Implementing Management Practices to Reduce Pollution Potential Contributed to Livestock Waste
High Priority Watershed TMDLs in Kansas
Overall Objective

In high priority watersheds in Kansas:

• Abatement of nonpoint sources of fecal coliform (E. coli) contamination

• Improve water quality through adoption of best management practices by livestock producers, farmers, homeowners, and landowners
Potential Sources of Fecal Coliform Bacteria

- **Humans**
  - Sewer outfalls and septic tank drainage
- **Pets and Wildlife**
  - Stormwater runoff
  - Runoff into streams and lakes
- **Livestock**
  - Effluents from food processing plants
  - Runoff from feedlots and grazinglands
Implementing Best Management Practices on Livestock Facilities

- Integrate voluntary compliance of TMDL issues with state regulations addressing Confined Animal Feeding Operations (CAFOs)
- Work with producers to assess livestock facilities
Facility Compliance Process

Livestock Confinement

Less Than 999 AU’s

300-999 AU’s

Must Register

Site Evaluation

Significant Pollution Potential?

NO

Certify the Facility

YES

Can Management Modifications be made to Facility so Significant Pollution Potential no longer Exists?

NO

Permit the Facility

NO

Structural

YES

Improve Management Practices
Site Assessment Factors

- Number of animals
- Pen slope
- Slope below pen
- Distance to surface water
- Months of use
- Soil type below pen
- Buffer type and size
- Extraneous drainage
- Annual rainfall
- Rainfall intensity
- Depth to groundwater
- Distance to down gradient well
Other Assessment Issues

• Distance to rural water line
  ▪ Must be 25 ft. away

• Distance to nearest neighbor
  ▪ Must be ¼ mile or obtain releases on ≥300 AUs

• Distance to property line
  ▪ Must be 100 ft away

• Animal waste stockpile

• Land available to apply nutrients
Factors that can be Influenced

- Number and/or size of animals
- Distance to stream
- Months of use
- Buffer type
- Buffer size
- Extraneous drainage
<table>
<thead>
<tr>
<th>Capacity (AU’s)</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 50</td>
<td>1</td>
</tr>
<tr>
<td>50 – 100</td>
<td>3</td>
</tr>
<tr>
<td>100 – 300</td>
<td>5</td>
</tr>
<tr>
<td>300 – 500</td>
<td>7</td>
</tr>
<tr>
<td>500 – 700</td>
<td>8</td>
</tr>
<tr>
<td>700 – 999</td>
<td>9</td>
</tr>
</tbody>
</table>
Distance, pens to protected water body

- > 5280’  
- 4000’ – 5280’  
- 2640’ – 4000’  
- 1000’ – 2640’  
- 500’ – 1000’  
- 100’ – 500’  
- < 100’
## Livestock Waste Management Program

### Determination of Significant Pollutant Potential

**Worksheet**

**Name:**

**Address:**

**City/State/Zip:**

**Location Site #:**

**Instructor:**

### Section B: Surface Water Protection

<table>
<thead>
<tr>
<th>Utilization (AU)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 30</td>
<td>1</td>
</tr>
<tr>
<td>30 - 90</td>
<td>2</td>
</tr>
<tr>
<td>100 - 298</td>
<td>3</td>
</tr>
<tr>
<td>299 - 999</td>
<td>4</td>
</tr>
<tr>
<td>&gt; 999</td>
<td>5</td>
</tr>
</tbody>
</table>

### Section C: Groundwater

<table>
<thead>
<tr>
<th>Depth to groundwater (ft)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 90</td>
<td>1</td>
</tr>
<tr>
<td>&lt; 90</td>
<td>2</td>
</tr>
</tbody>
</table>

