Welcome A Lunchtime Webinar Series
Serving Pennsylvania’s Best Practices on Animal Ag, Water-, and Air Quality

BARNYARDS, EXERCISE LOTS & WATER QUALITY

• Ann Swinker, Professor of Dairy & Animal Science, Penn State
• Beth Futrick, Ombudsman, Pennsylvania Agricultural Ombudsman Program & Blair Co. Conservation District
• Jerry Martin, Extension Associate, Crop and Soil Sciences, Penn State

HOST: Virginia Ishler
Nutrient Management Specialist
Dairy Complex Manager
Manure Du Jour

January 28, 2009

Ann Swinker
Penn State Dairy and Animal Sciences
Water Quality - Barnyard and Exercise Lots

Dr. Ann Swinker,
Department of Dairy and Animal Science
Penn State University
Barnyards are a Recipe for Mud

• High Traffic Areas
  - Hooves loosen soil above and compact soil below

• Add Water + Manure
  - Mixes with the loose soil and manure
  - Great at holding moisture
Sacrifice Paddocks/Corrals/Dry Lots

Provide an opportunity to move animals off pastures, when excessively wet and to avoid overgrazing. Sacrifice lots can vary in size, should provide a minimum of 500 sq. ft. per horse.
When Designing a Sacrifice Area

- Is the sacrifice area near your manure pile and feed/hay source?
- Access to fresh water?
- Can animals be fed without walking through the sacrifice area?
- Can you move animals in and out easily?
- Are alleyways large enough for equipment?
- Can deliveries be made without moving animals?
Prevent this
How to Change

Pictures courtesy of Snohomish Conservation District, Washington
Example Paddock Layout

- Barn
- Water
- Sacrifice Paddock
Construction - Sacrifice Area

• Create good drainage by filling the lot with a layer of stone aggregate topped with finer stone dust.
• Final footing sand or wood products
• Surround your sacrifice area with vegetation to filter out run off.
• Remove manure to keep surface in place.
Rules of Thumb

- Remove the mud down to the solid soil or use a geotextile fabric
- Apply at least 3 inches of footing
- General rule of thumb = 1:1 ratio of mud to footing (6” of mud = 6” of footing)
Constructing - Sacrifice Area

- Geotextile then stone
- Final footing wood products
- An attractive safe sacrifice area.
Construction of Sacrifice Area

- 600 to 1000 sq ft per horse
- Well drained with access to barn
- Rock pad needed in most cases

Diagram:
- 2-4 inches of sifted lime
- 4-6 inches of No. 4 Rock
- Geotextile Fabric
- Bare Ground
Selecting the Type of Fence

- Horses run through or get tangled in a fence they cannot see.
- Cattle will crawl over fences.
- Sheep try to crawl under fences.
- Hogs try to root under fences.
Install roof gutters, downspouts, and underground outlets

- Install roof gutters - on a 30’x30’ barn a 1” rainstorm produces 558 gallons of water.
- Gutter slope 1/16 inch for every 1 foot of gutter
- Move water away from livestock areas
Dust

Small dust particles in the air can bother humans and animals and be a nuisance when they settle.

They can also cause health conditions.
Manure Du Jour

Beth Futrick

Pennsylvania Agricultural Ombudsman Program & Blair Co. Conservation District

January 28, 2009
Why build barnyards or establish grass exercise lots?

- To contain the nutrients and pollutants produced on the farm
- To reduce soil erosion
- To keep clean water clean
- To improve the environment
• Beef operation – winter feeding area.
• Established a rotational grazing system, waterers, and stream-bank fencing.
• Partners
  – NRCS
  – PADEP – stream-bank fence
  – Chesapeake Bay Program
  – Project Grass
• Beef operation feeding area.

• Installed a concrete pad, stacking pad, filter area, roof gutters/outlets.

• Partners
  - NRCS
  - Act 6 – NM
  Program
  - Chesapeake Bay Program
• Concrete barnyard or grassed rotational exercise lot reduces animal health problems

• Construction of barnyards help contain manure, reduce nutrient pollution, and gives relief to vegetative exercise lots
• A typical heavy use area is located near a stream (convenient water source)

• Provide a good water source as part of the rotational exercise lot helps keep sod in good shape

• Partners
  – PADEP
  – Project Grass
  – Growing Greener
  – Western PA Conservancy
- Dairy animals need a stable alleyway to and from the barn and exercise lot.

- Stabilized alleyways reduce sediment erosion (gullies)

- Partners
  - NRCS
  - Act 6 NM Program
• Concrete isn’t the final solution. Dirty water needs collected.

• Partners
  – NRCS
  – Chesapeake Bay Program
Dirty water from concrete barnyards collected and placed in a grassed filter area

Partners
- NRCS
- Chesapeake Bay Program (CD)
- Act 6 NM Program (CD)
• If the barnyard area is very close to the stream, a roof structure (with gutters) is sometime justified. This will keep clean water clean.

• Partners
  – Chesapeake Bay Program
  – NRCS
  – Project Grass
  – PADEP Stream-bank fence
• Grass exercise lots need maintained by properly rotating the animals.

