Beef Feedlot Systems Manual

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Beef Feedlot Systems Manual

Iowa's cattle feeding industry is an important part of the state and local economy. More importantly, it is a significant enterprise on several thousand Iowa farms. Cattle feeding adds value to corn and forages; more fully employs farm resources such as labor, facilities, and machinery; and provides profit opportunities for skillful managers. Iowa producers also are reinvesting in feedlots to modernize, improve environmental performance, and expand their businesses to capture emerging opportunities. Growth of ethanol production is creating opportunities for cornbelt cattle feeders and consumer demand for beef has turned the corner after a long downward trend -- moving cattle prices to a new level.

Iowa is the leading state in ethanol production, which has important implications for Iowa's cattle feeding sector. Each bushel of corn converted to ethanol produces approximately 17 pounds (air dry basis) of distillers grains and solubles (DGS), a high quality feedstuff for cattle. DGS works particularly well in feedlot rations and has a higher feed value wet than dry, resulting in a win-win situation for ethanol plants and nearby cattle feeders. Inclusion rates of DGS to 20-40% or more of the dry matter in the ration can significantly reduce cost of gain for feedlots. While early in the transformation, bio-renewable production will have a significant impact on Iowa by increasing the demand for corn. It also creates a significant opportunity for cattle feeders near ethanol plants.

Demand for high quality beef has fueled value-based marketing systems that reward the type of cattle Iowans produce. As a result, innovative marketing programs and alliances have emerged, giving Iowa feeders more choices as to where and how to sell their cattle. Value-based, or grid marketing is rewarding cattle with superior quality grade.

At the same time that the cattle feeding sector is poised for growth, there is increasing environmental scrutiny of agriculture in general and open feedlots in particular. Concerns raised by citizens and organized groups about ground and surface water quality are forcing regulatory agencies such as the Environmental Protection Agency (EPA) to step up enforcement of existing laws and consider new ones. Many of the regulations date back to the Clean Water Act of 1972 or major revisions to Iowa's laws in 1987. The 2003 revisions to the Concentrated Animal Feeding Operations (CAFO) regulations will require nutrient management plans and greater public input to the permit process for CAFOs. While all Iowa producers must work to protect the waters of the state, feedlots with more than 1,000 head of capacity must now adhere to specific regulations regarding runoff control and manure nutrient application. Feedlots considering expansion or new construction must be aware of 1) the environmental regulations and 2) how facility design will impact which regulations apply and their resulting costs.

This publication describes and evaluates five alternative feedlot designs at three different size levels. The designs incorporate necessary environmental control features appropriate for each feedlot size under the regulations at the date of publication. The analysis incorporates differences in animal performance, initial investment costs, annual operating cost, and cost of gain.

As with any modeling analysis, the results depend heavily on the assumptions, and we will explain the assumptions and the reasoning behind them as we proceed. Also note that this analysis is based on new construction, including overhead items such as feed storage, cattle handling facilities, and feeding equipment. Existing feedlots may already have made these investments. The analysis assumes a high enough level of management to meet the performance goals stated.

As producers evaluate the alternative facility designs they must keep in mind the need to:

- create a cattle environment to achieve the target performance,
- protect water quality and be neighbor friendly,
- recognize that soil type, rainfall, slope, drainage, etc., are site specific and affect choices,
- facilitate and encourage proper observation, movement, and management of cattle to assure that they perform well and people stay safe when working cattle.

These objectives can be achieved in a variety of ways in any of the designs considered. Likewise, improper management of even the best designed facilities will produce unsatisfactory results from the cattle and facility.

Iowa Cattle Feeding Economics

Regional Advantage

Iowa has several cattle feeding advantages. The most obvious is the availability and price of corn and corn processing coproducts. During the period 1994-2003, Iowa corn prices averaged from as little as $0.10/bu under southwest Nebraska prices, to as much as $0.35/bu less than in parts of the Texas cattle feeding region. One concern often raised about feeding cattle in Iowa is that of competition for fed cattle from packers, relative to other regions. During the same 1994-2003 period, Iowa fed cattle prices averaged more than other regions on a shrink adjusted live price (Table 1).

It is often thought that much of the corn price advantage is given back in poorer performance related to Iowa's weather. However, feedlot closeout analysis indicates that Midwest feedlots have comparable performance, superior quality grade, and a cost of gain advantage over the Central and High Plains (Table 2). Midwest feedlots tend to use more feed per pound of gain and have more Yield Grade 4 and 5 and Heavy carcasses. To achieve this level of performance, feedlots must be well designed and managed.

Table 1. Average Live Cattle, 1994-2003 for Iowa and Leading Feedlot States

	Texas	Colorado	Kansas	Nebraska	Iowa
Shrink	**4%**	**4%**	**4%**	**3%**	**3%**
Average Price	**$68.73**	**$68.71**	**$68.71**	**$68.43**	**$68.52**
Shrink adjusted live price	**$65.95**	**$65.96**	**$65.96**	**$66.38**	**$66.45**

Table 2. Regional BenchMark Steer Data, 2004-2006

Region	ADG **lbs**	F/G **ratio**	COG **$/lbs**	VM **$/head**	PR+CAB **%**	Choice **%**	Outs **%**
Central Plains	**3.26**	**6.31**	**0.55**	**13.85**	**5.89**	**41.56**	**11.32**
High Plains	**3.02**	**6.38**	**0.56**	**13.27**	**3.80**	**42.31**	**9.43**
Midwest	**3.18**	**7.10**	**0.51**	**13.28**	**9.68**	**56.01**	**19.52**
North Plains	**3.28**	**6.58**	**0.52**	**13.82**	**9.34**	**49.19**	**12.31**

Source: VetLife, BenchMark, Outs include YG 4 & 5 and Heavy and Light Carcasses

Historical Perspective

Feeding cattle in Iowa generally has been profitable during the most recent 10 years. On average, steer calves made a profit of $31 per head over all costs and yearlings averaged $28 per head over the same period (Figure 1). These averages were influenced by exceptional profits in 2003. More typical profits are closer to $20/head for a 6 month feeding period and require approximately $150-200/head equity investment. There is a strong seasonal pattern to profitability (Figure 2). Calves sold during the first six months of the year produced larger average returns than sales in the second half of the year. Yearlings are generally less profitable when sold in the summer months and more profitable sold in the fall. Naturally, there are exceptions to these seasonal patterns.

Cattle feeding returns are not without their risk and there are tools available to help producers manage this risk. Live cattle futures is one tool to reduce price risk. For the 1990-2005 period, futures could be used to hedge a profit in feeding yearling cattle in 65 percent of the trading days during the feeding period (**www.econ.iastate.edu/outreach/agriculture/periodicals/ifo/IFO_2006/ifo061506.pdf**). In addition to futures and options on futures, Livestock Revenue Protection and Livestock Gross Margin Insurance are two relatively new products to reduce price risk.

Figure 1. Estimated returns per head feeding steer calves and yearlings in Iowa

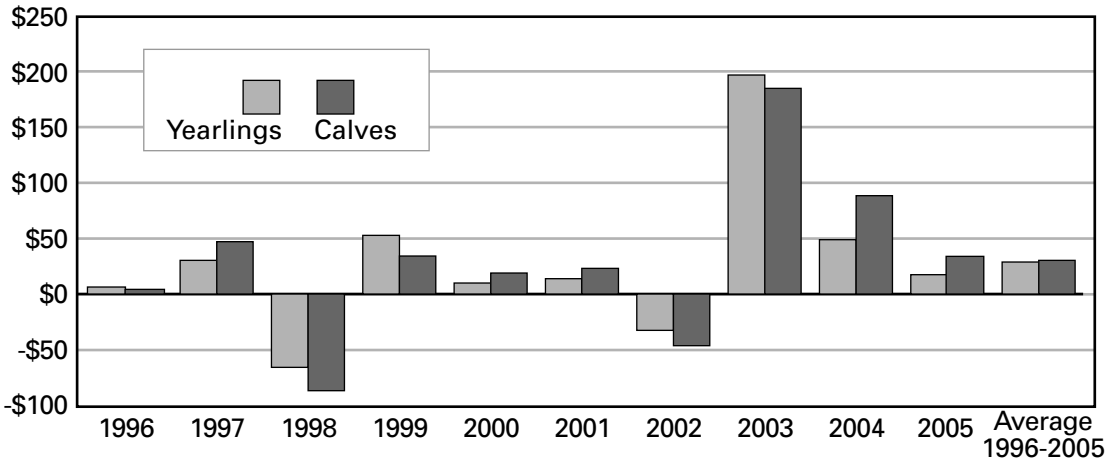
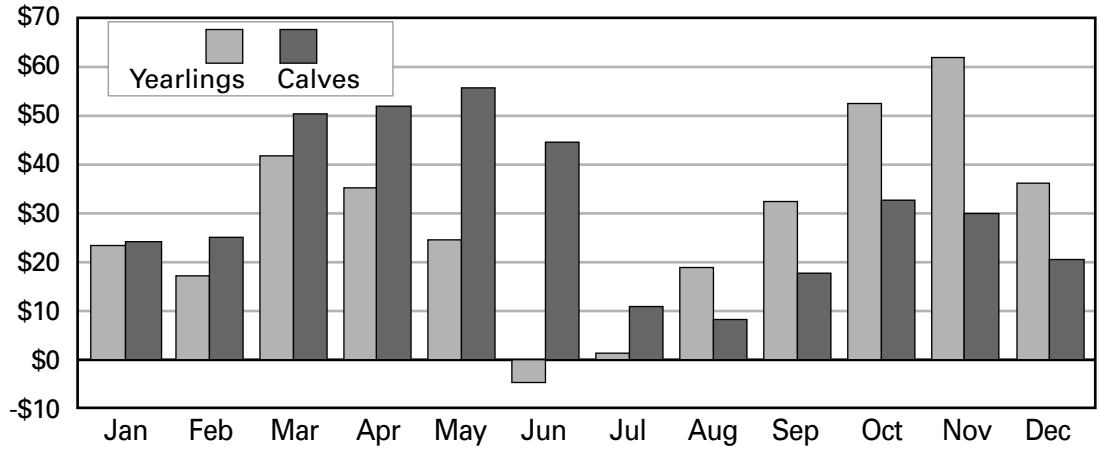