### Section D: Special Conditions

<table>
<thead>
<tr>
<th>Special Condition</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Springs, seeps, rock outcrops in pond or direct runoff area</td>
<td>Yes/No</td>
</tr>
<tr>
<td>2. Located in sensitive groundwater area</td>
<td>Yes/No</td>
</tr>
<tr>
<td>3. Is the protected water body an Outstanding Natural Resource or Special Aquatic Fish Use Surface Water?</td>
<td>Yes/No</td>
</tr>
</tbody>
</table>

### Section E: Evaluation

1. Section A: any "yes" answer requires controls and a permit.
2. Section B: Sum of risk values > 20 is a significant pollution potential which requires controls and a permit or modification for operations.
3. Section C: Sum of risk values > 20 is a significant pollution potential which requires controls and a permit or modification for operations.
4. Section D: any "yes" answer requires controls and a permit or modification for operations.
5. Section E: facility evaluation does not require a permit, the facility is eligible for certification. Prior to certification, the inspector shall receive all applicable separation distances for final eligibility determination.
### Buffer Type

- Dense cover of grass: 1
- Grass with woody plants: 4
- Cultivated crop ground: 6
- Bare ground: 10

---

### Livestock Waste Management Program

**Determination of Significant Pollution Potential Worksheet**

<table>
<thead>
<tr>
<th>Buffer Type</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dense cover of grass</td>
<td>1</td>
</tr>
<tr>
<td>Grass with woody plants</td>
<td>4</td>
</tr>
<tr>
<td>Cultivated crop ground</td>
<td>6</td>
</tr>
<tr>
<td>Bare ground</td>
<td>10</td>
</tr>
</tbody>
</table>

---

**Buffer Type**

- Dense cover of grass: 1
- Grass with woody plants: 4
- Cultivated crop ground: 6
- Bare ground: 10
Buffer Size

<table>
<thead>
<tr>
<th>Pen Area Range</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 2 x Pen Area</td>
<td>1</td>
</tr>
<tr>
<td>1 – 2 x Pen Area</td>
<td>4</td>
</tr>
<tr>
<td>0.5 – 1 x Pen Area</td>
<td>6</td>
</tr>
<tr>
<td>&lt; 0.5 x Pen Area</td>
<td>10</td>
</tr>
</tbody>
</table>

**Table: Livestock Waste Management Program**

**Section B: Surface Water Protection**

<table>
<thead>
<tr>
<th>Capacity (AU)</th>
<th>Buffer Size</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.5 x Pen Area</td>
<td>&gt; 2 x Pen Area</td>
<td>1</td>
</tr>
<tr>
<td>0.5 – 1 x Pen Area</td>
<td>1 – 2 x Pen Area</td>
<td>4</td>
</tr>
<tr>
<td>&lt; 0.5 x Pen Area</td>
<td>&lt; 0.5 x Pen Area</td>
<td>10</td>
</tr>
</tbody>
</table>

**Section A: Permit Required**

1. Over 1,000 AU's, needs NPDES permit, or 300 AU's and discharges through a manmade device.
2. Has one or more lagoons, pits, or tanks for waste storage.
3. Has a seasonal, intermittent or perennial stream.
4. Has a wetland.
5. Has a wetland buffer.

**Section C: Groundwater**

<table>
<thead>
<tr>
<th>Capacity (AU)</th>
<th>Buffer Size</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 2 x Pen Area</td>
<td>&gt; 2 x Pen Area</td>
<td>1</td>
</tr>
<tr>
<td>1 – 2 x Pen Area</td>
<td>1 – 2 x Pen Area</td>
<td>4</td>
</tr>
<tr>
<td>0.5 – 1 x Pen Area</td>
<td>0.5 – 1 x Pen Area</td>
<td>6</td>
</tr>
<tr>
<td>&lt; 0.5 x Pen Area</td>
<td>&lt; 0.5 x Pen Area</td>
<td>10</td>
</tr>
</tbody>
</table>

**Section D: Special Conditions**

1. Springs, seeps, rock outcrops in pens or direct runoff area.
2. Located in sensitive groundwater area.
3. Is the protected water body in Outstanding National Resource.

