LONE STAR HEALTHY STREAMS:
Reducing Bacteria with Best Management Practices for Livestock

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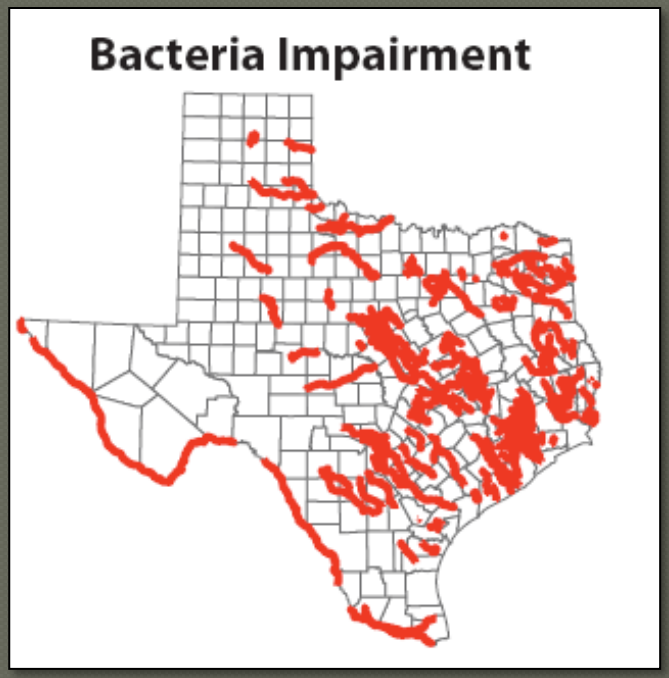
Double Bayou Steering Committee Meeting

Background

- More than **50%** of water quality impairments in Texas are due to excess bacteria levels.



Sources of Bacteria

Texas Livestock

- Texas livestock industry is most important agricultural industry in the state:
  - Value of livestock, poultry, and associated product is estimated to be $15 billion.
  - Texas ranks 1st in total number of cattle and calves (13% of total U.S. inventory).

Lone Star Healthy Streams

- Protection of Texas waterways from bacterial contamination.
- LSHS educates livestock producers on best management practices to reduce bacterial contamination in runoff.