Figure 2. Average estimated return per head by selling month, 1996-2005



A New Strategy for a New Agriculture

Increasing ethanol production is significantly changing Iowa agriculture. Cattle feeders should evaluate their current business in the light of this new environment.

A traditional view of cattle feeding is as a corn marketing strategy. Prorating the profits and losses from the Estimated Returns Series for yearling cattle back on a per-bushel-of-corn-fed basis reveals what many Iowa cattle feeders have known all along. Feeding cattle adds value to the corn they raise.

For the 15 years, 1988-2003, the average corn price at north central Iowa elevators in October was $2.17/bu. Selling equal amounts of corn each month averaged $2.26 and selling at the highest monthly average price each year averaged $2.55. If the producer prices the corn into the cattle each month and sells cattle each month the average value of corn through cattle was $2.58/bu. Marketed through cattle corn price was higher than the October price in 11 of 15 years and higher than the highest monthly price in 9 of the 15 years (**www.iowabeefcenter.org/content/MarketingCornThroughCattleStillWorks.pdf**). Cattle feeding has more upside potential for corn prices, but cattle feeders need to manage cattle price risk.

With the rapid increase in ethanol production, corn farmers are less concerned about adding value to corn via cattle feeding and are more interested in the profit advantage of feeding the corn coproducts to cattle. Depending on the distance the feedlot is from the ethanol plant and the relative price of wet distillers grains (WDG) to dry corn in the ration, the profit increase from feeding WDG is significant.

One strategy is for Iowa farmers to benefit from selling higher priced corn to ethanol processors and buying and feeding the increasingly plentiful distillers grains to cattle. Because of the proximity to ethanol production, Iowa feedlots have a competitive advantage over regions with higher cost distillers grains.

A second strategy is for farmers to produce the same amount of corn as before, but increase the number of cattle fed by 20-40 percent by purchasing corn coproducts to add to the ration.

Increasing ethanol production and its demand for corn is changing agriculture. Feedlot cattle can use corn coproducts better than other species and producers located near the plants will have greater access to these products at lower costs than will other cattle feeding regions. Expanding or upgrading feedlot capacity may be a method to effectively capture opportunities that the bioeconomy is creating.

Beef Cattle Feedlot Systems

Feedlots in Iowa are many and varied. Beef feeding in Iowa has not undergone the consolidation that has occurred in other species or other parts of the United States. Many small feedlots still exist. Although there is a wide range of facility types in the state, most feedlots in Iowa can be classified into one of five different feedlot systems: 1) earthen lot with windbreak, 2) earthen lot with shed, 3) concrete lot with shed, 4) complete confinement building with solid floor, and 5) complete confinement building with slatted floor. Facilities may vary greatly from feedlot to feedlot particularly as they relate to shelter and feedlot layout. Each of these systems will have different investment costs and will lead to different levels of animal performance. The facilities examined here are based on a number of general assumptions in order to assign costs.

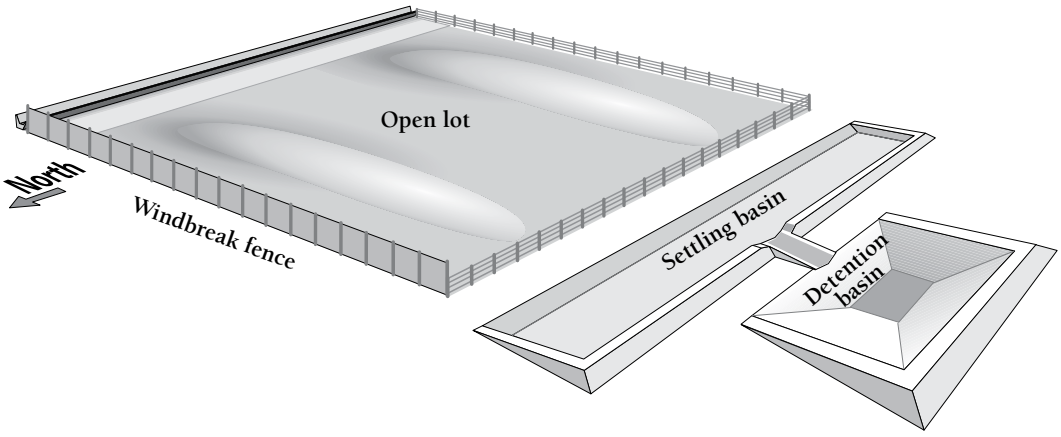
Overall assumptions for all systems include the following:

- Each pen contains 150 head.
- One foot of bunk space per head for all systems.
- Earthen lots have 16-foot wide concrete aprons under the feedbunks.
- Outdoor lots under 1,000 AU have settling basins designed for a 2.5 inch storm.
- Outdoor lots over 1,000 AU have settling and detention basins designed for a 5.2 inch storm.
- No cost estimates were made for water supplies; consult local experts for water supply issues.
- Manure hauling expenses are based on commercial rates.
- All lots assume fence and gates at $10 per foot.

Earthen Lot with Windbreak

In this system, cattle are fed in an open earthen lot with no shelter. An 8-foot high windbreak fence provides some protection against adverse weather. The open lot allows 250 square feet of space per animal. Thirty square feet per head of mound space is provided as a dry resting area. Permanent solid fencing surrounds the lot and a gravel drive lies adjacent to the fence-line feedbunk. Diversions on the upper side of the feedlot direct runoff away from the lot so only what falls on the lot must be handled. A settling basin located on the lower side of the feedlot removes solids from lot runoff and releases the settled liquid to a grassed filter area for lots of less than 1,000 AU or to an engineered detention basin for lots of more than 1,000 AU. The settling and detention basins meet current state and federal pollution control standards. A 16-foot wide concrete apron is used along the feedbunk.

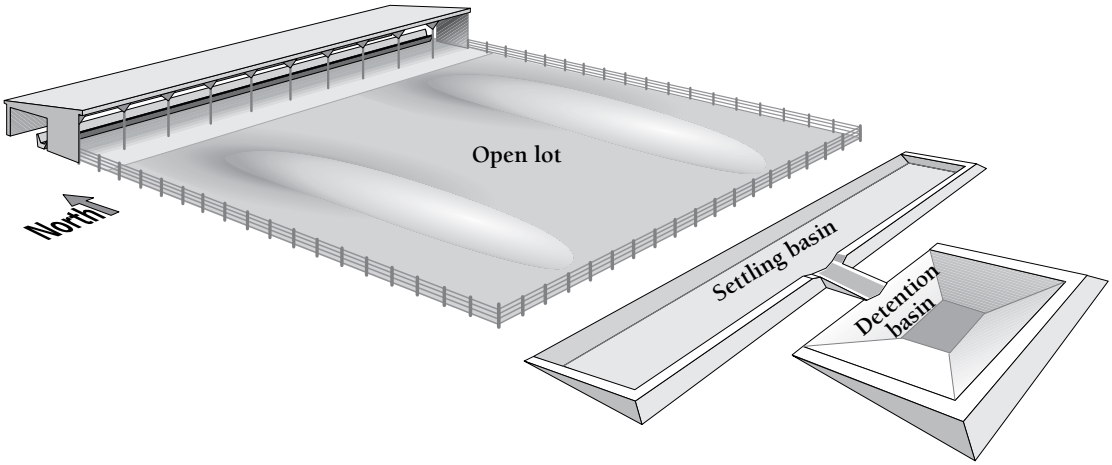
Figure 3. Earthen Lot with Windbreak



Earthen Lot with Shed

This system uses a shed that provides 25 square feet per head inside and an earthen lot that provides an additional 225 square feet per head outside. The shed is a 42-foot wide post frame, uninsulated building with a concrete floor that extends 12 feet outside the building posts. It is open on the feedlot side with a ventilation curtain on the back side. Rain gutters keep roof water out of the feedlot. The feedbunk is located inside the building along with a 14-foot wide feed alley. Mounds are included as a resting area for the cattle and are sized for 30 square feet per head. Water diversion and manure management are similar to the earthen lot with windbreak.

