K-STATE Research and Extension

Planning and Designing Cattle Feedlots

Introduction

Construction of a new feedlot or expansion of an existing feedlot requires adequate planning and design to maintain the feedlot's efficiency and profitability. The planning of cattle feedlots should:

- feed and water cattle in an adequate and efficient manner;
- provide acceptable lot space that will withstand local climate extremes;
- provide facilities to maintain animal health and to receive and export cattle;
- minimize cattle and employee stress during cattle and feed movement;
- include removal, storage, and land application of manure and lot runoff;
- protect the surrounding environment and meet existing environmental regulations; and
- present a well-managed image to the public.

Cattle feedlot north of the Kansas State University campus. Photo by Luis Felipe Feitoza, Kansas State University.

Initial Site Evaluation

Preliminary site evaluation should consider topography and accessibility issues associated with inclement weather and number of cattle (present and future). Sites with soils classified by the National Resources Conservation Service (NRCS) as occasionally or frequently flooded or are located in a 100-year flood plain are not acceptable[1]. The lowest point of the facilities (normally the bottom of the sediment basin or lagoon) must be at least 10 feet above groundwater. The groundwater separation distance at the feedlot site should be verified with the Kansas Department of Health and Environment (KDHE) or other state environmental regulatory agency. KDHE regulations also specify that larger cattle operations will have to meet separation distances from existing habitable structures before construction is started **(Table 1,** page 2**)**. Manure removal from pens, manure and runoff storage, and final land application of runoff and manure should be planned and approved by KDHE as part of the planning process.

Feedlot Plan

Approximately 1 acre of land per 100 head of cattle is required for pen space, alleys, and feed roads. When making initial land surveys, an area with 2% to 5% land slope is recommended, and soil with 25% or more clay is preferred over sand or fractured rock

1 NRCS. *Web Soil Survey*. (2019). https://websoilsurvey.

Table 1. Separation Distance from Feedlot Facilities to Nearest Habitat Structure and from Water Resources[2]

Infrastructure Consideration	Animal Units (AU)	Beef Feedlot Capacity	Separation Distance (ft)	KDHE Reference
Habitat structures	300–999 AU	600–999 head weighing < 700 lbs	1,320 ft	K.S.A. 65-171d
		300–999 head weighing ≥ 700 lbs		
	1,000 or more AU	1,000 head regardless of weight	4,000 ft	
Property line			100 ft	
Public water supply reservoirs: "freshwater ponds wholly within the applicant's property"			200 ft	K.S.A. 65-171d
Surface water not used as a public water supply			100 ft	
Public water distribution pipes			25 ft from public water supply pipelines	K.A.R. 28-18-17 and 28-18a-33
Ground water and wells			100 ft from active wells and 10 ft from lowest facility elevation to nearest ground water	
Flood plain			Not located in 100-year, 24-hour floodplain	K.S.A. 65-171d

2 Adapted from Kansas Department of Health and Environment (KDHE), Livestock Waste Management Section. https://www.kdheks.gov/feedlots.

structures. Many feedlots use 300 sq ft per head of pen space. In the drier climates of western Kansas, pen space may be reduced to 200–250 sq ft per head.

A minimum distance of 200 feet is recommended from the back side of the pen to the nearest natural stream, field or pasture drainage, or road ditch to allow acreage for runoff control structures. All extraneous runoff around the perimeter of the feedlot should be diverted away from the feedlot and roads. For new sites, locating the feedlot on a ridge or elevating the feed road to construct a drainage ditch will accomplish the diversion of extraneous runoff.

The distance from the feed bunk to back side of the pen will usually measure between 175 feet and 250 feet. Terrain and drainage will determine bunk orientation. North-south bunk orientation in an east-west sloping lot is preferred because bunks with an east-west orientation may accumulate ice on the north side of the bunks during winter months. North-sloping lots will remain wet longer than south-sloping lots during winter weather, and cattle may be exposed to more severe winds in north-sloping lots.

Site evaluation also includes development and location of the cattle working facilities, receiving pens, and sick pens. In larger feedlots, moving cattle out of the lower side of the pens does not interfere with feed road traffic and may decrease cattle and worker stress during cattle movement. Normally one-eighth to one-half acre of land is required for siting the working facilities. Additional space will be needed for sick or receiving pens.

Trucks and stock trailers must have all-weather access to the working facilities. Using a circular turning area is preferred to backing trucks, tractors, and trailers. A semi-truck requires a turning area of 130–150 feet in diameter to turn around. A similar area is required for many farm pickup fifth-wheel and bumper hitch stock trailers. Adequate truck turning area also is required around the feed center for delivering feed ingredients.

Pen Arrangement

Pens are arranged using single or double rows. A single-row arrangement typically has feed bunks located on one side of the road and a diversion channel located on the other side to carry away extraneous drainage. Often, a single-row arrangement is used for operations with fewer than 800 head and may follow a terrace around a hillside. An advantage of the single-row arrangement is that only one runoff control structure is required. A double-row arrangement requires locating pens along a ridge with lot construction on both sides of the feed road (**Figure 1**). With a double-row arrangement, runoff can be contained from both sides of the ridge using two separate lagoon systems or, depending on available slope, drainage channels may collect all runoff into one lagoon. An advantage to the double-row arrangement is that the cost of the feed road is reduced.