BEEF CATTLE

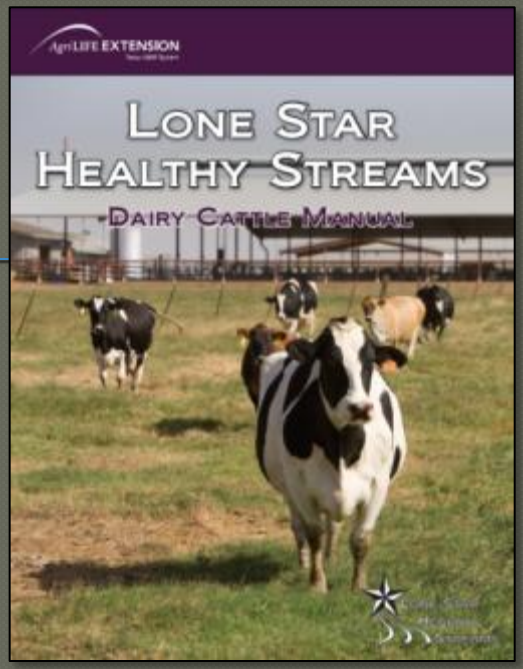
DAIRY CATTLE

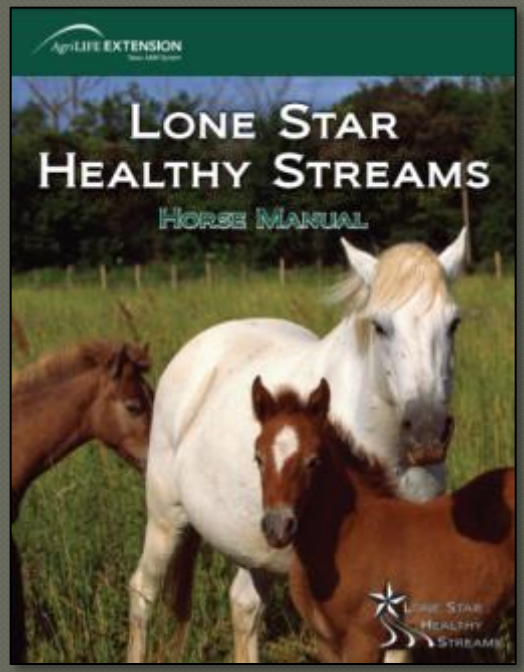
HORSES

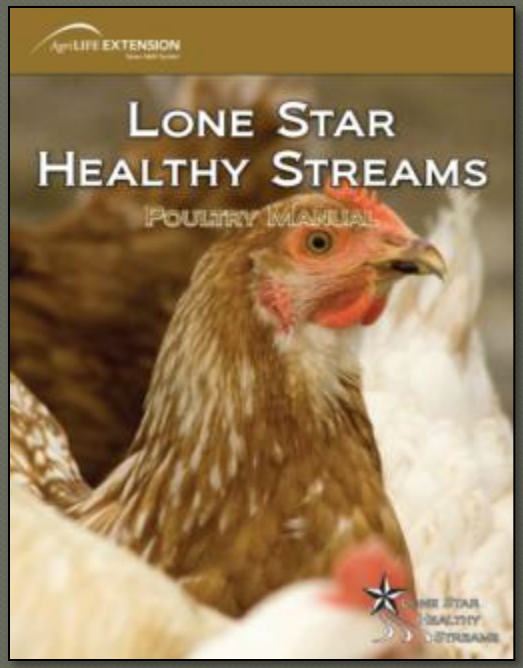
FERAL HOGS

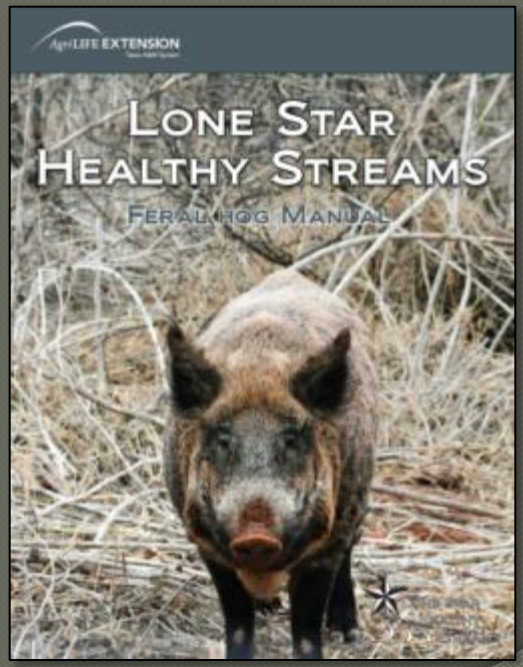
POULTRY

Resource Manuals









Resource Manuals

- 5 resource manuals including information on:
  - Background
  - Water quality law/policy
  - Bacteria fate and transport
  - Best Management Practices (BMPs)
    - Description
    - Bacteria removal efficiency
    - Cost

Other Available Resources

- Project website (*http://lshs.tamu.edu*)
- Project factsheet/brochure
- Research bibliography/database
- Voice-over PowerPoint presentations
- Online/interactive version of resource manuals

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Lone Star Healthy Streams

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Keeping Texas Waters Safe and Clean...