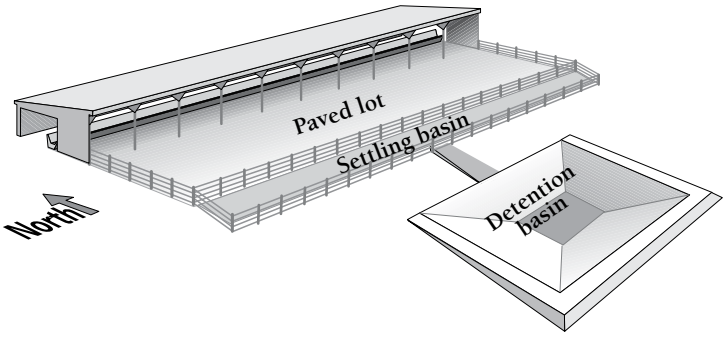
Figure 4. Earthen Lot with Shed



Concrete Lot with Shed

This system uses a shed that provides 20 square feet per head inside and a paved lot that provides an additional 50 square feet per head outside. The shed is a 36-foot wide post frame, uninsulated building with a concrete floor. It is open on the feedlot side with a ventilation curtain on the back side. Rain gutters keep roof water out of the feedlot. The feedbunk is located inside the building along with a 14-foot wide feed alley. Because these pens are relatively small, manure must be scraped often, at least weekly. A concrete settling alley below the pens settles solids from runoff and serves as a sorting and handling alley. Water diversion and manure management are similar to the earthen lots. Bedding is not generally used in this system.

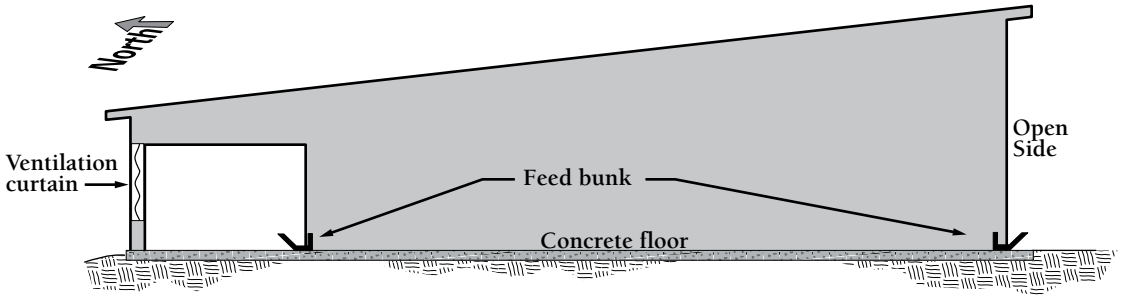
Figure 5. Concrete Lot with Shed



Complete Confinement Building with Solid Floor

This system uses an uninsulated building approximately 100 feet wide, with two sets of fenceline feedbunks. One bunk is filled from a driveway inside the north wall of the building, the other bunk is filled from outside the south wall of the building. The building provides 40 square feet of pen space per animal. The concrete floor is bedded to create a manure-bedding pack in the middle of the pens. Some wet manure may be removed weekly from the areas along the feedbunk. The high open wall on the south and a ventilation curtain along the north provide natural ventilation. All manure is handled as a solid. Space is provided in the building for manure storage between hauling periods. Narrower buildings with a single row of bunk can be built at similar cost.

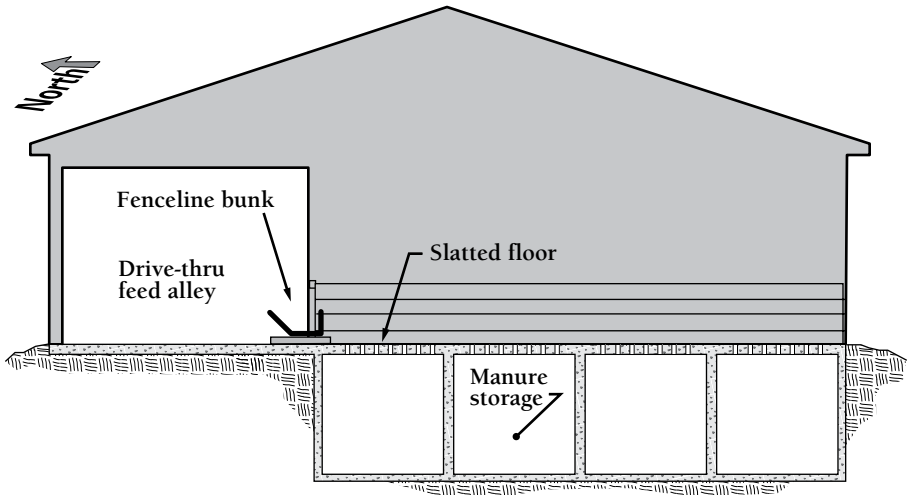
Figure 6. Complete Confinement Building with Solid Floor



Complete Confinement Building with Slatted Floor

Cattle fed in this typical deep-pit facility are confined inside an uninsulated building with a drive-through feeding alley. The building, typically 40 feet wide, is divided into several 150-head pens, each allowing 25 square feet per head. A fenceline bunk runs lengthwise through the building and allows one foot of space per animal. The pen floor is totally slatted with concrete slats over an 8-foot deep pit. The pit is designed to be pumped twice per year. The building has a ventilation curtain on the north, an open south side, and an open ridge to facilitate natural ventilation.

Figure 7. Complete Confinement Building with Slatted Floor



Manure Management

The change in commercial fertilizer costs since 2001, especially nitrogen and phosphorus, has renewed interest in using manure nutrients in crop production. In fact, manure plans now are created to show the supply of manure nutrients and the crop acres that are in greatest demand for those nutrients. Manure plans are an agronomic management tool that protects the environment when implemented correctly.

All cattle feedlots of more than 1,000 head are required to have a National Pollution Discharge Elimination System (NPDES) permit issued by the Department of Natural Resources (DNR) and implement a Nutrient Management Plan (NMP) by the summer of 2007. Smaller cattle feedlot operations will follow state-specific rules and regulations regarding manure control, storage, and nutrient management plans. In Iowa these regulations are minimal. Even if not required by regulations, nutrient planning and land application have important agronomic considerations.

Regulated NMPs must meet specific criteria outlined in state law and rules. This includes incorporating crop needs with application rates, identifying the specific land where manure will be applied, and specifying planned application methods and timing. Nutrient Management Plans (NMPs) must now include the Natural Resources Conservation Service (NRCS) Phosphorus Index (P Index) rating for each field. The P Index estimates the potential for P losses from a field based on landscape features, soil test P, and soil conservation and nutrient management practices. The specific regulations differ by state, but for Iowa when animal manure or other organic byproducts are applied, NMPs must be developed using a crop removal rate based on either nitrogen or phosphorus. Whether the planning process uses nitrogen or phosphorus depends on several conditions including soil test P, crop rotation, crop yields, P Index rating, manure analysis, manure application rates, and the field land treatments and conservation practices.

The P Index identifies the risk of nutrients reaching waters of the state. Depending on the risk category of the field, the farmer may apply manure at a nitrogen rate (lower risk categories), on a phosphorus rate (higher risk categories), or not at all on very high categories. See Table 4 for risk category criteria for phosphorus.

Operations with an NPDES permit must apply manure based on the DNR P Index Risk Categories. Operations that are not permitted by DNR, but follow a Comprehensive Nutrient Management Plan (CNMP) from NRCS must follow the NRCS P Index Risk Categories. The NRCS procedures are good recommendations to follow to protect water quality for operations not required to have an NMP or CNMP.

Most nutrient management plans are Nitrogen utilization plans:

- Manure may be applied to all crops at a rate equal to the nitrogen removal rate (calculated by an approved method) by the harvested crop.
- Applying manure for multiple crop years is acceptable for phosphorous only. This is an accepted practice as long as the nitrogen does not exceed the application year's crop nitrogen demand.

It is important to access correct manure nutrients and characteristics to develop accurate and realistic site-specific nutrient management plans. Understanding the supply of nutrients available for crop demand in manure teamed up with accurate application and incorporation of the manure will ensure full use of the manure's value.