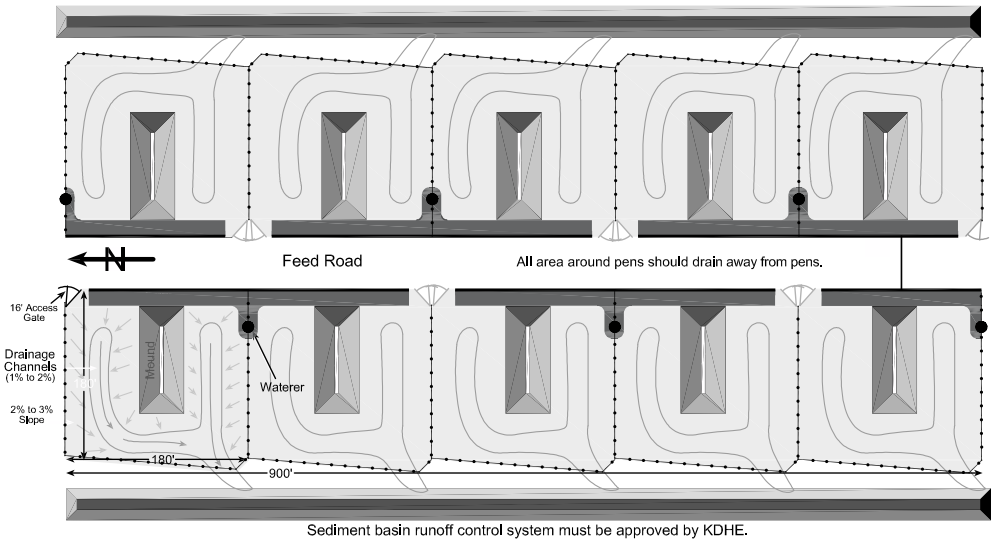

Figure 1. Double-Row Pen Design Using a Common Feed Road (100 Head Per Pen)

Feed Road

Most feed roads are 12–16 feet wide for single-row pen arrangements. The feed road is sloped away from the feed bunks and pens into a drainage ditch. Feed road width with double-row arrangements can vary, with widths from 16–30 feet. A wider road area is required if snow and runoff from the road are drained or stored in a center channel of the feed roads. The center channel normally drains away from the pens and to one end of the feed road. If the feed road water drains towards the pens, then the feed road should be crowned in the center. To build an all-weather road, adequate roadbed preparation (elevation, slope, and drainage) is required prior to the placement of geotextile fabric and 8–12 inches of gravel.

Pen Size

Separate receiving pens should be sized to hold one truckload of cattle to help identify stressed or sick cattle. The number of cattle in a pen usually varies from 60–150 head. Smaller pens are suggested if cattle are custom fed. Cattle purchased from multiple sources should be segregated into smaller receiving pens by source. Mixing incoming cattle from different sources may cause additional health problems. Smaller receiving pens of cattle may be comingled once cattle are on feed, rested, and healthy. Feedlot pens are sized to handle the number of cattle transported in one or two semitrailers.

If cattle weigh 300–400 pounds upon arrival, a typical pen may hold 120 head. Incoming cattle in the 500- to 600-pound range can be placed in pens that hold 80–100 head. If two semitrailer loads are comingled, pens will hold 160–200 head.

Pen Drainage

Figure 2a is a design of a typical 100-head pen, and **Figure 2b** shows a 200-head pen for backgrounding cattle, located in a region where the net annual moisture evaporation[3] is between 20 and 30 inches. The concept of a sawtooth back fence with approximate dimensions is also shown in both figures. Actual dimensions are dependent upon materials being used.

During the winter months, muddy pens may result from reduced evaporation of rainfall or melting snow. **Table 2** (page 5) provides recommendations on mounds and waterer location in the fence line, based on lot area per head and net annual moisture evaporation. Calculations in Table 2 assume urine production for a 750-pound animal, and 75% of the daily urine production evaporates during the winter months. **Figure 3** shows the net annual moisture evaporation for each county in Kansas. Feedlots will remain drier in areas with higher net moisture evaporation with proper stocking density. In eastern Kansas, feedlots may not be dry with proper stocking density due to limited moisture evaporation during the winter months and if the feedlot surface does not freeze. If the lots are frozen, then urine freezes or drains away from the lot. Stocking density may not prevent muddy lots during extreme weather events such as blizzards or excessive rainfall.