BEEF CATTLE

DAIRY CATTLE

HORSES

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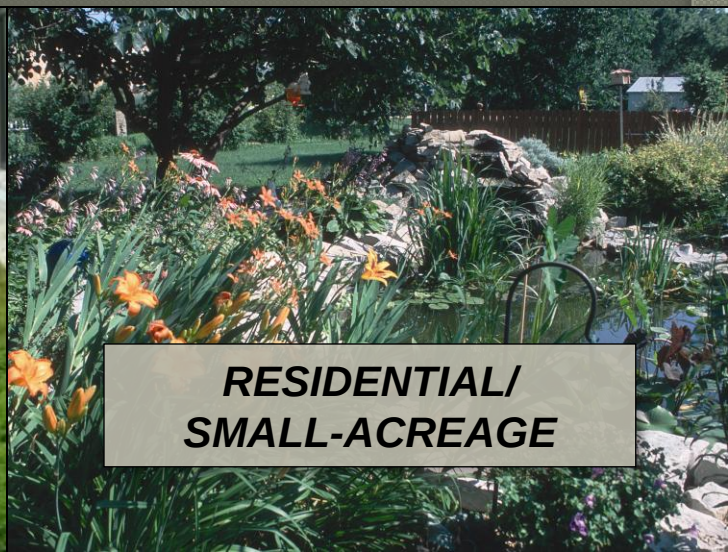
Texas A&M AgriLife Extension | TSSWCB | Texas Water Resources Institute

Produced by the Texas A&M AgriLife Extension Service, Department of Soil and Crop Sciences, in partnership with the Texas State Soil and Water Conservation Board and the Texas Water Resources Institute.

Best Management Practices

- *BMPs* = methods that have been determined to be the most effective, practical means of preventing or reducing pollution from nonpoint sources (diffuse sources).



Best Management Practices

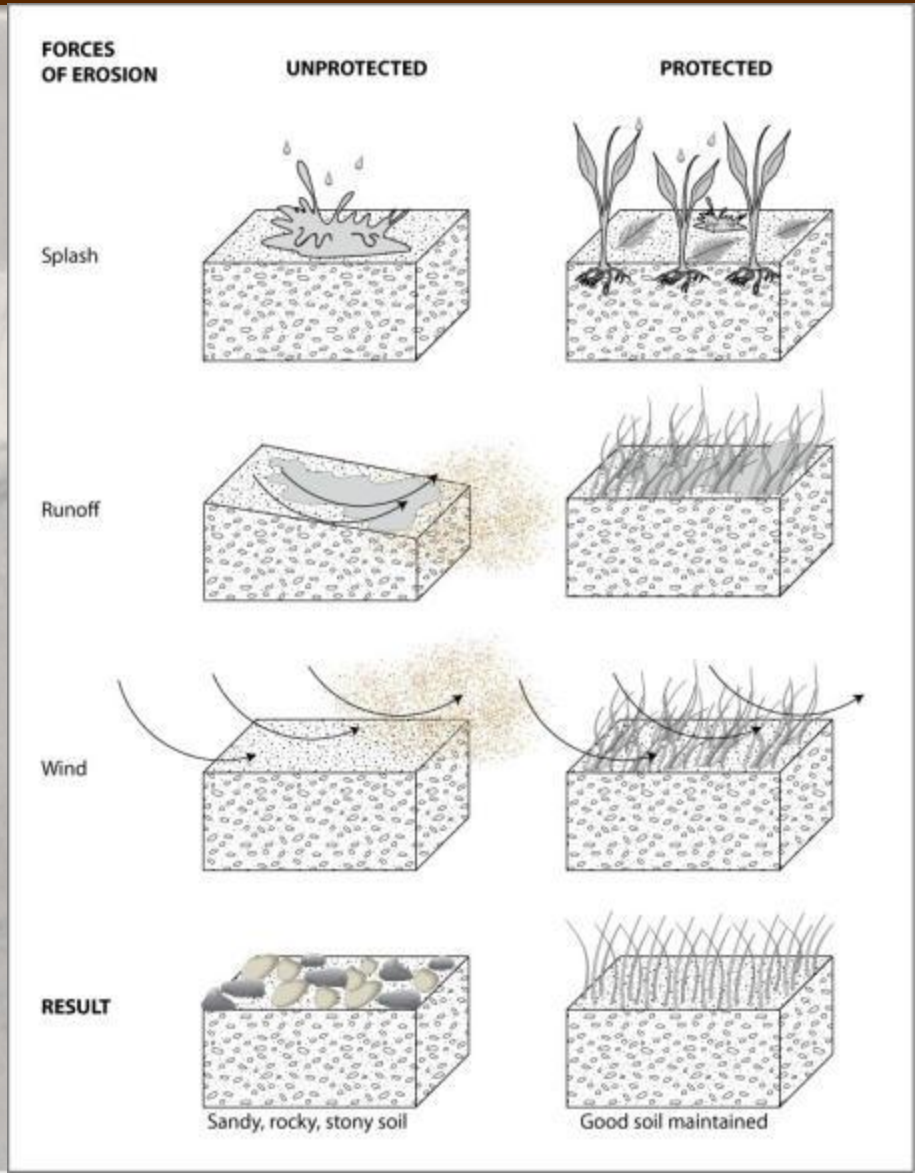
- BMPs organized by categories:
  - Grazing management
  - Runoff management
  - Riparian area protection & management
  - Mortality management

