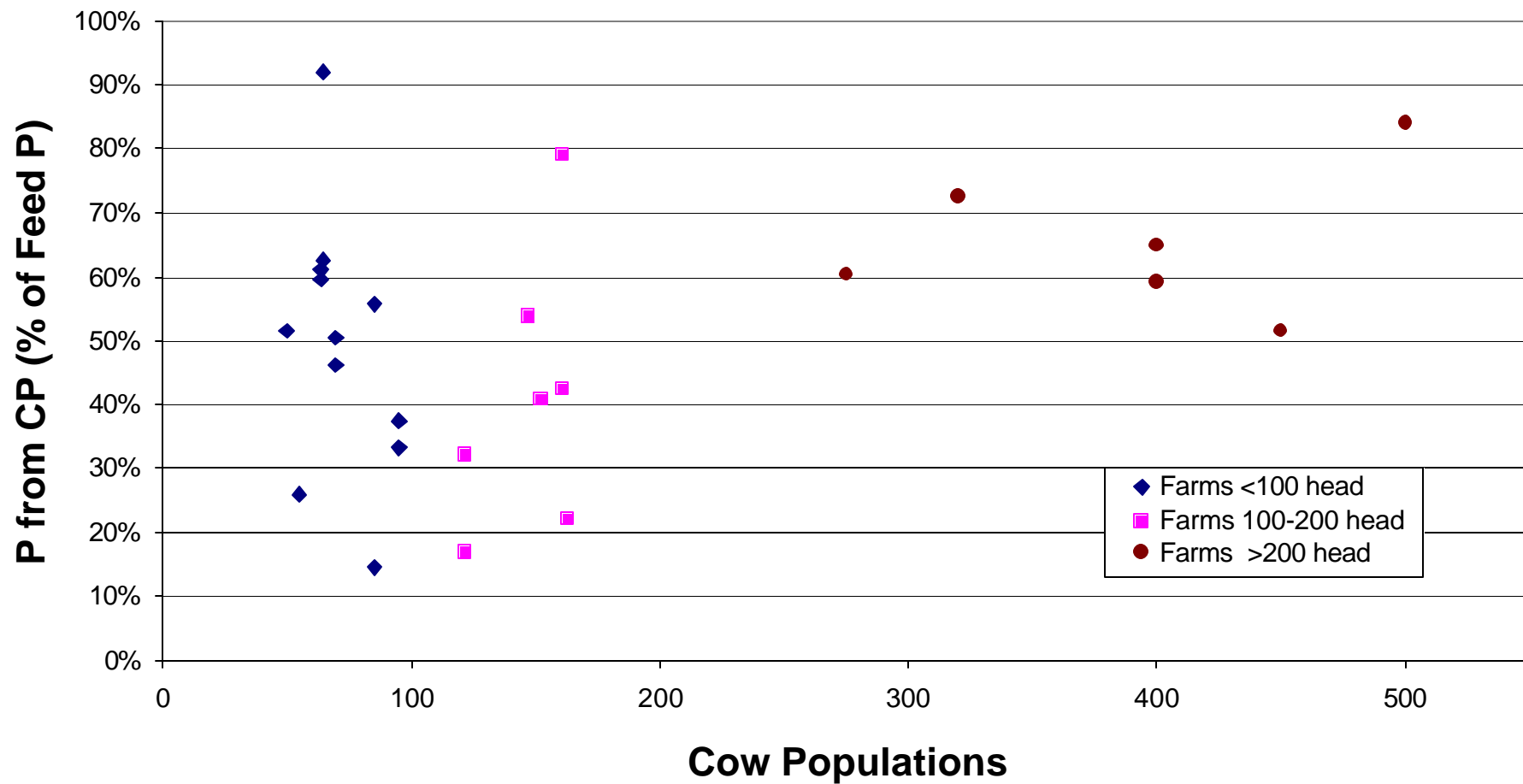


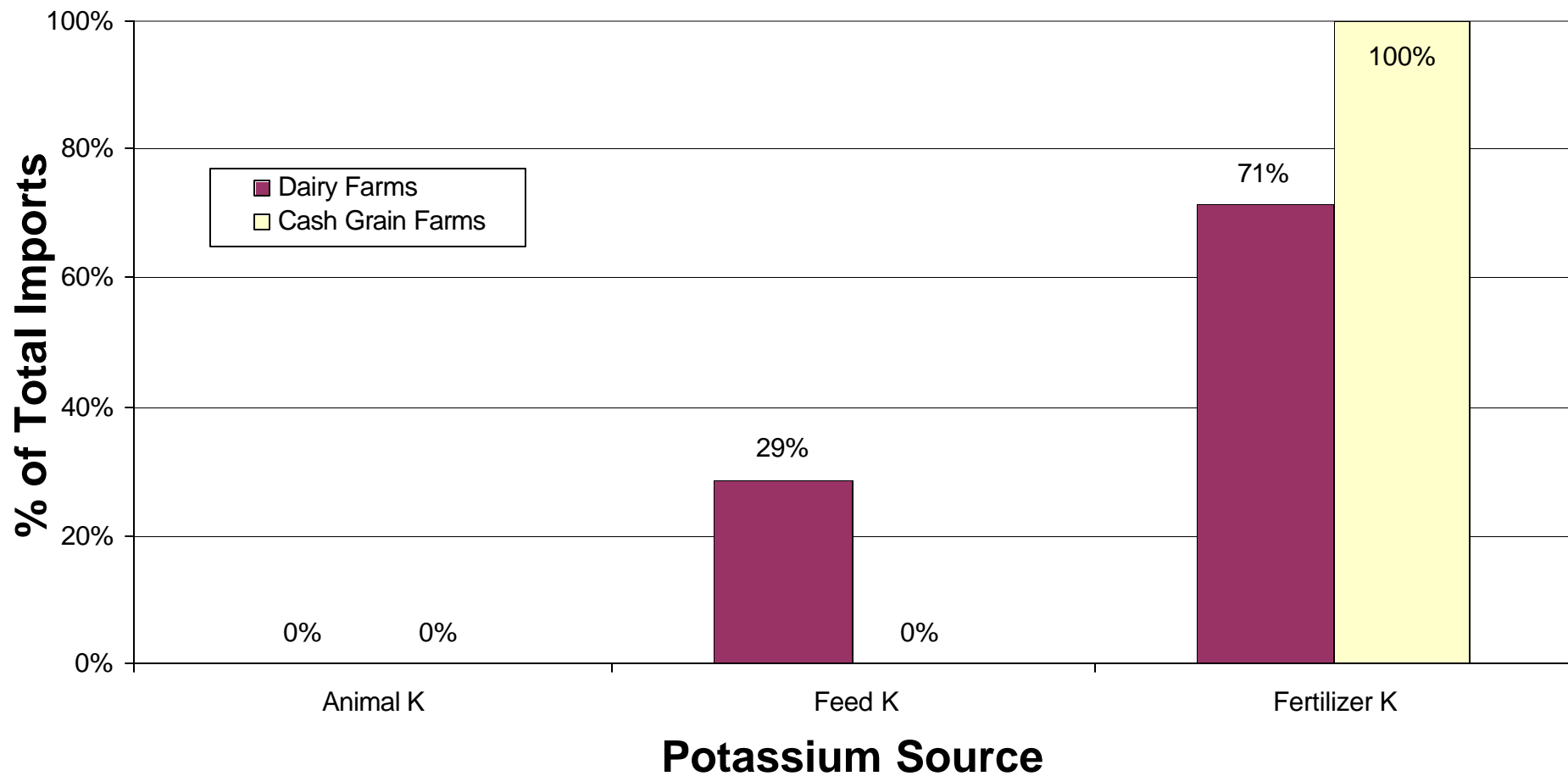




Sources of Feed Phosphorus







Conclusions

- ◆ **Acres and cow numbers**
 - ◆ **DO NOT** affect per acre phosphorus loading.
 - ◆ Increase per acre N and K loading.
- ◆ **Phosphorus problem CAN NOT** be solved by just looking at the fertilizer sources.

Conclusions

- ◆ Implementing the following eliminated surplus
 - ◆ Reduce feed P from 0.52 to 0.38%
 - ◆ Reduce % P in starter fertilizer (9-23-30 → 9-15-30)
 - ◆ Minor change in manure rates on some fields.