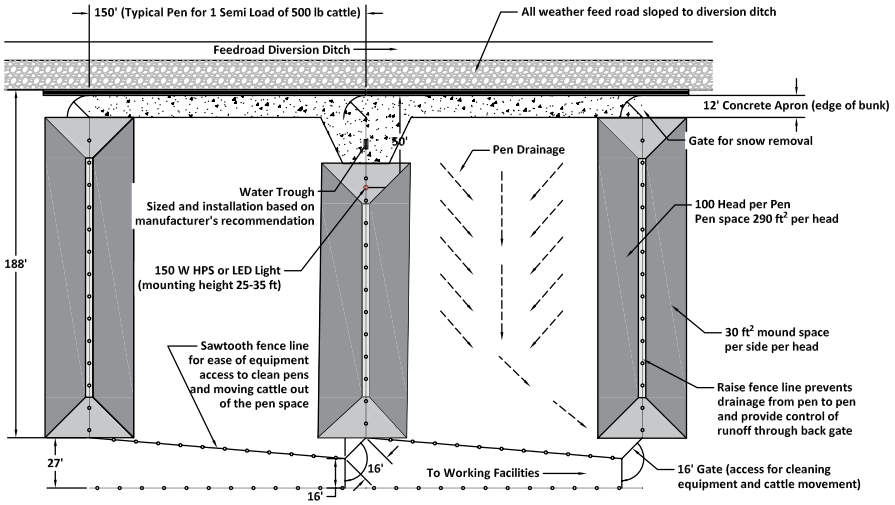

Figure 2a. Example 100-Head Pen with Sawtooth Back Fence Design and Mounds in Fenceline

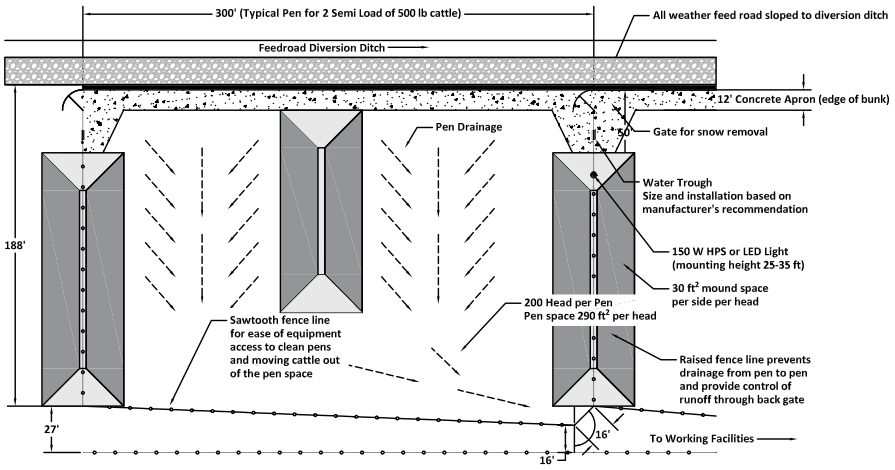

Figure 2b. Example 200-Head Pen with Sawtooth Back Fence Design and Mounds in Pen and Fenceline

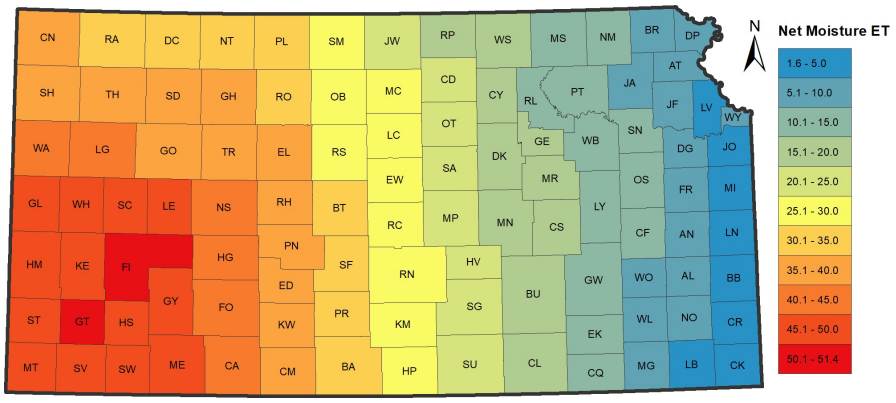

Figure 3. Net annual moisture evaporation map for the state of Kansas. ET units in inches/year

3 Net moisture evaporation is defined as net annual evaporation minus net annual rainfall.

Mounds

Mounds in pens are not locations to stack manure, but are locations for cattle to rest, away from the mud. Proper mound construction requires 20–40 sq ft of mound space per head on each side of the mound. The entire pen of cattle should be able to rest on one side of the mound without laying on each other. Cattle should be able to step off a mound and onto the feeding apron without having to travel through mud. The height of a mound ranges from 4–6 feet. The top of the mound is less than 5 feet wide, and the side slopes are at a 5:1 or 4:1 ratio (**Figure 4**). Mounds oriented east-west allow cattle to use the mound as a windbreak by lying on the south side. Mounds should be constructed to encourage cattle to rest on the sides rather than the top. Cattle resting on top of a mound may erode areas where rainwater or urine accumulate, rather than draining off the sides. Mounds should not impede natural pen drainage and should be constructed so that pen cleaning and grading equipment can travel over and maintain the shape of the mound.