Grazing Management

- Primary BMP is prescribed grazing, designed to :
  - Maintain adequate vegetative cover
  - Reduce soil erosion
  - Improve forage production
  - Enhance water conservation
  - Improve animal performance
  - Enhance long-term sustainability of beef cattle production systems

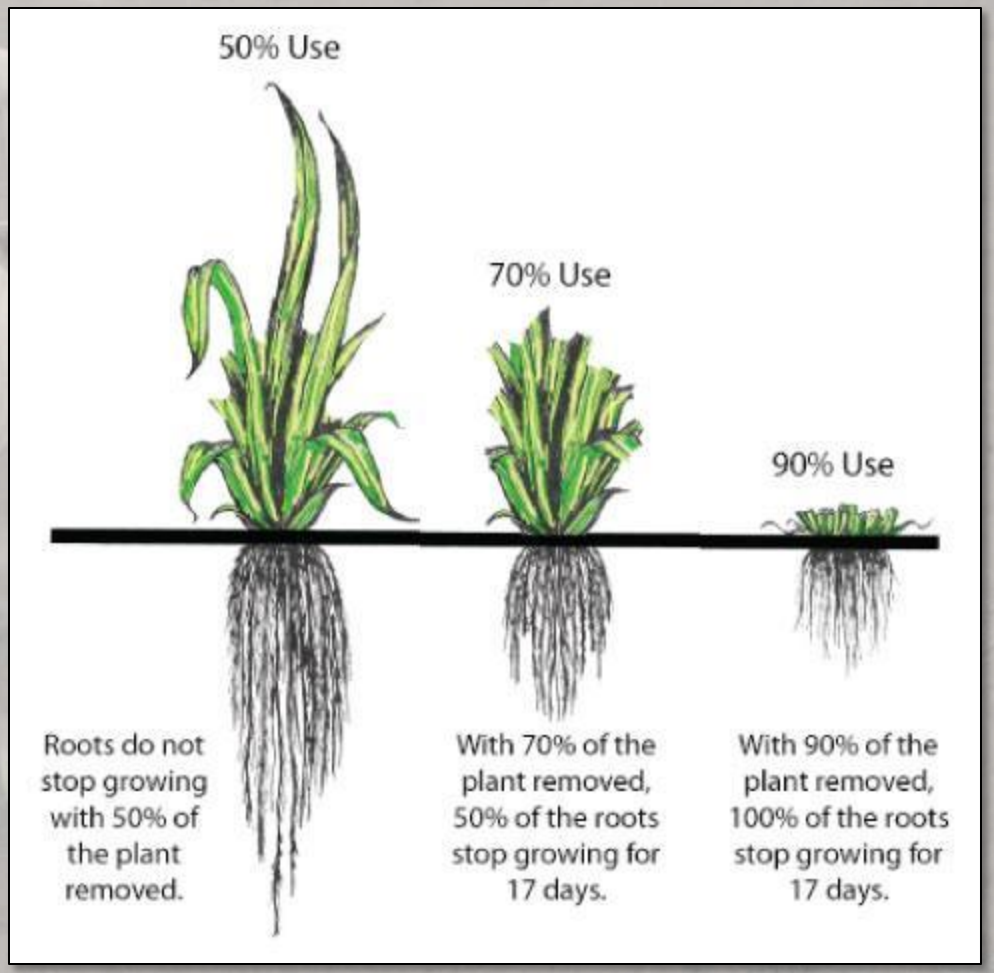
Improper Grazing Management

- Increased soil erosion due to water.



