EFFECTIVE RESIDUE-TILLAGE-MANURE MANAGEMENT

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MANURE MANAGEMENT ISSUES HAVE EXISTED FOR A LONG TIME

TECHNOLOGY CHANGE IN 90 YEARS
WHAT IS THE GOAL OF MANURE MANAGEMENT

- Distribute nutrients evenly on the farm
- Avoid soil P buildup
- Utilize plant nutrients
- N based management
- Avoid application where losses are likely
- Steeply sloping land
- Fields adjacent to water
- Balance nutrient use and disposal need
A COMMON WISCONSIN PICTURE
DEVELOP A MANURE SPREADING PLAN

PART OF THE NUTRIENT MGT. PLAN

UTILIZE ALL SOURCES OF NUTRIENTS

PLAN COMPONENTS

ESTIMATE OF MANURE AVAILABLE

FIELD SELECTION BASED ON CROP, SOIL TEST, SOIL TYPE, SLOPE, ACCESS

APPLY AS ACCURATELY AS POSSIBLE

KEEP RECORDS
SPREADER CALIBRATION A MUST
THE CONSERVATION PLAN COMES FIRST

- Determines crops and rotations
- Many are outdated or worse not followed
- Agriculture is moving toward conservation tillage
- Which is more important: the conservation plan or the NMP
SOIL CONSERVATION IS A SOCIETAL CONCERN

- Degradation of the resource
  - Fertility
  - Organic Matter
  - Tilth
- Water Quality
  - Sediment
  - Nutrients
- Program Cost
  - Expensive to Manage
  - Cheaper to Prevent
THE SOIL EROSION PROCESS

DETACHMENT

DEPOSITION

Soil

Sediment Load

Sediment Transport

Detachment

Deposition
CROP RESIDUE IS STILL THE BEST EROSION PREVENTION TOOL

- Reduces detachment
- Hinders overland flow
- Improves infiltration
CONSERVATION PRACTICES ADD FLEXIBILITY

- Contour Buffers
- Rotation Options
- Cost Share $
CONFLICT BETWEEN CONSERVATION AND NMP

- NMP will allocate manure to more fields on a farm.
- Some may be directed toward sloping land.
- Rotations and tillage may not be adaptable to manuring.
- Planting problems.
- More tillage = more erosion and total P loss.
- Which is more important: the conservation plan or the NMP?
WHAT TO DO WITH MANURE

- Daily haul still very common
- Rate limited with surface application
- Manure = residue
PROBLEMS WITH DAILY HAUL APPLICATIONS
STORAGE INCREASES LAND SPREADING OPTIONS
MANURE AND WATER DON'T MIX

CRYPTOSPORIDIUM OUTBREAK
MILWAUKEE, APRIL, 1993
COMMON SENSE:
SHUT OFF SPREADER IN WATERWAY
SOLUBLE P LOSS AND MANURE APPLICATION

BUNDY et al., 2000
SOLUBLE P LOSS AND MANURE APPLICATION

BUNDY et al., 2000
SOIL LOSS AND MANURE APPLICATION

MUELLER et al., 1984
HOW MIGHT RUSLE 2 INTERACT WITH MANURE MANAGEMENT

- Farms need a conservation plan with fields at “T” first.
- Satisfy “T” mainly by rotation and tillage.
- This will dictate how manure is managed in fields.
- Manure may serve as residue.
- The P index may be part of the RUSLE 2 model in the future.
RUSLE 2 - “NEW” TOOL FOR CONSERVATION PLANNING
RUSLE 2 - “DRILL DOWN” TO FINE-TUNE PRACTICES
INCORPORATION AFFECTS MANURE MANAGEMENT

- Changes manure allocation
- Violate conservation plan
- Higher rate possible
- Affects time management
- Difficult with daily haul
- Application in spring and fall
- Storage would be needed
- Reliance on custom applicators
- Residue friendly application
MANURE INCORPORATION TOOLS:
USDA-DFRC FIELD DAY, AUGUST, 2001

NARROW POINT INJECTOR
ROLLING TINE COVERAGE

SMOOTH SEEDBED
RELATIVELY AGGRESSIVE
MANURE INCORPORATION TOOLS:
USDA-DFRC FIELD DAY, AUGUST, 2001

SWEEP INJECTOR

ROUGH SURFACE, MORE RESIDUE
WATCH YOUR STEP!!
MANURE INCORPORATION TOOLS:
USDA-DFRC FIELD DAY, AUGUST, 2001

Hose System
Nurse Tank

Sweep Injector
Good residue coverage
Not suited to small fields
ARLINGTON TILLAGE/MANURE STUDY, 1995-1996

- SEMI-SOLID DAIRY MANURE
- SPRING-APPLIED ON CORN
- 0, 12, 24, 48 t/a (N BALANCED)
- CHISEL, DISK, ROW CLEARING, NO-TILL
ARLINGTON TILLAGE/MANURE STUDY, 1995
48 t/a MANURE, CHISEL PLOWED
ARLINGTON TILLAGE/MANURE STUDY, 1995
48 t/a MANURE, DISK
ARLINGTON TILLAGE/MANURE STUDY, 1995
48 t/a MANURE, NO-TILL
MANURE APPLICATION AND TILLAGE

- 48 t/a STRAW DAIRY MANURE
- NO-TILL
- ~90 % RESIDUE
MANURE APPLICATION AND TILLAGE

- 48 t/a STRAW DAIRY MANURE
- INCORPORATION BY LIGHT DISKING
- 60-70 % RESIDUE
MANURE APPLICATION AND TILLAGE

- 48 t/a STRAW DAIRY MANURE
- INCORPORATION BY PLANTER ROW CLEANERS
- ~80 % RESIDUE
# Main Effect of Manure Rate on Surface Residue and Emergence

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<th>Residue (%)</th>
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<td>CH</td>
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## Main Effect of Tillage on Surface Residue and Emergence

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<tr>
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RELATIONSHIP BETWEEN TILLAGE AND MANURE APPLICATION ON CORN YIELD

ARLINGTON, WIS., 1995-1996
MANURE MANAGEMENT IN REDUCED TILLAGE SYSTEMS

- APPLY MANURE EVENLY
- CONTROL COMPACTION
- AVOID SPREADING NEAR CHANNELS OR WATERWAYS
- USE TOOLS THAT CONSERVE RESIDUE
- FOLLOW SLOPE CONTOURS
- ADJUST PLANTING FOR ADDED RESIDUE
- COMMON SENSE AND EXPERIENCE