Table 2. Recommendations on Mounds and Waterer Location

Lot Area per Head (sq. ft.)	Net Annual Moisture Evaporation (inches)								
	10	15	20	25	30	35	40	45	50
200									
250									
300									
350									
400									

Lot area is too small/pens will be muddy in winter

Pens may be muddy in winter/waterer within 25 feet of bunk/mounds required

Pens likely dry in winter/waterer within 50 ft of bunk/mounds recommended

Pens likely dry in winter/waterer within 75 ft of bunk/mounds optional

Pens likely dry in winter/waterer within 100 ft of bunk/mounds optional

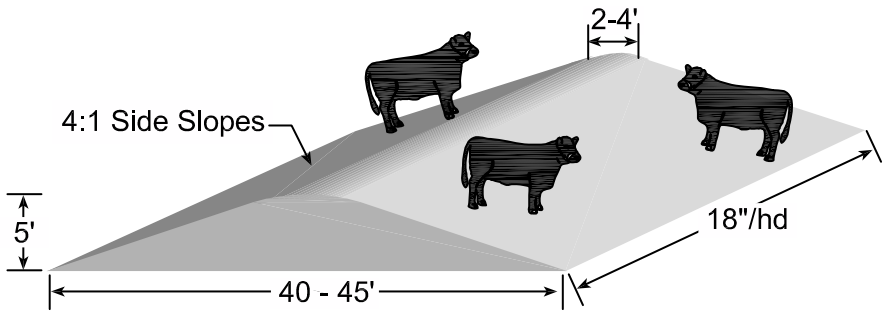

Figure 4. Mound Construction

Bunk Space Per Animal

Recommended bunk space for backgrounding feedlots (500–700 pounds) is 18 inches per head. Younger cattle prefer to eat together and require more bunk space than finishing cattle. Finishing cattle operations have a bunk space of 9–12 inches per head. Feeding frequency also can influence bunk space: once-a-day feeding requires more bunk space for containing the feed than operations feeding two or more times per day. Rations containing a higher percentage of forage require more bunk space because the feed is less dense. The receiving pen may allow 24 inches per head of bunk space to avoid crowding and ensure cattle have access to feed upon arrival.

Feed Bunk Construction

Concrete bunks have a longer life than wooden bunks. Concrete bunks have either a round or flat bottom. Bunk cleanout of snow or old feed is easier with a flat-bottom bunk. Movable steel bunks are similar in cost to concrete bunks on a per-foot basis, but normally are used with in-pen feeding and constructed so cattle can feed from both sides. Bunk life is increased by removing old feed and maintaining open drain ports. A cable, or neck rail extends along the inside of fence line bunks. Flexibility is added to the pens by using an adjustable neck rail rather than a fixed rail, which is normally positioned for one size of cattle. Provisions for mounting the neck rail must be considered when using

posts anchored into the concrete apron, bolted onto the feed bunks, or positioned in the feed bunk base. **Figure 5** provides designs for adjusting the neck rail to feed varying sizes of cattle.

Fence line bunks are preferred to in-pen bunks. Feeding equipment driven within pens during wet weather without constructed feed pad surfaces can damage the pen surface and result in reduction of feed efficiency. If in-pen bunks are used, a gravel-packed base using geotextile fabric should be constructed (**Figure 6**). Minimum width for the gravel pack is 26 feet, which allows room for cattle to stand on both sides of the bunk and feeding equipment to feed on one side of the bunk (**Figure 6**). The gravel pack should be extended at the end of the bunks for maneuvering feeding equipment.

