Typical Engineering Features for Feedlot Design

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Initial Site Planning

- **Site evaluation considers:**
  - Cattle numbers present and future
    - Adequate water supply for potential cattle numbers
    - CNMP how many head does the CNMP allow for
    - Is there adequate area for cattle numbers
  - Odor regulations
    - Local or state odor regulations
  - Soils in feedlot and potential pond area
    - Is there high a high water table
  - Topography 2%–5% land slope

- **All these factors should be evaluated in this order to determine as early as possible if site is feasible**
### Cattle Numbers

#### Water requirements

- **Consider water requirements for cattle**
- **Lack of water reduces feed intake and causes stress on cattle**

**Table 8. Approximate Total Daily Water Intake of Beef Cattle**

<table>
<thead>
<tr>
<th>Temperature (°F)</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (lb)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Growing heifers, steers, and bulls</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>4.0</td>
<td>4.3</td>
<td>5.0</td>
<td>5.8</td>
<td>6.7</td>
<td>9.5</td>
</tr>
<tr>
<td>600</td>
<td>5.3</td>
<td>5.8</td>
<td>6.6</td>
<td>7.8</td>
<td>8.9</td>
<td>12.7</td>
</tr>
<tr>
<td>800</td>
<td>6.3</td>
<td>6.8</td>
<td>7.9</td>
<td>9.2</td>
<td>10.6</td>
<td>15.0</td>
</tr>
<tr>
<td><strong>Finishing cattle</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>6.0</td>
<td>6.5</td>
<td>7.4</td>
<td>8.7</td>
<td>10.0</td>
<td>14.3</td>
</tr>
<tr>
<td>800</td>
<td>7.3</td>
<td>7.9</td>
<td>9.1</td>
<td>10.7</td>
<td>12.3</td>
<td>17.4</td>
</tr>
<tr>
<td>1,000</td>
<td>8.7</td>
<td>9.4</td>
<td>10.8</td>
<td>12.6</td>
<td>14.5</td>
<td>20.6</td>
</tr>
</tbody>
</table>
Water Requirements

- Insufficient space for animals to drink, low flow rates, and low storage capacity can all decrease water consumption and thus reduce feed intake.
- Animals should have 2 feet of drinking space per 25 animals.
- System should deliver 1 to 2 gallons of water per animal per hour.
- Entire day’s supply of water should be supplied within 4 to 8 hours.
Water Requirements

- If it is assumed that the maximum daily water use per animal is 15 gal/day and there are 500 animals in the system.
- Total of $15 \times 500 = 7500$ gallons of water per day.
- Delivery rate: $500$ head x $2$ gal/hr / $60$ min/hr = 16.5 gal/min.
- Or $7500$ gal in 8 hr (480 min) $7500/480 = 15.5$ gal/min.
- Is the well on the property able to produce this quantity of water?
Water Requirements

- If current well gal/min is insufficient can drill another well or create storage within system
- Storage can be larger water tanks in lots or storage tanks within the system
- Large tanks in lots hard to keep frost free
- What if the well goes down?
Storage Tanks within system in an insulated building
CNMP

- How many head can the producer have with respect to the CNMP
- This should be addressed right away so that it does turn into a hang up later on
Cattle Numbers Present and Future

Is there adequate space

- Approximately 1 Acre required per 100 head for pen space, alleys, and feed roads
- Pens usually sized for 100 or 200 head
- Working facilities should be located in an area that is easy to access with cattle trucks and handle one semi load of cattle
- How will the producer move the cattle from working area to pens?
Cattle Numbers

Pen dimensions and feed bunk space

- 300 ft² – 450 ft² feedlot space is required per animal depending on size of animals
- 12” – 18” of feedbunk space is required depending on size of animals
- 25% of feedlot is recommended to be mounded for cattle to get out of mud during wet conditions
- Also consider where manure will be stacked before it can be spread the drainage from this area has to be contained and should be easily accessed from pen areas for easy pen scrapping
Cattle Numbers
Feedbunk and Concrete Slabs

- Feed bunk or Concrete Curb adjacent to feed road
- Concrete slabs provide firm place for cattle to stand while eating or drinking also allows for easy manure removal
Feedlot Design
Odor Regulations

- Check for any county or township laws on odor regulations
- If no county or township laws exist check state laws
  - How far away is nearest neighbor
  - Will neighbors in close vicinity sign an odor easement
Soils

- Check soils where storage pond will be located where current or potential lots are draining
  - Check soils map
  - Ask producer what soils he has
  - Check for high water tables or any wetland issues

- If clay is not present than borrow clay must be hauled in

- How far is a potential clay borrow area the farther away the more it costs to construct

- All these factors should be evaluated for site feasibility as early as possible
Topography

- Is overland water draining within current or potential feedlot
- Can water be diverted around feedlot area
- Remember area of feedlot, working area, and silage storage should all be contained
- If feedlot road is desired to deliver feed try locate it on the ridge of a hill in order to reduce need for diversions
Topography
Why do we need slope within lots?

- Good drainage for dry clean feedlots
- Important for ease in management and better weight gains
- Study by beef links consultants

<table>
<thead>
<tr>
<th></th>
<th>2000 (dry)</th>
<th>2001 (mud)</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADG</td>
<td>3.23</td>
<td>2.78</td>
<td>-13.9%</td>
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<tr>
<td>F/G</td>
<td>7.02</td>
<td>7.96</td>
<td>+14.4%</td>
</tr>
<tr>
<td>Death Loss %</td>
<td>.68</td>
<td>1.14</td>
<td>+67.6%</td>
</tr>
<tr>
<td>Total Cost of Gain</td>
<td>42.22</td>
<td>50.24</td>
<td>+$8.02/cwt gain</td>
</tr>
</tbody>
</table>
Topography

Keeping Lots Dry

- Slope in feedlot 2% - 5%
- Mounds
  - Mounds provide cattle with place to rest out of mud
- Soils in feedlot - higher clay content
- Soil additives – Fly ash
Web sites

- http://www.beeflinks.com
- http://www.iowabeefcenter.org/
- http://www.akey.com/
- http://www.mwpshq.org/