**Section E: Evaluation**

1. Section A: any "yes" answer requires controls and a permit.
2. Section B: Sum of risk values > 80 is a significant pollution potential which requires controls and a permit or modification for operations.
3. Section C: Sum of risk values > 20 is a significant pollution potential which requires controls and a permit or modification for operations.
4. Section D: 1. If D1 or D2 is "yes" and groundwater potential > 20, a permit is required.
5. Section E: if facility evaluation does not require a permit, the facility is eligible for certification. Prior to the certification, the inspector shall review all applicable separation distances for final eligibility certification.
### Livestock Waste Management Program
#### Determination of Significant Pollution Potential Worksheet

<table>
<thead>
<tr>
<th>Section B</th>
<th>Surface Water Protection</th>
<th>Comments</th>
<th>A/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Capacity (AU):</td>
<td>&lt; 50</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50 - 100</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100 - 200</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>200 - 400</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 400</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>2. Pen Slope:</td>
<td>&lt; 1%</td>
<td>1</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>1 - 2%</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 - 3%</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 - 4%</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 - 5%</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 5%</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>3. Slope from pen to protected water body:</td>
<td>&lt; 1%</td>
<td>1</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>1 - 2%</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 - 3%</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 - 4%</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 - 5%</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 5%</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>4. Distance, pens to protected water body:</td>
<td>&lt; 500'</td>
<td>1</td>
<td>feet</td>
</tr>
<tr>
<td></td>
<td>500 - 1000'</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1000 - 2000'</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 2000'</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>5. Utilization:</td>
<td>&lt; 3</td>
<td>1</td>
<td>months/year</td>
</tr>
<tr>
<td></td>
<td>3 - 4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 - 6</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 6</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>6. Silt between pens and water body:</td>
<td>Clay</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Silty Clay</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loam</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Silty Sand</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sand</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>7. Buffer:</td>
<td>Damace cover of grass</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grass with moose plants</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Collected crop grass</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bare earth</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>8. Buffer Size:</td>
<td>&lt; 2 x Pen Area</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 - 4 x Pen Area</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 - 6 x Pen Area</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 6 x Pen Area</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>9. Extraneous Drainage:</td>
<td>&lt; 1 x Pen Area</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 - 3 x Pen Area</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 - 5 x Pen Area</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 5 x Pen Area</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

#### Section A

- Permit Required: Yes/No
- 1. Over 1,000 AUs, needs NPDES permit, or 300 AUs and discharges through a manmade device
- 2. Has one or more reservoirs, pits, or tanks for waste storage
- 3. Has a practicable, alternative or interventional stream
- 4. Uses on-stream applications
- 5. Has off-site

#### Section C

- Groundwater Protection
  - 1. Capacity (AU):
    - < 50
    - 50 - 100
    - 100 - 200
    - 200 - 400
    - > 400
  - 2. Annual Rainfall
    - < 20
    - 20 - 30
    - 30 - 40
    - 40 - 50
    - > 50
  - 3. Distance to groundwater
    - < 200
    - 200 - 400
    - 400 - 600
    - > 600
  - 4. Silt between pens and water body
    - Clay
    - Silty Clay
    - Loam
    - Silty Sand
    - Sand
  - 5. Buffer:
    - Damace cover of grass
    - Grass with moose plants
    - Collected crop grass
    - Bare earth

#### Section D

- Special Conditions
  - 1. Springs, seeps, rock outcrops in pens or direct runoff
  - 2. Located in sensitive groundwater area
  - 3. Is the protected water body an Outstanding Natural Resource or Special Aquatic Life Use Surface Water?

#### Section E

- Evaluation
  - 1. Section A: any "yes" answer requires controls and a permit.
  - 2. Section B: Sums of risk values > 80 is a significant pollution potential which requires controls and a permit or modification for operations.
  - 3. Section C: Sum of risk values > 20 is a significant pollution potential which requires controls and a permit or modification for operations.
  - 4. Section D:
    - If D1 or D2 is "yes" and groundwater Potential > 20, a permit is required.
    - If D3 is "yes" and Surface Water Potential > 50, a permit is required.
  - 5. Section E: If facility evaluation does not require a permit, the facility is eligible for certification. Prior to the certification, the inspector shall review all applicable separation distances for final eligibility determination.