The following (Table 3) are estimates of nutrients excreted in beef feedlot manure on a per head produced basis according to PM 1811, ISU(1999).

Table 3. Estimated Manure Nutrients

	lbs		
	N	P_2O_5	K_2O
Solid, bedded manure from open lots (scraped)/Ton [1]	**22**	**16**	**14**
Solid manure from Confinement solid floor/space/yr [2]	**84**	**54**	**78**
Liquid manure from deep pit/space/yr[3]	**95**	**59**	**83**
Liquid runoff from open earthen lots/space/yr[3]	**5**	**2**	**11**

[1] based on an estimate of 3 Tons of manure produced per head per year

Due to the extreme variation of manure nutrients from excretion to field application, each feedlot should establish a site specific, 3 year history of manure analysis by sampling fresh feedlot manure scrapings in early winter, early spring, and summer stockpile, plus manure accumulated in sediment control structures (at time of cleanout), and runoff control ponds prior to irrigation. Significant ration changes will create a need to re-sample manures.

A recent 10 year study of open feedlot manure analysis at the University of Nebraska found 0.14 pounds of harvested manure nitrogen per head per day, and 0.07 pounds of phosphorus per head per day (2006 Nebraska Beef Report)

[2] Small sampling of actual manure analysis

[3] PM 1811, ISU

Table 4. Risk Category Criteria for Phosphorus

Department of Natural Resources (DNR) P Index Risk Categories:	Natural Resources Conservation Service (NRCS) P Index Risk Categories:
Very Low, 0-1 Manure shall not be applied in excess of a nitrogen-based rate.	**Very Low, 0-1** A field in which movement of P off-site will be very low. If soil conservation and P management practices are maintained at current levels, impacts on surface waters from P losses from the field will be small.
Low, >1-2 Manure shall not be applied in excess of a nitrogen-based rate.	**Low, >1-2** A field in which movement of P off-site will be low. Although the P delivery to surface water bodies is greater than from a field with a very low rating, current soil conservation and P management practices keep water quality impairment low.
Medium, >2-5 Manure may be applied at a nitrogen-based rate if current or planned soil conservation and phosphorus management practices predict the rating of the field to be not greater than 5 for the next determination of the phosphorus index. Manure shall not be applied in excess of two times the phosphorus removed with crop harvest over the period of the crop rotation.	**Medium, >2-5** A field in which movement of P off-site will be medium. Impacts on surface water resources will be higher than for the field with a low rating, and the P delivery potential may produce some water quality impairment. Careful consideration should be given to further soil conservation and P management practices that do not increase P delivery to surface water.
High, >5-15 Manure shall not be applied on a field with a rating greater than 5 and less than or equal to 15 until practices are adopted that reduce the phosphorus index to at least the medium risk category. However, prior to December 31, 2008, fields with a phosphorus index greater than 5 and less than or equal to 10 may receive manure at a phosphorus-based rate if practices will be adopted to reduce the phosphorus index to the medium risk category.	**High, >5-15** A field in which movement of P off-site will be high. Water quality impairment will be large. Remedial action is required to reduce P movement to surface water bodies. New soil and water conservation and/or P management practices are necessary to reduce off-site P movement and water quality degradation.
Very High, >15 Manure shall not be applied on a field with a rating greater than 15.	**Very High, >15** A field in which movement of P off-site will be very high. Impacts on surface water resources are extreme. Remedial action is required to reduce P delivery to surface water. All necessary soil and water conservation practices plus a P management plan, which may require discontinuing P applications, must be put in place to reduce water quality impairment.
For more information **http://www.iowadnr.com/afo/mmp.html#phosphorus**	**For more information** **http://www.ia.nrcs.usda.gov/technical/Phosphorus/phosphorusstandard.html**

Increased use of ethanol byproduct feed ingredients in livestock rations has changed the traditional assumptions of manure nutrients. A comparison is listed in Table 5 that illustrates a range from a corn and forage base ration to rations that replaced 10 percent, 20 percent, 30 percent, and 40 percent of the corn with byproduct from ethanol production. Analyses also were performed increasing the diet crude protein and phosphorous concurrently as byproduct use increased. Scenarios were developed for 2-year application rates for P with various crude protein and phosphorous levels. All these variables were compared for continuous corn (CC) and corn-soybean (C-SB) crop rotations to analyze the crop rotation effect. Nutrient values were set at $0.19/lb for N, and $0.26/lb P for a 2,500 head lot capacity case study. Assume manure applied to fields that can assimilate all nutrients in the manure.

Table 5. Impact of Corn Coproducts on Manure Application

	Manure applied on 2-year P removal basis									
	Continuous Corn					Corn-Soybean				
P % in diet	base diet	10%	20%	30%	40%	base diet	10%	20%	30%	40%
(DM basis)	**0.29**	**0.34**	**0.39**	**0.44**	**0.49**	**0.29**	**0.34**	**0.39**	**0.44**	**0.49**
Tons/A	**12.0**	**9.8**	**8.3**	**7.2**	**6.4**	**9.2**	**7.5**	**6.4**	**5.5**	**4.9**
acres	**500**	**620**	**730**	**840**	**950**	**660**	**810**	**950**	**1100**	**1250**
Cost of manure/hd	**$3.40**	**$3.60**	**$3.90**	**$4.10**	**$4.40**	**$3.70**	**$4.10**	**$4.40**	**$4.70**	**$5.10**
Net value manure/hd	**$2.90**	**$3.70**	**$4.70**	**$5.70**	**$6.70**	**$1.80**	**$2.50**	**$3.40**	**$4.20**	**$5.00**

*excerpts from 2006 Nebraska Beef Report

The 3 factors that influence the actual plant available nutrients following animal excretion are:

- Manure handling/storage/application management
- Time between excretion and field application
- Environmental factors (temperature, moisture, wind speed, etc.)

Hauling manure to the field within 7 days of excretion will provide the highest nitrogen content to the crop. Composting manure within 7 days of excretion will produce the next most valuable manure product in terms of nitrogen content. Handling manure by cleaning the pen once a year contributes to the greatest nitrogen loss from manure.

Site specific manure production, quantities handled/applied coupled with accurate manure analysis, good crop production yield records, and calibrated manure application equipment will help ensure that the Nutrient Management Plan outlined will reward the feedlot with lower cost of production and improved environmental stewardship.

Sample feedlot record keeping forms that will track the National Pollution Discharge Elimination System (NPDES) requirements as well as the operational management needs can be downloaded at:
www.heartlandwq.iastate/manure

Iowa NRCS P Index can be found at:

www.ia.nrcs.usda.gov/technical/Phosphorus/phosphorusstandard.html

Feedlot Performance and Facility Type

Facility design that improves animal comfort also may improve cattle performance. A considerable amount of research was conducted, primarily in the 1970s, that evaluates cattle performance and facility type. A summary of this research is shown in table 6.

Considerable variation exists in these studies. However, there appear to be certain consistent trends. Those include reduced feed intake in total confinement and improved efficiency in open lots when shelter is provided. The more recent 10-year analysis of 1,836 Iowa closeouts showed similar confinement and shelter effects on feedlot performance. Based on the early studies, it was assumed that cattle fed in open lots with shelter would be 5 percent more efficient than cattle fed in open lots without shelter. It also was assumed that confinement cattle consume 5 percent less feed, but are 2-3 percent more efficient than cattle fed in open lots. Average performance assumptions for calves and yearlings were based on recent closeouts summarized in the State of Iowa Summaries (Wilson and Loy, various issues). The average performance was then adjusted for facility type based on the previously stated assumptions.

Limited experimental data exist on the relative performance of cattle fed in solid-floor total-confinement systems. It was assumed that cattle performance in these systems would be similar to the open lot with shelter system, based on closeouts from systems in South Dakota and early research from Iowa State University and South Dakota State University. The performance assumptions for steer calves and yearlings for each of the facility types is shown in table 7.

