

# Best Management Practices to Prevent Antibiotic Contamination of Water Bodies

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# Types of BMPs

- Livestock Management
- Manure Management
- Land and Water Management



# Livestock Management BMPs

- Antibiotic BMPs based on recommendations from the American Veterinary Medicine Association
- Two types:
  - 1) BMPs that reduce antibiotic use
  - 2) BMPs for antibiotic use

# 1) BMPs to Reduce Antibiotic Use

- Limit antibiotic therapy to sick animals.
- Emphasize preventative measures such as
  - Good hygiene
  - Routine health monitoring
  - Immunizations
- Consider other types of therapies before choosing antimicrobial therapy.
- Avoid antimicrobials for uncomplicated viral infections.



## 2) BMPs to Guide Antibiotic Use

- Only treat animals for as long as is necessary.
- Use narrow spectrum antibiotics whenever possible.
- Maintain accurate records regarding all antimicrobial use.



# Manure Management BMPs

- Two types:
  - 1) BMPs that speed degradation of antibiotics
  - 2) BMPs that limit off-site transport



# 1) BMPs to Speed Degradation of Antibiotics

- Aeration speeds bio-degradation.
  - Lagoon aeration reduces antibiotic concentrations in wastewater.
  - Actively composting (including turning as necessary to mix and aerate) speeds antibiotic removal.



# 1) BMPs to Speed Degradation of Antibiotics

- Exposure to light speeds photolysis.
  - Spreading manure stockpiles out could degrade pharmaceuticals.
- Phytoremediation can degrade tetracyclines and possibly other antibiotics.





## 2) BMPs to Limit Off-site Transport

- Maintain ability to collect runoff from 25-yr, 24-hr storm at all times.
- Line retention ponds and lagoons to reduce seepage (and maintain liners).



## 2) BMPs to Limit Off-site Transport

- Site corrals and manure storage areas at least 150 ft from wellheads, creeks, or ponds.
- In humid regions, store manure under roofed areas.



# Land and Water Management BMPs

- 1) Manure application BMPs
- 2) Soil conservation BMPs
- 3) Irrigation BMPs



# Manure Application BMPs

- Make field-specific application decisions
- For example, avoid
  - Sandy soils over shallow groundwater or tile drains OR
  - Clayey soils on steep slopes near surface water bodies
- Avoid application to saturated or frozen soils if possible
- Incorporate immediately after application



# Soil Conservation BMPs

- Many pharmaceuticals are strongly sorbed to soil particles.
- Therefore, preventing soil erosion also prevents antibiotic contamination of surface water (especially for tetracycline, erythromycin, and tylosin).
- For example, use:
  - Conservation tillage
  - Cover crops
  - Filter strips
  - Terracing
  - Strip cropping
  - Grassed waterways

# Irrigation BMPs

- Avoid over-watering to prevent leaching and runoff.
  - Monitor soil moisture and irrigate based on crop needs
- Manage irrigation systems for optimum uniformity and efficiency



# Future Outlook for BMPs

- As our scientific knowledge base expands, we will be able to develop more effective BMPs to protect water bodies from antibiotic contamination.