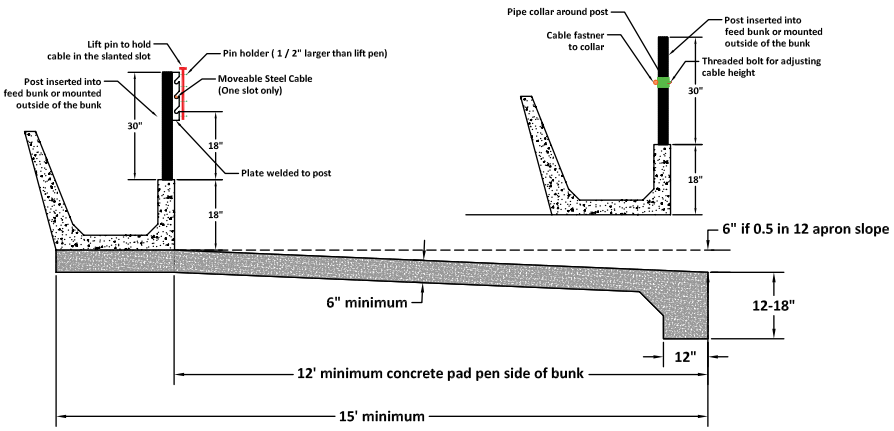

Figure 5. Designs for Adjustable Neck Rail

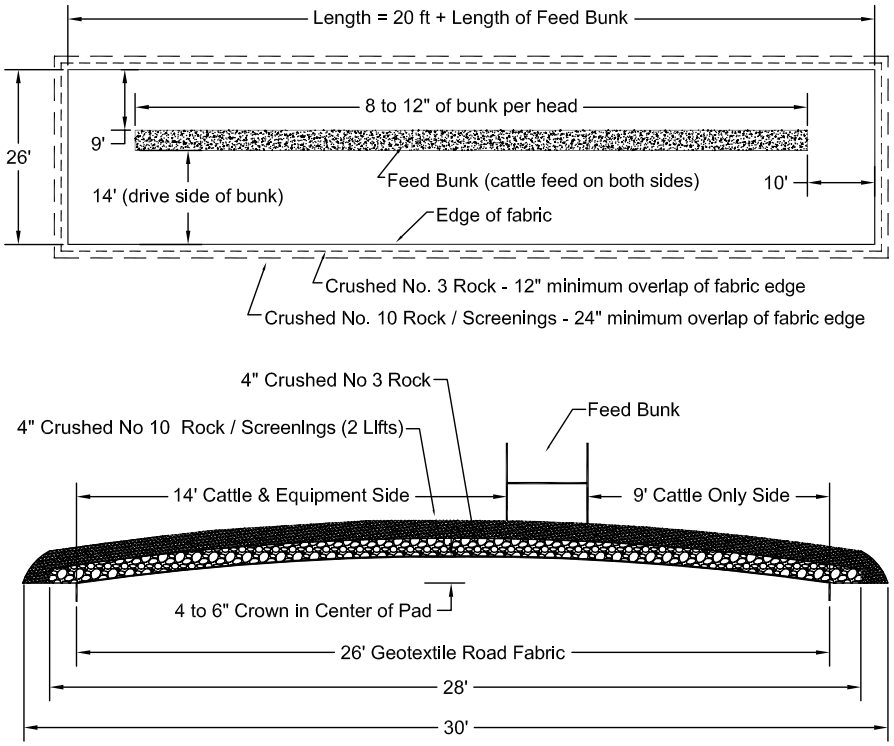

Figure 6. Geotextile Fabric and Gravel Construction for In-Pen Feeding Pads (top view and cross-section)

Concrete Apron

Firm standing areas for cattle near the bunks and waterers are necessary, as mud hinders cattle movement and reduces their ability to reach the bottom of the bunk. Research indicates four inches of mud reduces feed efficiencies 10% per day.[4]

The concrete apron adjacent to the fence line bunk provides the cattle with a firm place to stand while eating. On the cattle side of the bunk, a 12-foot-wide concrete apron with a slope of ¼–1 inch per foot away from the feed bunk is recommended. Geotextile fabric and gravel can be added to create a 20-foot apron, if desired. A cubic yard of concrete will construct approximately 6–8 linear feet of apron if the apron is 12 feet wide, 6 inches thick, and has a 12-inch-deep, back-edge footing (**Figure 7**). The apron must be wide enough to allow cleaning equipment to scrape along the bunk. Rutting of the pen will occur if the cleaning equipment travels along the side of the apron, rather than on top of it. If the feed bunks are resting on the apron, then a minimum 15-foot-wide apron is required. A 10- to 20-foot-wide section with 8–12 inches of gravel screening along the back side of the apron is recommended to provide additional solid ground for the cattle to stand on during wet weather.

4 DeRouchey, J., Marston, T., & Harner, J.P. (2015). *How Feeding-site Mud and Temperature Affect Animal Performance*, Kansas State University. https://bookstore.ksre.ksu.edu/pubs/mf2673.pdf

Cattle Waterers

Waterers can be located in fence lines or the middle of the pen (**Figure 8**). A 10-foot-wide concrete apron is placed around the waterer. A 10- to 20-foot-wide concrete apron from the feeding apron to the waterer allows cattle access in muddy conditions. However, a concrete apron from the feeding apron to the water trough may not be feasible if the water trough is more than 25–50 feet from the feed apron. Having an open water trough for newly arrived cattle can aid initial water consumption until the cattle learn to drink from small automatic waterers. Open tanks or trough waterers may require draining overflow water to the back of the pen to avoid mud holes and ice around the waterer. Most operators use frost-free, electric heat, or flow-through waterers in the pen during freezing weather. Manufacturer's recommendations for waterer installation and number of head per opening should be followed to avoid frozen waterers during the winter months. All water pipes that pass through the concrete slab should be insulated to reduce heat loss to the concrete slab.

Water consumption varies from 8–20 gallons per 1,000-pound animal unit, depending on the weather. **Table 3** shows daily water consumption rate based on cattle size and temperature. Daily water usage and demand should be determined using hot weather rates.