Table 6. Feeding Trial Summaries *Confinement and Shelter Effects on Feed Intake and Feed Efficiency*

Feeding Trials	% Change	
Confinement vs. open lots w/o shelter	**Feed Intake**	**Feed Required Per Lb. Gain**
Iowa State (Allee, 1970-75)	-7.90	-6.80
Iowa State (Allee, 1978-83)	-9.10	2.10
Minnesota (Morris, 1970-76)	-0.60	-4.50
Minnesota (Morris, 1977-78)	6.00	-5.10
Nebraska (1974-75)	-3.50	-1.00
Missouri (Commercial feedlot, 1974-82)	-12.00	-1.00
Iowa State (Closeout summaries, 1988-97)	-6.00	-1.00
Shelter vs. no shelter in open lots		**Feed Required Per Lb. Gain**
Iowa State (Allee, 1970-75)		-9.20
Iowa State (1978-83)		-5.50
Minnesota (Morris, 1970-76)		-2.40
Minnesota (Morris, 1977-78)		-6.70
Henderson & Geasler, 13-study summary		-5.00
Iowa State (Closeout summaries, 1988-97)		-3.00

Table 7. Feed Usage Assumptions of Yearling Steers and Steer Calves Fed in Differing Facility Types

	Yearling Steers			Steer Calves		
	Open Lots (no shelter)	Sheltered Open Lots Partial Confine. Solid-floor Confine.	Total Confine.	Open Lots (no shelter)	Sheltered Open Lots Partial Confine. Solid-floor Confine.	Total Confine.
Ave. Daily Gain (lbs)	**3.14**	**3.29**	**3.05**	**2.95**	**2.95**	**2.72**
Feed/gain, Dry Matter	**7.25**	**6.90**	**6.90**	**6.85**	**6.50**	**6.65**
Dry Matter intake (lbs)	**22.80**	**22.80**	**22.80**	**20.20**	**20.20**	**19.20**
Days on Feed	**159**	**152**	**164**	**203**	**194**	**207**

Feedstuffs used for feedlot rations are quite variable in Iowa. Many feeders harvest the majority of their feedstuffs from their own grain operations. The required type of storage ranges from dry commodity storage to fermented feeds including silage and high moisture corn. Other feeders rely more heavily on purchased feeds, including byproducts and other commodities. In this analysis the system that allows the most flexibility and incorporates only 2 to 3 weeks storage of processed feeds was chosen. If the producer chooses to incorporate longer-term storage, including silage bunkers, additional costs should be assumed. The rations used in this analysis included dry rolled corn, tub ground hay, modified distillers grains (MDG, 50 percent of dry matter) and supplement (vitamin-mineral premix). Obviously, many other feedstuffs and successful feedlot rations exist. This one is somewhat common statewide and includes flexibility. The total feed requirements for steer calves and yearlings by facility-type assumed in the economic analysis are shown in table 8.

Table 8. Feed Requirements for Yearling Steers and Steer Calves Fed in Differing Facility Types

	Yearling Steers			Steer Calves		
	Open Lots (no shelter)	Sheltered Open Lots Partial Confine. Solid-floor Confine.	Total Confine.	Open Lots (no shelter)	Sheltered Open Lots Partial Confine. Solid-floor Confine.	Total Confine.
Corn (bu.)	**47.70**	**45.60**	**46.80**	**49.30**	**47.10**	**47.80**
Hay (ton)	**0.213**	**0.204**	**0.210**	**0.362**	**0.346**	**0.350**
Distillers Grain (50% dm-ton)	**0.906**	**0.866**	**0.890**	**1.025**	**0.980**	**0.994**
Supplement (lb.)	**97**	**92**	**95**	**128**	**122**	**124**

Feed Storage

Commodity feed storage is needed for holding corn, ground hay, MDG, and supplement. The following assumptions were made to calculate the price. The shed was a monoslope building with bins that were 12 feet wide, 36 feet deep with a wall height of five feet. Corn and coproducts were stored to a height of five feet. Ground hay was blown in, to a height of 10 feet.

Construction cost was $9 per square foot. Supplement was stored in a steel bulk bin.

The following feed delivery assumptions were used to calculate prices. Corn and coproducts were delivered once per week for the 750 and 1,500 head feedlots, and twice per week for the 5,000 head feedlot. Hay was ground and blown into the shed once every two weeks for all the operations. Supplement would be delivered every two weeks for all operations. The summary of estimated feed storage costs by storage facility is shown in table 9.

Table 9. Estimated Feed Storage Facility Costs

	Operation Size		
	750 Head	1,500 Head	5,000 Head
Corn Bins	**1**	**2**	**4**
Ground Hay Bins	**1**	**2**	**7**
Coproducts Bins	**1**	**2**	**3**
Commodity Shed Bins	**$9,750**	$**19,500**	$**50,000**
Supplement Bulk Bin (tons)	**3**	**6**	**20**
Bulk Bin Cost	$**1,260**	$**1,910**	**$5,040**
Total Cost	**$11,010**	**$21,410**	**$55,040**

Feedlot Systems Cost Analysis

The initial investment required to construct each of the five feedlot systems described earlier is summarized in tables 10-14 (pages 19-23). For each system, the cost of a facility with a one-time capacity of 750 head, 1,500 head, and 5,000 head is shown. All systems are designed to meet EPA guidelines.

It was assumed that the land was already owned; hence, no investment cost is shown for land. However, if a site for the feedlot must be acquired, this investment cost should be added. The estimated number of acres needed for the feedlot and the environmental structures is shown for each system and capacity. Also, well capacity and cost are site specific and are not included here.

All other items reflect a new purchase or construction cost, including design fees. For many feeders, some of the items listed already may be available.

Tables 10-14 also show the annual cost of owning and maintaining each feedlot. In table 15 (page 24) the assumed depreciable life is shown for each component. With proper care, however, most of the components should be functional for a considerably longer period.

A capital recovery charge based on the expected life and an annual interest charge of 6 percent on the value of the investment was included. Annual insurance costs and property taxes were estimated at 1.5 percent of the initial investment. A rental charge or opportunity cost for land of $125 per acre per year also was included.

The assumed repair-cost rates also are shown in table 15. These indicate expected annual repair and maintenance costs as a percent of the initial investment. No maintenance for earthwork mounds in the earthen lots is shown. Rather, it was assumed that they would be rebuilt every five years.

Besides the annual ownership costs, each system has different costs for manure handling, labor, and feed rations. The estimated costs for moving both solid and liquid manure are shown in tables 18-20. These were based on custom handling charges of $1.50 per ton for solid manure and $0.01 per gallon for liquid manure. Labor costs were charged at a rate of $10.00 per hour. An average labor requirement of two hours per head for yearling steers and three hours per head for steer calves was assumed.

The time required to scrape lots or buildings for each 150-head pen was assumed to be 0.50 hours per week for the two earthen lot systems; 0.75 hours per week for the concrete lot with shed; and 0.50 hours per week for the solid floor confinement system plus a bedding cost of 5 pounds per head per day was used at one cent per pound. For the confinement building with slatted floors, no labor for scraping was included. The systems have different manure quantities and handling costs, but when put on a per head per day basis they are identical when rounded to the whole cent.

Feed usage assumptions for each system and for yearling steers and steer calves are summarized in table 7. To estimate the cost of each ration the following feed prices were used:

Corn	**$2.30 per bushel**
Hay	**$60 per ton**
Modified Distillers Grains	**$39.10 per ton**
Supplement	**$0.16 per pound**

These values reflect average prices over the past decade.

Other non-feed costs are summarized in table 16 (page 24). These were assumed to be the same for each of the five systems analyzed.

Tables 18, 19, and 20 (pages 25-27) summarize the total costs of gain for each of the systems, at three different capacities. For yearling steers, two turns of cattle per year were assumed, while for steer calves only one turn was assumed. Costs for each component of the systems for each type of cattle are calculated per head, per head per day, and per pound of gain.

Feedlot Systems Summary

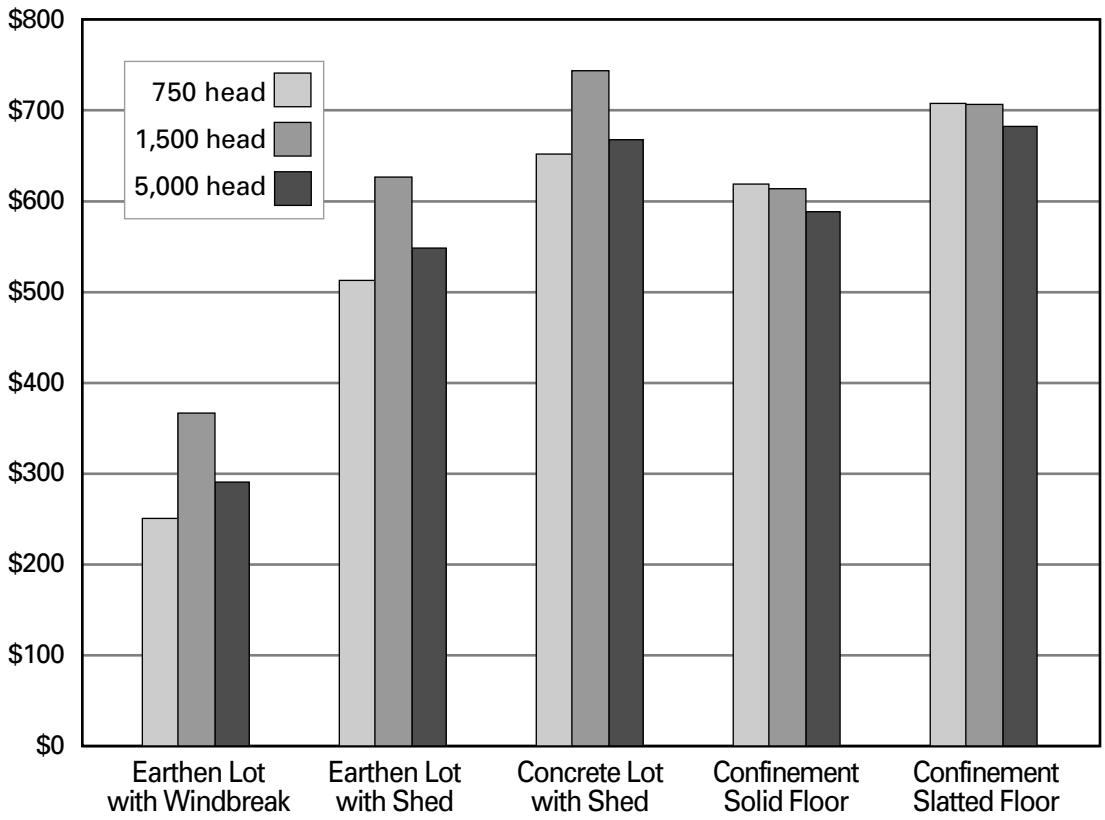
Perhaps the best way to compare the different feedlot designs is at the bottom line. Each design includes the initial investment, operating costs, and animal performance and they all meet current environmental requirements. Where should producers invest their money?