---

Extraneous Drainage

- < 1 x Pen Area: 1
- 1 - 3 x Pen Area: 4
- 3 - 5 x Pen Area: 7
- > 5 x Pen Area: 10
BMP Plan

Extraneous Drainage
Buffer size
Buffer type
Animal size

Slope 2%
Slope 3%
Slope 4%

Ephemeral Stream
A- New feeding pens, 200’x600’ divided into 4 pens, 150’x200’. Will hold 400 head total under 700#. There will be a 10’ alley at the bottom of the pens connecting to existing pens. The slope of the pens is 2% on the north and 4% on the south.

B- Existing 2 pens, with west pen shorten, used for accumulating and conditioning (together 60’x200’). Will hold 75 head under 700#.

C- Old feeding pens, ditch and 50’ west of ditch planted to brome grass. The maximum length is 830’ with the main body being 660’. 250’ at the widest and 110’ at the narrowest on the south. The slope average is 3% east to west and 3% north to south. Will put in a 130’ terrace to flow back from south end. Flow from the brome grass will enter old pond. The distance to the perennial stream is over ¼ mile.
BMP Plan

Slope 2%

555’

415’

320’

1000’

Mouth of intermittent stream

Rural Water Line

Slope 3%
Confined feeding area used about 6 months each year, feeding 90 animal units.

A – Utility lot

B – Lot is approximately 120’X 220’ used to feed 40 head > 700#.

C – Lot is approximately 135’ X 260’ used to feed 40 head < 700#.

D – Lot is approximately 240’ X 315’ used to feed 60 head < 700#. Lot is a set back 100’ west of road.

E – Previous feeding area will be abandoned and planted to brome grass.
Slope 1-2%
500' to stream
Berm
Perennial Stream
Slope 1-2%
Slope 2-3%
Intermittent Stream

BMP Plan
BMP Plan

A- New feeding area on old railroad bed with old track area being the dividing line for water flow. Water runoff from pasture north of lots should flow parallel to the north edge of lots. Trees will be removed that are currently growing in the buffer area. Berms will be placed at the base of each pen to direct runoff across field. Plan to use three lots as weaning and backgrounding for up to 300 head under 700#. Utilization will be 4-6 months.

B- Old feeding area planted to brome grass.

C- Existing two pens used for gathering and holding. Also, some individual pens for 4-6 horses.
Cattle feeding facility for 450 head up to 700#. Pen utilization will be 6 months.

Area A is receiving & loading, working pens, and occasional sick pen.

Lot B is approximately 43,456 sq. ft. or 150’ X 240’ plus wing area. A feeding capacity of 145 head. No extraneous drainage.

Lot C is approximately 47,350 sq. ft. or 130’ X 250’ plus 50’ X 60’ wing. A feeding capacity of 155 head. No extraneous drainage.

Lot D will be a new feeding area approximately 43,500 sq. ft. or 140 X 320’. A feeding capacity of 145 head. No extraneous drainage.
Management Practices that should be Implemented and Maintained

- Scrape lots and apply solids at agronomic rates
- Maintain vegetative cover in buffers
- Harvest vegetation to remove nutrients
- Prevent channeling of runoff onto vegetative system
Warren Bell
Watershed Specialist
Kansas State University

Will Boyer
Watershed Specialist
Kansas State University

Mike Christian
Watershed Specialist
Kansas State University

Bob Frisbie
Watershed Specialist
Kansas State University

Herschel George
Watershed Specialist
Kansas State University

Ron Graber
Watershed Specialist
Kansas State University

Bill Hargrove
Director, KCARE
Kansas State University