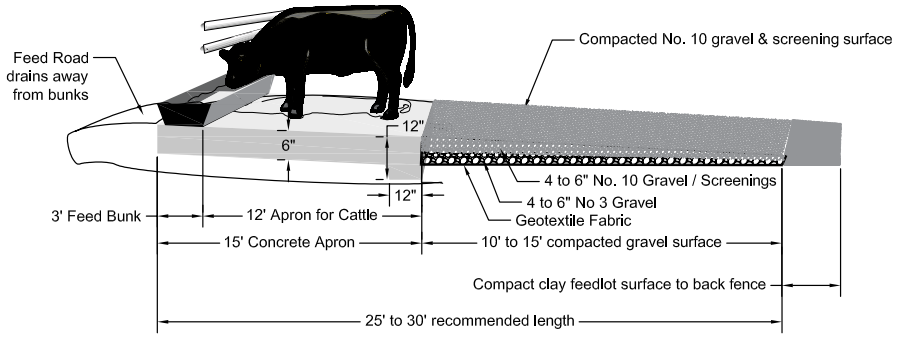

Figure 7. Cross-Section of Feed Bunk and Apron

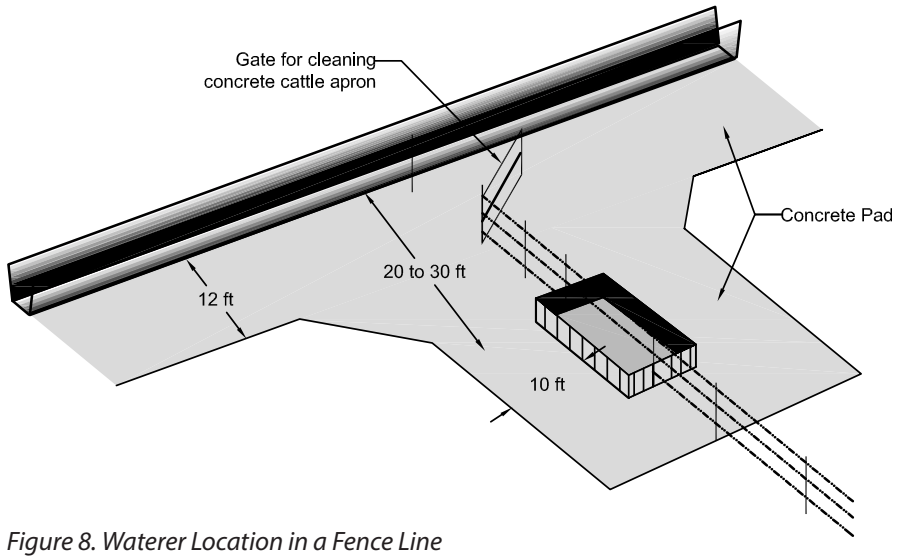

Figure 8. Waterer Location in a Fence Line

Table 3. Beef Cattle Water Intake Estimates[5]

Weight (lb)	Water Intake Estimates (gallons)					
	40 °F	50 °F	60 °F	70 °F	80 °F	90 °F
	Growing Beef Calves					
400	4.0	4.3	5.0	5.8	6.7	9.5
600	5.3	5.8	6.5	7.8	8.9	12.7
800	6.3	6.8	7.9	9.2	10.6	15.0
	Finishing Cattle					
600	6.0	6.5	7.4	8.7	10.0	14.3
800	7.3	7.9	9.1	10.7	12.3	17.4
1,000	8.7	9.4	10.8	12.6	14.5	20.6
1,200	10.1	10.9	12.5	15.6	16.8	23.8
1,400	11.4	12.3	14.2	16.5	19	26.9

5 Adapted from *Beef Cattle Water Requirements and Source Management.* Jane A. Parish and Justin De. Rhinehart. POD-04-09. Mississippi State University Extension.

Fencing and Gates

A permanent perimeter fence may be used to contain cattle. Fence construction materials include sucker rod, pipe, cattle panels, steel cable, continuous fence panels, high-tensile steel, electric, and wood. While producers can use high-tensile electric fences for temporary fences, an electrical failure or short circuit can cause the fence to fail. **Tables 4** and **5** (page 8) provide recommendations on typical feedlot perimeter and interior fences. Decisions about fence

type depends on intended use, cost, expected life, and availability of local materials. Access into pens may require one or two gates. When planning fencing and gates, consideration should be given to moving cattle, pen cleaning, manure removal, and access to downed cattle. "Sawtooth" gate arrangements or hinge gates at 45 degrees in a corner allow easier movement of cattle and access for pen cleaning equipment. A minimum gate width of 14 feet is recommended. Along the back or lower side of the pens, an additional gate for cleaning the lots may be needed where the lot runoff drains from the pens.

Gate arrangement, shown in **Figure 9** (page 9), allows producers to access pens from the feed road for manure and snow removal. If cattle are removed from the upper side of the pens, then fencing along feed road or bunks on both sides of the feed road is necessary. If the pen access from the feed road is mainly for snow removal, producers may locate gates further apart to minimize start-stop delivery of feed to the bunk.

