



# **Manitoba Livestock Manure Management Initiative**



**Achieving Manure Phosphorus Balance  
in Manitoba**

**December 1, 2009**



# What is MLMMI?

- Manitoba Livestock Manure Management Initiative, or “MLMMI” or “Manure Initiative”
- A volunteer board of directors representing a wide variety of expertise related to the livestock industry
  - Government, agri-industry, academia, public
- BOD sets the overall strategy of the Manure Initiative, and identifies and financially supports projects with clear potential to address current manure management issues



# Role of MLMMI

**Mandate:** To "coordinate efforts to resolve issues relating to manure management, to assist industry in promoting sustainable management of manure as a valuable resource, and to encourage beneficial management practices, through research, development, demonstration, and communication"

- Seek out and promote solutions to issues within the area of manure management
  - Type of issues: Nutrients, odour, pathogens, airborne contaminants, health and safety
  - Level: In-barn, manure storage, manure app. on-field
  - How: Feeding strategies, animal/facilities management, technology development & demonstration, manure storage, treatment, processing, application, etc.
  - Keeping in mind practicality and economic viability



# Feed Management



# Manipulating Dietary

## P Levels: Research in Progress

Fed diets with differing levels of P ( $\downarrow$ , =,  $\uparrow$  NRC requirements) to nursery, growing, and finishing pigs of differing breeds.

Preliminary results:

- No effects on performance, feed intake, feed:gain (nursery) but  $\downarrow$  dietary P =  $\downarrow$  gain or  $\uparrow$  feed:gain in growers (depending on breed)
- $\downarrow$  dietary P to 80-90% NRC =  $\downarrow$  P digestibility (nursery) but no change in P digestibility for growers
- $\uparrow$  dietary P =  $\uparrow$  urine P (nursery); changes were affected by breed for growers
- $\uparrow$  dietary P effects on plasma P & Ca levels varied by pig breed and by stage of growth



# Phytase

- Remove inorganic P from growing pig diet + phytase
  - = Improved digestibility & P retention
  - = ↓ manure P excretion
  - ... No negative effects on pig performance
  
  - = ↓ total and labile P in the manure and feces
  - = ↓ P loading to soil
  - ... May ↓ P loss from soil to surface water
- No effect on the solubility of manure P in soil
- EXCEPT, without inorganic P, solubility of manure P ↑ in calcareous soil primarily due to a lack of Ca in the manure
  - ... be careful about how much inorganic P is removed from the diet if you are applying manure to calcareous soils!



# DDGS Use (poultry): Research in Progress

- Project started in November 2009

What we hope to learn:

- The relationship between feed management/dietary ingredients and P content in poultry manure, namely:
  - The relationship between DDGS level and P in manure
  - How this relationship varies at different growth phases
- How well DDGS feeding strategies for poultry will allow us to meet soil phosphorus regs when applying manure



# Crop & Land Management



# Manure Management



# Economics of the New P Regulations

- Negative impacts on farrowing operations were larger than on finishing operations
- Incorporating phytase in finishing rations will lower the costs of manure management
- If land area is insufficient for manure application on a  $P_2O_5$  removal basis, the cost increases are substantial
- Grain corn was the cropping system with the least increase in land required to meet the new P regulations
- Pasture required the largest increase in land



# Economics of the New P Regulations

- At 2xP removal, estimated added annual cost to the Manitoba pig industry is \$17.9 million
  - ~ 18% of the estimated annual 2005 net income accruing to pig producers in the Province
- At 1xP removal, estimated added annual cost is \$27.9 million
  - ~ 28% of the estimated annual 2005 net income accruing to pig producers in the Province
  - Greatest costs for R.M.'s of Hanover, La Broquerie, De Salaberry, Morris, and Ste. Anne



# Comparing Manures

Applied different manures and commercial synthetic fertilizer to soils in order to assess runoff and leaching losses of P

- To apply the same rate of total P:
  - Similar rates of liquid swine and solid cattle manure need to be applied (fresh weight basis)
  - A higher rate of labile P is applied with liquid swine manure than with solid cattle manure
- P from liquid swine manure may be more “available” than P from solid cattle manure
- On sandy soils, long term rates of P application should not exceed P removal rate → reduces risk of P leaching to groundwater
  - Especially for application of liquid swine manure



# Comparing Cropping Systems: Research in Progress

Applying manure to perennial versus annual cropping systems:

- What are the effects of manure application method on nutrient accumulation in coarse textured soil?
- Is accumulation rate of plant-available phosphorus linear in coarse textured soil?
- Are the nutrients moving in manured grassland?
  
- What amount of P is lost below the root zone ...
  - ... when applying nutrients using an N-based versus a P-based management system
  - ... when applying manure from liquid versus solid manure production systems
- Compare the use of field core lysimeters with traditional soil profile sampling when measuring nutrient losses from soil



# Computer Modeling: Research in Progress

2 studies that will utilize computer modeling:

- 1) Summarize and extrapolate data on P loss from different cropping systems and soils and use it in an model to predict P losses from other soils through out the province of Manitoba
- 2) Develop a user-friendly nutrient balance model for on-farm nutrient management planning
  - Allows for optimization of nutrient inputs to livestock
  - Minimizes nutrient outputs in manure
  - Source of crop fertility that is environmentally sustainable



# Precision Farming: Demonstration In Progress

- Aim to showcase a more prescriptive way of applying and managing manure nutrients
  - Create distinct management zones within each field
  - Soil test management zones to determine nutrient requirements
  - Apply manure nutrients based on site-specific nutrient requirements (GPS)
  - Ensures that nutrients are utilized to their fullest potential



# Role of MLMMI in P Workshop Action Plan

MLMMI facilitates & coordinates research:

- Gather priorities based on input from agri-industry, government, and academic groups
- Seek out R & D projects within priority areas
- Assist in creating partnerships between researchers, academic groups, equipment, and technology providers
- Link researchers with the necessary funds to run their project (\$ from MLMMI, other funding agencies and/or industry groups)