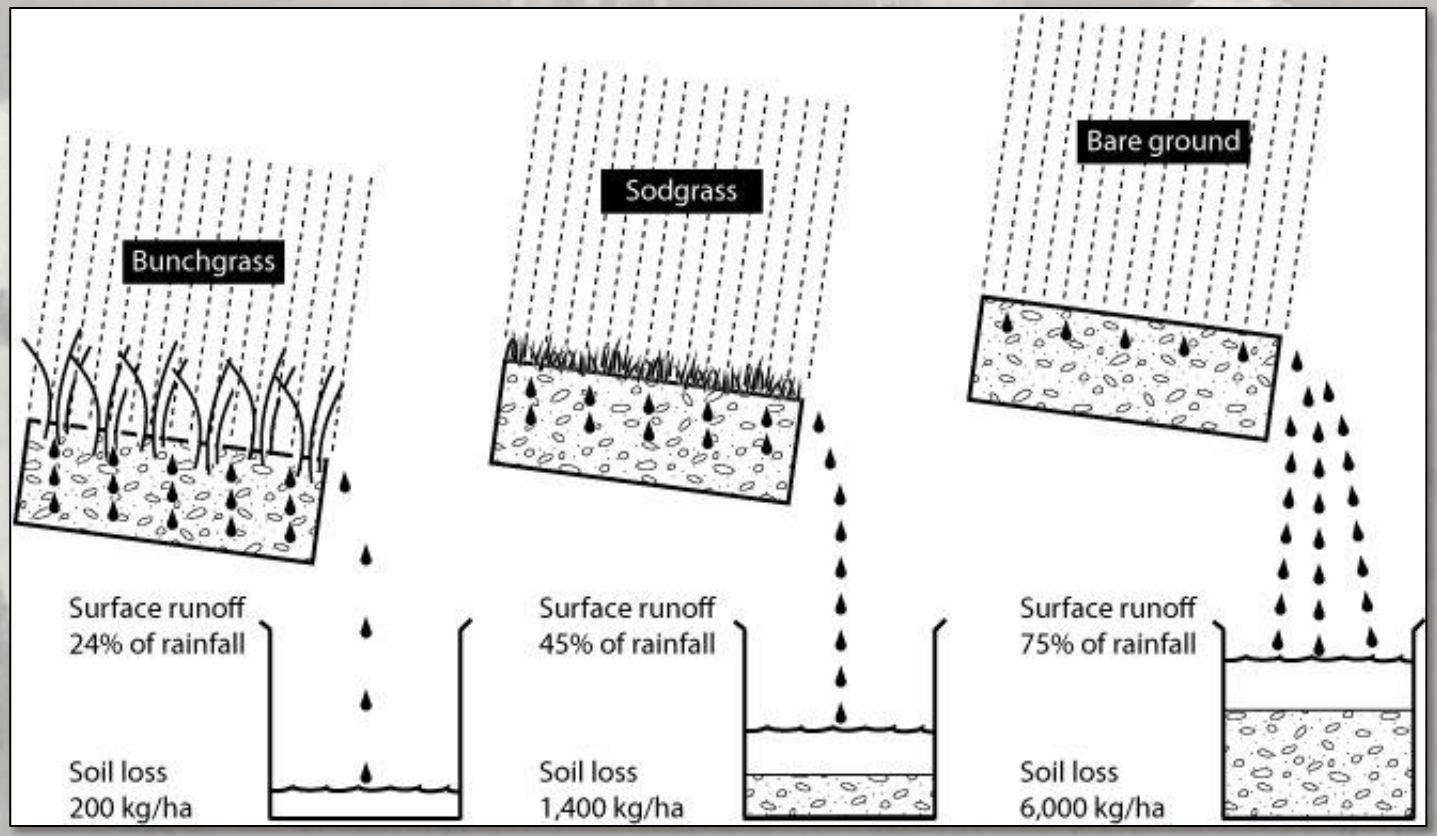
Improper Grazing Management

- Reduced forage production.
- >50% aboveground biomass removed:
  - Photosynthesis slowed
  - Root development reduced
  - Moisture and soil nutrients for plant production reduced.