Figure 8 compares the initial investment per head across the systems. Note that there is little difference between the 750 and 5,000 head lots on a per head basis. The 1,500 head investment is higher because of the additional environmental cost that the 750 does not have. The 5,000 head feedlot is able to spread these costs over more cattle, reducing the per head costs. Adding the shed to the earthen lot more than doubles the initial investment for the 750 head lot and increases it 80 to 90 percent in the larger lots.

The earthen lot is approximately one-third the cost of total confinement with slatted floors. The earthen lot with shed and concrete lot with shed have comparable initial investment. The concrete lot has higher animal density and less runoff to control than the earthen lot, and thus has a lower cost of environmental compliance.

Ownership and operating costs including the facility, bedding, manure hauling, fuel and utilities, health, marketing, and labor are summarized in figure 9 (page 17) for yearling steers assuming two turns a year. The costs range from $81.44 for the earthen lot with windbreak to $108.37 for solid floor confinement.

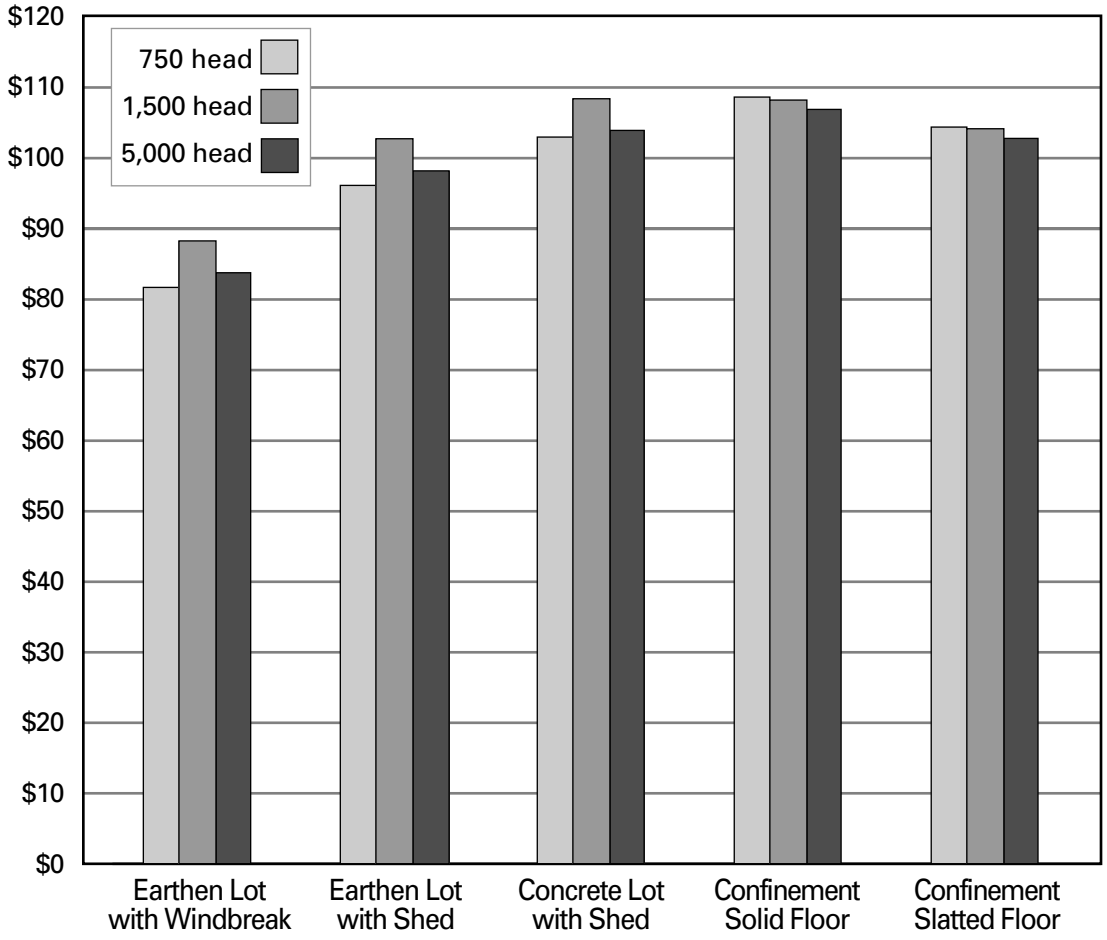
Figure 8. Initial Investment per Head by System and Size



The differences between the systems decline when compared on a cost-of-gain basis. Comparisons of the systems for two turns of yearlings and one turn of calves each year are shown in Tables 18-20. It also incorporates feed costs, and therefore animal performance differences, with the investment and operating costs. The difference between calves and yearlings is relatively small in part because the calves gain more pounds per head than do yearlings and have about 10 percent lower feed cost per pound of gain. The cost-of-gain numbers are similar across the systems ranging $0.04/lb from low to high on the yearlings, and $0.07/lb on calves. For all sizes of feedlots, the earthen feedlots have the lowest cost of gain. The other feedlot types all had very similar costs of gain.

Another analysis of interest to many producers is the daily operating costs that reflect a yardage charge. Table 17 is an estimate of the daily yardage cost based on an 85 percent occupancy.

Figure 9. Ownership and Operating Costs (nonfeed) per Head of Yearling Steers



Appendix

Table 10. Initial Investment for System 1, Earthen Lot with Windbreak

	Investment			Annual Cost		
Facilities and Equipment	750 Head	1,500 Head	5,000 Head	750 Head	1,500 Head	5,000 Head
Land (acres)	5.7	13.1	43.6	$717	$1,636	$5,452
Building	0	0	0	0	0	0
Concrete	$69,000	$135,000	$450,000	$6,778	$13,261	$44,202
Feed bunks	$11,250	$22,500	$75,000	$1,262	$2,524	$8,414
Fencing	$37,500	$67,500	$212,500	$4,582	$8,247	$25,964
Site preparation	$7,500	$15,000	$50,000	$699	$1,398	$4,661
Windbreaks	$9,000	$18,000	$60,000	$1,100	$2,199	$7,331
Commodity storage sheds	$9,750	$19,500	$50,000	$1,104	$2,208	$5,661
Bulk bin for supplement	$1,260	$1,910	$5,040	$143	$216	$571
Cattle handling equipment	$9,000	$15,000	$17,500	$1,280	$2,133	$2,488
Feed handling equipment	$16,500	$38,500	$77,000	$1,521	$3,549	$7,098
Subtotal	**$170,760**	**$332,910**	**$997,040**	**$19,185**	**$37,372**	**$111,843**
Environmental Structures	750 Head	1,500 Head	5,000 Head	750 Head	1,500 Head	5,000 Head
Engineering costs	$5,000	$50,000	$50,000	$466	$4,661	$4,661
Construction costs	$11,250	$90,000	$300,000	$1,049	$8,390	$27,968
Irrigation system	0	$75,000	$100,000	0	$10,742	$14,323
Subtotal	**$16,250**	**$215,000**	**$450,000**	**$1,515**	**$23,794**	**$46,952**
Total	**$187,010**	**$547,910**	**$1,447,040**	**$20,699**	**$61,165**	**$158,795**
$ per head of capacity	**$249**	**$365**	**$289**	**$28**	**$41**	**$32**