• A vegetated riparian buffer further protects the stream from contamination of sediment and nutrients

• Partners
  – Growing Greener (CD)
  – US Fish and Wildlife Service
  – PADEP stream-bank fence
  – ClearWater Conservancy
Develop partnerships with other organizations who have the same environmental goals

**Benefits**

• Donate equipment, labor, and time

• Provide technical support – play off each others strengths

• Funding – piggyback grants help leverage additional funding

• Watershed Management Plans/Assessments – provide good baseline data to add to your grant application
Vegetated Exercise Lots

Water Quality Non-Negotiables

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Vegetated Exercise Lots – Water Quality Non-Negotiables

Manure Du Jour Webinar Series – January 28, 2009

Vegetated Exercise Lots

• Are not "bare" exercise lots
  • Distinction is some degree of vegetation

• Are not pastures (although often called pastures)
  • Distinction is related to purpose

Exercise lots vs. pastures

• Pastures
  • Managed as a crop for livestock feed value

• Exercise lots
  • Provided as an alternative to confinement (housing)

Non-Negotiable

• Not open to negotiation or bargaining

• If we are really serious about reducing water quality impacts…

Defining Terms
Water Quality Challenges

- These areas are extremely vulnerable to nutrient loss
  - Combination of factors have a multiplying impact

- Site factor
  - Initial site selection criteria is “lack of suitability for corn production”
  - Sites with high potential for runoff, erosion and leaching
    - Proximity to water
    - High water tables
    - Steep slopes
    - Exposed bedrock
    - Lower yield potential
Water Quality Challenges

- **Management Factor**
  - **Purpose**
    - Provide outdoor area for exercise, sun, fresh air
    - Reduce manure storage and handling

- **Initial site selection criteria is…**
  - Convenience
  - Minimal management concerns

- **Implementation starts with creating the area**
  - Installing the perimeter “fence”

- **Management often does extend beyond maintaining the existence of the area**
Water Quality Challenges

- **Animal Factor**
  - Heavy traffic areas
    - Hoof or foot action destroys vegetation
    - Travel paths and entrance areas
  - Congregation areas
    - Feeding, watering, shade, and lounging areas
    - Concentrated manure deposition
  - Non-vegetated areas more prone to runoff and erosion
    - In some cases increased leaching
Water Quality Challenges

- Animal Factor (cont.)
  - Nutrient utilization inefficiency
    - 70 - 85% of nutrients consumed are excreted
  - Uneven distribution of nutrients
    - Manure and urine deposited on 15 - 20% of the total area
  - Concentrated deposition of nutrients
    - “Spot” application
    - Manure piles cover <1 ft² (500 lb N/Acre)
    - Urine spots cover 4 – 7 ft² (1000 lb N/Acre & 100”/Hour)
Critical Management Areas

- We must manage the following 3 aspects of vegetated exercise lots
  - Grass
  - Congregation Areas
  - Surface Water

- If we are really serious about reducing water quality impacts…
  - We need a “non-negotiable” approach
Manage Grass

- Maintain a dense stand of grass
  - Starts with establishment
  - Manage access
    - Do not allow overgrazing
    - Do not allow access when traffic will damage sod
  - One management option
    - Multiple paddocks and rotation of access
Manage Grass

- Maintain nitrogen balance
  - Minimal nutrient management
  - Control stocking rate

- Assessment tool
  - Pasture Nutrient Calculator

http://pannutrientmgmt.cas.psu.edu/main_planning_tools.htm
Manage Congregation Areas

- Eliminate “untreated” permanent congregation areas
  - Feeding, watering, and sacrifice areas
  - Must be able to remove accumulated manure
  - Minimal treatment
    - Heavy Use Area Protection (561)
  - Other
    - Wastewater Treatment Strip (635)
    - Roof Runoff Structure (558)

- Eliminate direct discharge of contaminated runoff to surface and groundwater from all congregation areas
  - See BMPs above
Manage Surface Waters

- Eliminate livestock access
  - Except at properly designed and installed crossings
    - Streambank Fencing (382)
    - Stream Crossing (578)

- Protect water from runoff
  - Filter strip (393)
Summary

- Key to addressing water quality impacts from vegetated exercise lots
  - Implementing management

- Manage the system
  - Using known and proven best management practices

- Excellent assessment tools
  - Pennsylvania Farm-A-Syst
    - Worksheet 4 – Animal Concentration Areas Management
    - Worksheet 6 – Stream and Drainageway Management

- Final word
  - If adequate management cannot be implemented on area…
  - Livestock access needs to be deemed an unacceptable land use for the area
Question and Answers

- Questions received in writing will be directed to the speakers by the host.
- If your question is not answered during the time remaining, responses to the questions will be posted at www.aec.cas.psu.edu
- Recordings of this session can also be viewed at the URL listed above.
Next Week on Manure Du Jour

NOTE: February Webinars are on Thursdays!

On *Water Quality – Manure Storage & Treatment* (the liquid variety)

- **Bob Graves**, Penn State Agricultural & Biological Engineering
- **Rob Meinen**, Penn State Dairy and Animal Science
- **Heather Smeltz**, Natural Resources Conservation Service

For more information  [www.aec.cas.psu.edu](http://www.aec.cas.psu.edu)