Improper Grazing Management

- Reduced water conservation.



Grazing Systems

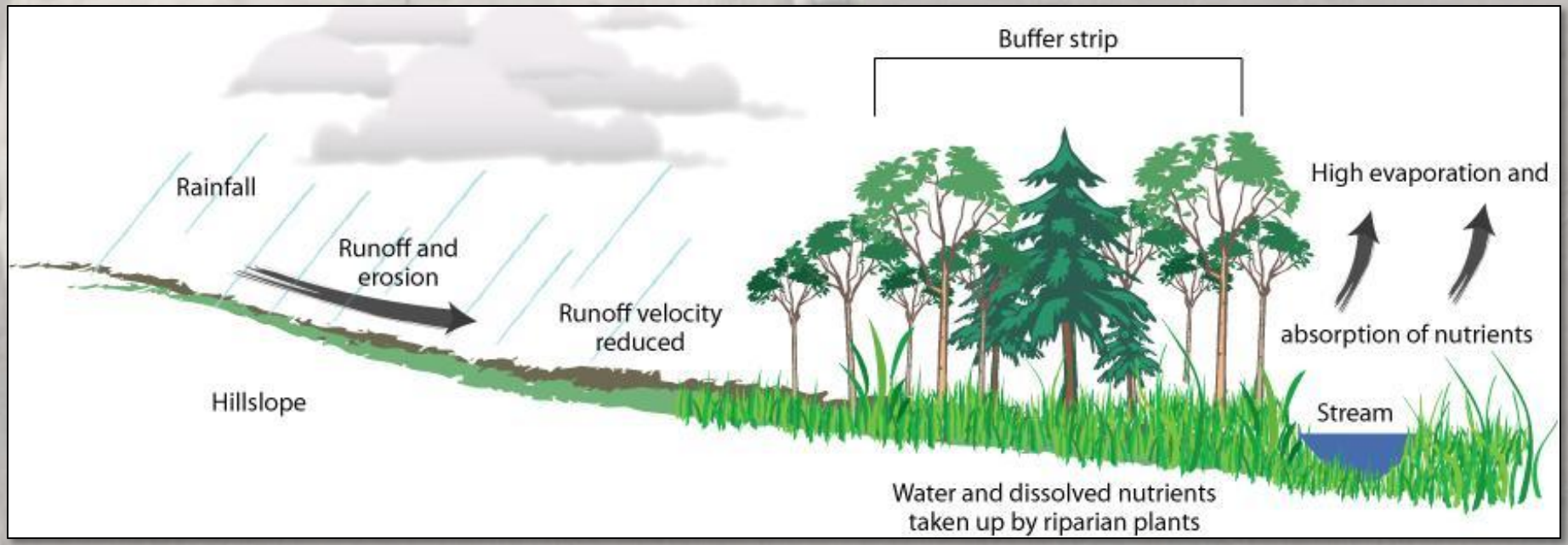
- 200% reduction in *E. coli* levels when grazing intensity switched from heavy to moderate.
- 90% - 96% reduction in fecal coliform levels when grazing intensity switched from heavy to no grazing.
- 72% reduction in *E. coli* levels when prescribed grazing implemented with contour farming, grassed waterways, nutrient/pest management.

Runoff Management

- BMPs help control water moving across the landscape:
  - Filter strips
  - Field borders
  - Roof runoff structure
  - Diversion
  - Grassed waterway

Filter Strips

- An area of herbaceous vegetation established between a body of water and the surrounding land.
  - Designed to remove sediment, bacteria, organic material, nutrients, and chemicals from runoff.