Table 11. Initial Investment for System 2, Earthen Lot with Shed

	Investment			Annual Cost		
Facilities and Equipment	750 Head	1,500 Head	5,000 Head	750 Head	1,500 Head	5,000 Head
Land (acres)	5.7	13.1	43.6	$717	$1,636	$5,452
Building	$187,500	$375,000	$1,250,000	$21,230	$42,460	$141,533
Concrete	$87,000	$168,000	$550,000	$8,546	$16,502	$54,025
Feed bunks	$11,250	$22,500	$75,000	$1,262	$2,524	$8,414
Fencing	$37,500	$67,500	$212,500	$4,582	$8,247	$25,964
Site preparation	$7,500	$15,000	$50,000	$699	$1,398	$4,661
Windbreaks	$0	$0	$0	$0	$0	$0
Commodity storage sheds	$9,750	$19,500	$50,000	$1,104	$2,208	$5,661
Bulk bin for supplement	$1,260	$1,910	$5,040	$143	$216	$571
Cattle handling equipment	$9,000	$15,000	$17,500	$1,280	$2,133	$2,488
Feed handling equipment	$16,500	$38,500	$77,000	$1,521	$3,549	$7,098
Subtotal	**$367,260**	**$722,910**	**$2,287,040**	**$41,083**	**$80,874**	**$255,868**
Environmental Structures	750 Head	1,500 Head	5,000 Head	750 Head	1,500 Head	5,000 Head
Engineering costs	$5,000	$50,000	$50,000	$466	$4,661	$4,661
Construction costs	$11,250	$90,000	$300,000	$1,049	$8,390	$27,968
Irrigation system	0	$75,000	$100,000	0	$10,742	$14,323
Subtotal	**$16,250**	**$215,000**	**$450,000**	**$1,515**	**$23,794**	**$46,952**
Total	**$383,510**	**$937,910**	**$2,737, 040**	**$42,598**	**$104,668**	**$302,820**
$ per head of capacity	**$511**	**$625**	**$547**	**$57**	**$70**	**$61**

Table 12. Initial Investment for System 3, Concrete Lot with Shed

	Investment			Annual Cost		
Facilities and Equipment	750 Head	1,500 Head	5,000 Head	750 Head	1,500 Head	5,000 Head
Land (acres)	1.9	4.1	13.5	$239	$508	$1,693
Building	$187,500	$375,000	$1,250,000	$21,230	$42,460	$141,533
Concrete	$208,500	$411,000	$1,360,000	$20,480	$40,371	$133,588
Feed bunks	$11,250	$22,500	$75,000	$1,262	$2,524	$8,414
Fencing	$26,250	$46,500	$150,000	$3,207	$5,682	$18,328
Site preparation	$7,500	$15,000	$50,000	$699	$1,398	$4,661
Windbreaks	$0	$0	$0	$0	$0	$0
Commodity storage sheds	$9,750	$19,500	$50,000	$1,104	$2,208	$5,661
Bulk bin for supplement	$1,260	$1,910	$5,040	$143	$216	$571
Cattle handling equipment	$9,000	$15,000	$17,500	$1,280	$2,133	$2,488
Feed handling equipment	$16,500	$38,500	$77,000	$1,521	$3,549	$7,098
Subtotal	**$477,510**	**$944,910**	**$3,034,540**	**$51,165**	**$101,049**	**$324,036**
Environmental Structures	750 Head	1,500 Head	5,000 Head	750 Head	1,500 Head	5,000 Head
Engineering costs	$5,000	$50,000	$50,000	$466	$4,661	$4,661
Construction costs	$5,625	$45,000	$150,000	$524	$4,195	$13,984
Irrigation system	0	$75,000	$100,000	0	$10,742	$14,323
Subtotal	**$10,625**	**$170,000**	**$300,000**	**$991**	**$19,599**	**$32,968**
Total	**$488,135**	**$1,114,910**	**$3,334,540**	**$52,156**	**$120,648**	**$357,004**
$ per head of capacity	**$651**	**$743**	**$667**	**$70**	**$80**	**$71**

Table 13. Initial Investment for System 4, Complete Confinement with Solid Floor

	Investment			Annual Cost		
Facilities and Equipment	750 Head	1,500 Head	5,000 Head	750 Head	1,500 Head	5,000 Head
Land (acres)	1.4	2.6	8.0	$172	$323	$1,004
Building	$225,000	$450,000	$1,500,000	$25,476	$50,952	$169,840
Concrete	$178,500	$351,000	$1,160,000	$17,533	$34,478	$113,943
Feed bunks	$11,250	$22,500	$75,000	$1,262	$2,524	$8,414
Fencing	$10,500	$15,000	$40,000	$1,283	$1,833	$4,887
Site preparation	$1,500	$3,000	$10,000	$140	$280	$932
Windbreaks	$0	$0	$0	$0	$0	$0
Commodity storage sheds	$9,750	$19,500	$50,000	$1,104	$2,208	$5,661
Bulk bin for supplement	$1,260	$1,910	$5,040	$143	$216	$571
Cattle handling equipment	$9,000	$15,000	$17,500	$1,280	$2,133	$2,488
Feed handling equipment	$16,500	$38,500	$77,000	$1,521	$3,549	$7,098
Building engineering costs	$0	$3,000	$3,000	$0	$277	$277
Total	**$463,260**	**$919,410**	**$2,937,540**	**$49,742**	**$98,449**	**$314,112**
$ per head of capacity	**$618**	**$613**	**$588**	**$66**	**$66**	**$63**

Table 14. Initial Investment for System 5, Complete Confinement with Slatted Floor

	Investment			Annual Cost		
Facilities and Equipment	750 Head	1,500 Head	5,000 Head	750 Head	1,500 Head	5,000 Head
Land (acres)	0.9	1.7	5.2	$172	$323	$1,004
Building	$187,500	$375,000	$1,250,000	$21,230	$42,460	$141,533
Manure containment	$277,500	$555,000	$1,850,000	$27,258	$54,516	$181,719
Feed bunks	$11,250	$22,500	$75,000	$1,262	$2,524	$8,414
Fencing	$15,750	$24,750	$70,000	$1,924	$3,024	$8,553
Site preparation	$1,500	$3,000	$10,000	$140	$280	$932
Windbreaks	$0	$0	$0	$0	$0	$0
Commodity storage sheds	$9,750	$19,500	$50,000	$1,104	$2,208	$5,661
Bulk bin for supplement	$1,260	$1,910	$5,040	$143	$216	$571
Cattle handling equipment	$9,000	$15,000	$17,500	$1,280	$2,133	$2,488
Feed handling equipment	$16,500	$38,500	$77,000	$1,521	$3,549	$7,098
Building engineering costs	$0	$3,000	$3,000	$0	$277	$277
Total	**$530,010**	**$1,058,160**	**$3,407,540**	**$55,862**	**$111,186**	**$357,247**
$ per head of capacity	**$707**	**$705**	**$682**	**$74**	**$74**	**$71**

Table 15. Depreciation Life and Repairs Rate

	Depreciation Life–years	Repairs Rate
Facilities and Equipment		
Building	25	2.0%
Concrete	25	0.5%
Feed bunks	20	1.0%
Fencing	20	2.0%
Site preparation	25	0.0%
Windbreaks	20	2.0%
Commodity storage sheds	25	2.0%
Bulk bin for supplement	25	2.0%
Cattle handling equipment	20	5.0%
Feed handling equipment	20	5.0%
Engineering costs for building	20	0.0%
Environmental Structures		
Engineering costs	25	0.0%
Construction costs	25	0.0%
Irrigation system	25	5.0%

Table 16. Other Nonfeed Costs, per Head

	Yearlings	Calves
Veterinary and health	$8.00	$10.00
Machinery and equipment	$7.00	$11.00
Marketing and miscellaneous	$16.00	$14.00
Total	**$31.00**	**$35.00**

Table 17. Yardage Cost Assuming 85% Occupancy Rate ($/Head/Day)

Capacity	Earthen Lot with Windbreak	Earthen Lot with Shed	Concrete Lot with Shed	Confinement Solid Floor	Confinement Slatted Floor
750	$0.48	$0.64	$0.69	$0.73	$0.65
1,500	$0.53	$0.66	$0.71	$0.70	$0.62
5,000	$0.49	$0.63	$0.67	$0.69	$0.62