Table 4. Feedlot Perimeter Fences

Fencing Material	No. of Members	Member Spacing (inches)	Remarks
2 x 8	3	16	Pressure treated
Poles (wood)	4	12	Minimum diameter 2 ½"
Pipe	4	12	Minimum diameter ½" with spring tension
Sucker rod	4	12	Weld or thread joints
Cable	5	10	½" minimum diameter with spring tension
Cattle panel or woven wire and 1-barb wire	1	—	Barb 3" above panel
Posts: 12' on center, 3' minimum depth in ground, 4" minimum top diameter, pressure-treated wood or equivalent			

Table 5. Feedlot Interior Fences

Fencing Material	No. of Members	Member Spacing (inches)	Remarks
Poles (wood)	3	16	Minimum diameter 2 ½"
Pipe	3	16	Minimum diameter 1 ½"
Cable	4	12	½" minimum diameter spring tension
Wire (barb)	4	12	
Posts: same as perimeter fences			

Wind Protection

Windbreaks for cattle feedlots will reduce winter wind speed in pens and decrease animal stress, improve animal health, and increase feed efficiency. Windbreaks protect an area approximately 10 times the height of the wind break. In winter weather, windbreaks will drop snow in an area four times the windbreak height. Windbreaks should be located along the north and west sides of the pens. Additional protection may be necessary if a pen is located more than 200 feet from a windbreak. In this case, options available include leaving a gap between pens and planting a second windbreak or placing a non-living windbreak in the fence line. Non-living windbreaks include wood, metal, or plastic materials. Windbreaks need 20% of open area to function properly; solid windbreaks create undesirable air currents near the structure, and cattle tend to use the windbreak only on calm days. For example, if 24-inch-wide metal roofing material is used for a windbreak, a 4 to 6-inch opening between sheets is recommended. A plastic wind break fence can be attached directly to the existing fence and removed when weather warms. Planted trees, when fully grown, should not allow snow to be deposited on either the feed road or in the feed bunks. **Table 6** (page 9) provides guidelines on windbreak length required per head. Receiving pens should have additional protected resting space to reduce stress upon arrival.

Shade

Shade benefits are a function of the duration of a heat stress event, annual hours of heat stress, and length of confinement. Shade can be a part of animal welfare audits. Producers should carefully review the requirements of special marketing or production agreements which may require minimum shade per head as part of their animal welfare requirements and auditing procedures. Sprinklers can be used in addition to shade to improve summer performance.

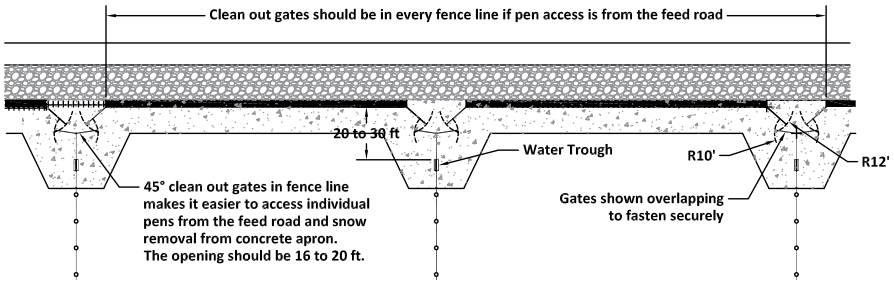

Figure 9. Example of Gate Arrangement to Access Pens Along the Feed Road

Table 6. Windbreak Length Per 10 Head

	Windbreak Height (ft)				
	4	**8**	**10**	**12**	**20**
Recommended windbreak length (ft) required per 10 head	16	8	7	6	4

Note: Based on 40 sq feet of resting space per head

Shade structures should provide a minimum of 32 sq ft of space per head. Larger animals may require 40–60 sq ft per head. Shade structures should have a minimum clearance of 12 feet from the ground to the lowest structural member. This allows cleaning equipment to move under the shade and reduces heat from structure's roof to cattle's backs. To allow the sun to dry the area under the structure, orient shade structures north-south. As the sun moves across the sky during the day, the cattle will follow the shade and move from west to east.

Lighting

Benefits of feedlot lighting include:

- fewer predators and less cattle theft,
- improved animal safety resulting from the quieting effect of night lighting,
- increased number of cattle eating during cool summer nights,
- reduced stress on newly arrived cattle agitated by darkness,
- improved feed availability for timid cattle, and
- reduced feed bunk space per head, due to 24-hour feeding period (if feed is available).

Lighting should provide 10 foot-candles of light intensity in a 30- to 50-foot area along the feed bunks. Additional light is necessary for the receiving and working areas. Automation (e.g., photocell or timer) will ensure that lights illuminate at dusk and extinguish at dawn. **Table 7** (page 10) lists the size, efficiency, and lamp life of common light sources used in livestock facilities.

The distance between the light source and the illuminated area is an important consideration. Illumination levels decrease rapidly when the distance from the light source increases. Both the mounting height and the separation distance between evenly distributed lights affect the average illumination level. The mounting height is calculated using the distance from the bottom of the luminaire to the work surface. Excessively high mounting heights waste light by dispersing light over too large of an area, and large separation distances decrease illumination uniformity. For example, if using high pressure sodium lamps, space 35-foot-tall poles 225 feet apart, and 20–30 feet from the

feed road. Light poles and wiring should be located away from the feed bunk and waterer to avoid contamination from bird droppings.