Use of Filter Strips

Note denuded stream banks, sand depositions in creek, and algal bloom.

Note the effectiveness of a vegetative filter strip in trapping sediment that would have wound up in the creek or reservoir. Nutrients, pesticides and bacteria were also trapped.

Bacteria Removal with Filter Strips

Effectiveness of filter strips in reducing fecal coliform levels under varying conditions.

Fecal Coliform Reduction	Slope	Buffer Length	Runoff Source	Reference
94.8% – 99.9%	5% - 35%	.1 – 2.1m	Grazing cattle	Tate et al. 2006
43% - 74%	9%	9m	Poultry litter on no-till cropland	Coyne et al. 1995
64% - 87%	4%	9m	Manure	Fajardo et al. 2001
>99%	4%	1 - 25m	Manure on pastureland	Sullivan et al. 2007

Riparian Area Management

- Riparian areas are environmentally sensitive areas along streams and rivers that require special protection.
- Riparian protection BMPs alter amount of time livestock spend in riparian areas.
  - Shade structure
  - Watering facility
  - Exclusionary fencing
  - Access control
  - Stream crossing
  - Feed, salt, mineral locations
  - Heavy use area protection
  - In-stream watering points

Shade Structures

- Can be permanent or portable…
- May improve nutrient distribution and recycling in the pasture.
- Improves weight gain of cows and calves.
  - Turner, L. W. 2000.

Alternative Water Source

- Encourages livestock to obtain water away from the stream.
- Easy to implement.
- NRCS cost-share programs reduce costs.
- Consider solar-powered wells.

Alternative Water Source

Fecal Coliform Reduction	Reference
57% - 95%	Byers et al. 2005
51%	Sheffield 1997
Reduced time in riparian area by 48% - 53%	Wagner et al. 2009 (unpublished Texas data)

Mortality Management

- Benefits of mortality management include:
  - Less pollution of groundwater and surface water.
  - Reduced odors from improperly handled carcasses.
  - Reduced damage to crops and forages.
  - Decreased risk of diseases spreading to animals feeding on the carcass.
  - Provide contingencies for normal and catastrophic mortality events.

Mortality Management

- Rendering
- Composting
- Incineration
- Sanitary landfills
- Burial

Bacteria Removal with Mortality Management

- Most studies on pathogen reduction and mortality management focus on composting and incineration:
  - *Salmonella* and fecal coliform undetectable after 9 months of composting (Mukhtar et al. 2003).
  - High temperatures of incineration eliminates pathogens.

Technical Assistance

- Soil and Water Conservation Districts (SWCD):
  - Offer technical assistance to farmers and ranchers in preparing soil and water conservation plans to meet each land unit's specific capabilities and needs.
- Texas State Soil and Water Conservation Board (TSSWCB):
  - Offers technical assistance to SWCDs.
- Natural Resources Conservation Service (NRCS):
  - Helps landowners and managers improve and protect their soil, water, and other natural resources.
- Texas A&M AgriLife Extension Service:
  - Offers technical assistance to citizens of Texas on natural resources issues, as well as many other topics.

Financial Assistance

- Texas State Soil and Water Conservation Board (TSSWCB):
  - Senate Bill 503 Program: Water Quality Management Plans
  - Clean Water Act 319 Nonpoint Source Grant Program
- Natural Resources Conservation Service (NRCS):
  - Environmental Quality Incentives Program (EQIP)
  - Wildlife Habitat Incentives Program (WHIP)
  - Grassland Reserve Program/Wetland Reserve Program
  - Conservation Security Program
- USDA Farm Service Agency (FSA):
  - Conservation Reserve Program
  - Conservation Reserve Enhancement Program
  - Source Water Protection Program

Conclusion

- Livestock can contribute bacteria to water bodies.
- Best management practices exist to help prevent bacterial contamination of water resources.
- Know your options and decide which practices to implement.

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