Table 18. Total Costs for Facilities and Rations--750 head capacity

Yearling Steers	Unit	Earthen Lot with Windbreak	Earthen Lot with Shed	Concrete Lot with Shed	Confinement Solid Floor	Confinement Slatted Floor
Facilities ownership	$/head	$13.80	$28.40	$34.77	$33.16	$37.24
Manure handling	$/head	$15.89	$15.89	$15.89	$15.89	$15.89
Bedding	$/head	na	na	na	$7.60	na
Ration	$/head	$173.45	$165.72	$165.72	$165.72	$170.19
Labor	$/head	$20.76	$20.72	$21.09	$20.72	$20.00
Other nonfeed costs	$/head	$31.00	$31.00	$31.00	$31.00	$31.00
Total	**$/head**	**$254.90**	**$261.73**	**$268.46**	**$274.09**	**$274.32**
Facilities ownership	$/head/day	$0.09	$0.19	$0.23	$0.22	$0.23
Manure handling	$/head/day	$0.10	$0.10	$0.10	$0.10	$0.10
Bedding	$/head	na	na	na	$0.05	na
Ration	$/head/day	$1.09	$1.09	$1.09	$1.09	$1.04
Labor	$/head/day	$0.13	$0.14	$0.14	$0.14	$0.12
Other nonfeed costs	$/head/day	$0.19	$0.20	$0.20	$0.20	$0.19
Total	**$/head/day**	**$1.60**	**$1.72**	**$1.76**	**$1.80**	**$1.67**
Total	**$/lb. of gain**	**$0.51**	**$0.52**	**$0.54**	**$0.55**	**$0.55**

Steer Calves	Unit	Earthen Lot with Windbreak	Earthen Lot with Shed	Concrete Lot with Shed	Confinement Solid Floor	Confinement Slatted Floor
Facilities ownership	$/head	$27.60	$56.80	$69.54	$66.32	$74.48
Manure handling	$/head	$31.77	$31.77	$31.77	$31.77	$31.77
Bedding	$/head	na	na	na	$5.82	na
Ration	$/head	$195.67	$186.91	$186.91	$186.91	$189.66
Labor	$/head	$30.97	$30.92	$31.39	$30.92	$30.00
Other nonfeed costs	$/head	$35.00	$35.00	$35.00	$35.00	$35.00
Total	**$/head**	**$321.00**	**$341.40**	**$354.61**	**$356.74**	**$360.91**
Facilities ownership	$/head/day	$0.14	$0.29	$0.36	$0.34	$0.36
Manure handling	$/head/day	$0.16	$0.16	$0.16	$0.16	$0.16
Bedding	$/head	na	na	na	$0.03	na
Ration	$/head/day	$0.96	$0.96	$0.96	$0.96	$0.92
Labor	$/head/day	$0.15	$0.16	$0.16	$0.16	$0.14
Other nonfeed costs	$/head/day	$0.17	$0.18	$0.18	$0.18	$0.17
Total	**$/head/day**	**$1.58**	**$1.76**	**$1.83**	**$1.84**	**$1.74**
Total	**$/lb. of gain**	**$0.49**	**$0.53**	**$0.55**	**$0.55**	**$0.56**

Table 19. Total Costs for Facilities and Rations–1,500 head capacity

Yearling Steers	Unit	Earthen Lot with Windbreak	Earthen Lot with Shed	Concrete Lot with Shed	Confinement Solid Floor	Confinement Slatted Floor
Facilities ownership	$/head	$20.39	$34.89	$40.22	$32.82	$37.06
Manure handling	$/head	$15.89	$15.89	$15.89	$15.89	$15.89
Bedding	$/head	na	na	na	$7.60	na
Ration	$/head	$173.45	$165.72	$165.72	$165.72	$170.19
Labor	$/head	$20.76	$20.72	$21.09	$20.72	$20.00
Other nonfeed costs	$/head	$31.00	$31.00	$31.00	$31.00	$31.00
Total	**$/head**	**$261.48**	**$268.22**	**$273.91**	**$273.75**	**$274.14**
Facilities ownership	$/head/day	$0.13	$0.23	$0.26	$0.22	$0.23
Manure handling	$/head	$0.10	$0.10	$0.10	$0.10	$0.10
Bedding	$/head	na	na	na	$0.05	na
Ration	$/head/day	$1.09	$1.09	$1.09	$1.09	$1.04
Labor	$/head/day	$0.13	$0.14	$0.14	$0.14	$0.12
Other nonfeed costs	$/head/day	$0.19	$0.20	$0.20	$0.20	$0.19
Total	**$/head/day**	**$1.64**	**$1.76**	**$1.80**	**$1.80**	**$1.68**
Total	**$/lb. of gain**	**$0.52**	**$0.54**	**$0.55**	**$0.55**	**$0.55**

Steer Calves	Unit	Earthen Lot with Windbreak	Earthen Lot with Shed	Concrete Lot with Shed	Confinement Solid Floor	Confinement Slatted Floor
Facilities ownership	$/head	$40.78	$69.78	$80.43	$65.63	$74.12
Manure handling	$/head	$31.77	$31.77	$31.77	$31.77	$31.77
Bedding	$/head	na	na	na	$5.82	na
Ration	$/head	$195.67	$186.91	$186.91	$186.91	$189.66
Labor	$/head	$30.97	$30.92	$31.39	$30.92	$30.00
Other nonfeed costs	$/head	$35.00	$35.00	$35.00	$35.00	$35.00
Total	**$/head**	**$334.18**	**$354.38**	**$365.50**	**$356.05**	**$360.55**
Facilities ownership	$/head/day	$0.20	$0.36	$0.41	$0.34	$0.36
Manure handling	$/head	$0.16	$0.16	$0.16	$0.16	$0.16
Bedding	$/head	na	na	na	$0.03	na
Ration	$/head/day	$0.96	$0.96	$0.96	$0.96	$0.92
Labor	$/head/day	$0.15	$0.16	$0.16	$0.16	$0.14
Other nonfeed costs	$/head/day	$0.17	$0.18	$0.18	$0.18	$0.17
Total	**$/head/day**	**$1.65**	**$1.83**	**$1.88**	**$1.84**	**$1.75**
Total	**$/lb. of gain**	**$0.51**	**$0.55**	**$0.56**	**$0.55**	**$0.55**

Table 20. Total Costs for Facilities and Rations–5,000 head capacity

Yearling Steers	Unit	Earthen Lot with Windbreak	Earthen Lot with Shed	Concrete Lot with Shed	Confinement Solid Floor	Confinement Slatted Floor
Facilities ownership	$/head	$15.88	$30.28	$35.70	$31.41	$35.72
Manure handling	$/head	$15.89	$15.89	$15.89	$15.89	$15.89
Bedding	$/head	na	na	na	$7.60	na
Ration	$/head	$173.45	$165.72	$165.72	$165.72	$170.19
Labor	$/head	$20.76	$20.72	$21.09	$20.72	$20.00
Other nonfeed costs	$/head	$31.00	$31.00	$31.00	$31.00	$31.00
Total	**$/head**	**$256.98**	**$263.61**	**$269.39**	**$272.34**	**$272.80**
Facilities ownership	$/head/day	$0.10	$0.20	$0.23	$0.21	$0.22
Manure handling	$/head	$0.10	$0.10	$0.10	$0.10	$0.10
Bedding	$/head	na	na	na	$0.05	na
Ration	$/head/day	$1.09	$1.09	$1.09	$1.09	$1.04
Labor	$/head/day	$0.13	$0.14	$0.14	$0.14	$0.12
Other nonfeed costs	$/head/day	$0.19	$0.20	$0.20	$0.20	$0.19
Total	**$/head/day**	**$1.62**	**$1.73**	**$1.77**	**$1.79**	**$1.67**
Total	**$/lb. of gain**	**$0.51**	**$0.53**	**$0.54**	**$0.54**	**$0.55**

Steer Calves	Unit	Earthen Lot with Windbreak	Earthen Lot with Shed	Concrete Lot with Shed	Confinement Solid Floor	Confinement Slatted Floor
Facilities ownership	$/head	$31.76	$60.56	$71.40	$62.82	$71.45
Manure handling	$/head	$31.77	$31.77	$31.77	$31.77	$31.77
Bedding	$/head	na	na	na	$5.82	na
Ration	$/head	$195.67	$186.91	$186.91	$186.91	$189.66
Labor	$/head	$30.97	$30.92	$31.39	$30.92	$30.00
Other nonfeed costs	$/head	$35.00	$35.00	$35.00	$35.00	$35.00
Total	**$/head**	**$325.16**	**$345.17**	**$356.46**	**$353.24**	**$357.88**
Facilities ownership	$/head/day	$0.16	$0.31	$0.37	$0.32	$0.35
Manure handling	$/head	$0.16	$0.16	$0.16	$0.16	$0.16
Bedding	$/head	na	na	na	$0.03	na
Ration	$/head/day	$0.96	$0.96	$0.96	$0.96	$0.92
Labor	$/head/day	$0.15	$0.16	$0.16	$0.16	$0.14
Other nonfeed costs	$/head/day	$0.17	$0.18	$0.18	$0.18	$0.17
Total	**$/head/day**	**$1.60**	**$1.78**	**$1.84**	**$1.82**	**$1.74**
Total	**$/lb. of gain**	**$0.50**	**$0.53**	**$0.55**	**$0.54**	**$0.55**

Notes

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