Table 7. Characteristics of Three Light Sources in Feedlots[6]

Lamp Type	Lamp Power (watts)	Efficacy (lumens/ watt)	Efficacy (foot-candles/ watt)	Typical Lamp Life (hours)
Metal halide	70–1,000	60–94	5.6–8.8	7,500–20,000
High-pressure sodium	35–1,000	63–125	5.9–11.7	15,000–24,000
White LED	1–200	50–100	4.7–9.3	25,000–100,000

6 American Society of Agricultural and Biological Engineers. (January 2014). *Lighting Systems for Agricultural Facilities.* https://elibrary.asabe.org/abstract.asp?search=1&JID=2&AID=44214&CID=s2000&T=2&urlRedirect=[anywhere=on&keyword=&abstract=&title=&author=&references=&docnumber=&journals=All&searchstring=lighting%20systems%20for%20agricultural%20facilities&pg=&allwords=&exactphrase=lighting%20systems%20for%20agricultural%20facilities&OneWord=&Action=Go&Post=Y&qu=]&redirType=newresults.asp

In open lots, using high-pressure sodium light sources are an economical option. Mercury vapor, light emitting diodes (LED), and metal halide light sources also are adequate for area lighting. In particular, high quality LED luminaires are energy efficient, have long useful lives, operate well in a range of temperatures (-20˚C to 40˚C; -4˚F to 104˚F), and are essentially instant-on devices. The main disadvantage of LED luminaires is the initial cost, which is two to three times more than comparable fluorescent or metal halide lamps. With long useful lives (25,000 hours or more) and reduced costs for lamp replacement and maintenance, good-quality LED luminaires can be more economical over the life of the LEDs.

Fixtures used in agricultural applications should be watertight and constructed of corrosion resistant materials. Feedlot owners should work with suppliers to make sure the ballast operating temperatures match local environmental conditions, as some luminaires have a lower temperature rating of -30 to -40 ˚C (-22 to -40 ˚F).

Runoff Containment and Treatment

Facilities should be planned and constructed for environmental compliance. Feedlot size and location will determine if runoff must be controlled and the type of system that can be utilized. Feedlots with 300 animal units (300 head weighing more than 700 pounds or 600 head weighing less than 700 pounds) are required to be registered through the Kansas Department of Health and Environment (KDHE). Larger feedlots may be required to obtain a National Pollutant Discharge Elimination System (NPDES) Permit. Feedlots with a 600-head-or-higher capacity may be required to construct a lagoon or holding pond. Smaller operations may be able to utilize a grass filter. At a minimum, a sediment basin along the back side of the pens is recommended to collect the solids and for containment of rainfall events. The basin length is equal to the pen width and should be able to hold a 2- to 3-inch rainfall. Normally, the sediment basin is 3–4 feet deep and 40–48 feet wide. The original earthen material removed from the sediment basin can be used for constructing the mounds or feed roads.

Holding pond capacity is based on the following: drainage area, surface type (e.g., concrete or earthen), normal rainfall; 25-year, 24-hour rainfall event; sedimentation, and additional water sources (e.g., overflow waterers). Consideration should be given to evaporation losses. Construct holding ponds with a minimum 12-inch clay layer so that any seepage from the sides and bottom is less than a quarter-inch per day when the pond is full. On sites evaluated by KDHE as Sensitive Ground Water Areas, seepage is reduced to one-tenth of an inch per day. All holding ponds must have 10 feet of separation between the floor of the holding pond and underlying water level.

Some soils may require additional materials such as bentonite to be mixed with the soil to meet the seepage requirements. In eastern Kansas, total holding pond capacity is about 2 acre-feet per acre of drainage area, which includes the volume for liquid storage as well as the volume utilized by the 2 feet of required free board. In western Kansas, the total required holding pond capacity is approximately 1 acre-foot per acre of drainage area. Holding pond construction must meet state and federal regulatory guidelines. Containment of rainfall runoff from other contaminate sources such as commodity storages, silage bunkers, feed mills, offices, and fuel storages should be considered.

Grass filters will require an area of one to three times the feedlot area, depending on stock density, average cattle weight, and normal rainfall events. The runoff water should be distributed uniformly across the grass filter. This requires the land to be leveled across the width of the filter and then uniformly sloped for the length of the filter. Other types of systems, such as wetlands, are developed on a case-by-case basis in cooperation with KDHE.

Air Quality and Dust Issues

Larger operations should consider the potential for air quality problems. KDHE regulations specify that larger cattle operations will have to meet separation distances from existing residents before starting construction. Proper site selection will minimize many dust and odor issues. Prevailing winds and habitable structures must be considered to avoid air pollution problems. Sprinkler systems can be used to control dust. Manure removal prior to hot summer weather will reduce odor and dust problems.

Summary

Planning and design information will aid feedlot owners and operators to improve and develop facilities to address human, cattle, and environmental issues, and will result in safe, efficient, and productive feedlots.

Cattle producers should contact KDHE to determine what steps are necessary to meet state and federal regulations. Design assistance is available from Natural Resource Conservation Service, engineering consultants and Kansas State University.

Additional Resources

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