K-STATE
Research and Extension

Managing Cows in Confinement

Drought and competition for grazing land force cattle producers to find new ways to feed and manage their cow herds. One option is to move cows off grass, house them in a pen, and feed them in confinement. This publication provides information on culling decisions, diets, housing, and other concerns associated with this practice.

Culling and Cow Decisions

Because feeding cattle in confinement is expensive, it is recommended to only keep cows with the greatest chance of returning a profit. Easy culling decisions include selling old, open (non-pregnant), ornery, bad-uddered, and oddball cows. Oddball refers to animals that are different from the rest. They may be a different color or calve at a different time. If 85 percent of the herd calves in the spring, consider selling cows that calve in the fall.

Dry (nonlactating) cows require the least amount of energy and protein, especially in the first two trimesters of gestation. Consider weaning calves before placing animals in confinement. Calves become easier to wean as they get older, but early weaning provides significant benefits, which include:

- improved cow body condition,
- improved calf performance,
- improved conception rates, and
- more forage available for the cow, reducing the amount of feed required.

Disadvantages of early weaning are increased management of calves and increased cash costs.

Weaning young calves (30 to 90 days old) enables cows to rebreed sooner because energy (calories) previously used for lactation can be reallocated and used to maintain body condition. To achieve a 365-day calving interval, cows should conceive within 80 days of calving. Breeding in confinement provides the opportunity to synchronize estrus for optimal timing of artificial insemination (AI) or natural service. Synchronization increases the number of calves born early and increases weaning weight the following year. In addition, confinement makes it easier to diagnose pregnancy and to cull open cows early. It gives pregnant cows time to adjust to the diet to minimize nutritional stress that may harm embryos.

Early weaning improves preganancy rates, but producers may not choose this option because of calf management concerns. Young calves retain passive immunity from their dams (mothers) but may be finicky eaters that sort diet ingredients, leading to nutrient imbalances. Another option is to wean calves

early and sell at auction. Calves that are at least 90 days old are easier to wean because they are much better eaters. If managed properly, calves that have been weaned early may perform better than nursing calves. After weaning, cows improve or maintain body condition with less feed than those that are lactating.

Limit-Feeding Diets

Consumption and Nutrient Content

Limit feeding is the practice of supplying cattle with a limited amount of a nutrient-dense feed. The goal is to meet cows' energy requirements but to reduce consumption to less than what it would be if animals were given unlimited access to medium-quality hay. Limit-feeding can be used with cows and calves to reduce the amount of feed required while increasing feed efficiency.

Protein is an important but expensive component in limit-fed cow diets. Before adopting this approach, evaluate feed to determine concentrations of degradable proteins, those digested in the rumen, and undegradable proteins, which bypass the rumen and are digested in the small intestine. Be prepared to supplement protein to meet cow requirements. Urea is a source of inexpensive protein that is 100 percent rumen degradable. To maximize protein utilization, the diet must be balanced for rumen degradable and undegradable protein. This balance becomes important when using by-product feedstuffs. Typically, these feeds offer protein primarily in the rumen "by-pass" form. Urea fulfills a specific dietary need by providing a source of protein that is completely rumen degradable. It not only keeps the rumen satisfied, but also complements the high energy diet.

Typically, urea is not offered to cattle on a grazing diet because of the imbalance between protein and energy consumed. In a high-energy, limit-fed diet, this is not an issue. Cows on a high-energy diet should consume dry matter equivalent to 1.5 to 2% of their body weight. Because restricted intake is the main concept of limit-feeding, it is important to test nutrient content of ingredients throughout the feeding period to ensure nutritional requirements are met. Dietary considerations when limit-feeding cows include:

- metabolic disorders associated with high-concentrate diets,
- mineral supplementation,
- roughage requirements, and
- adaptation to the diet.

Grains can be used for energy in limit-fed diets, yet there is a possibility of inducing digestive and metabolic disorders. The starchy component of the grain can lead to the disorders of bloat, acidosis, and founder. To manage these disorders, feed starch-free, high-energy products such as distiller's grains, corn gluten feed, wheat middlings, rice meal, brewer's grains, and soy hulls, or minimize the amount of high starch ingredients in the diet.

Another way to prevent acidosis and bloat is to feed cows an ionophore (a substance that transports particular ions across a cell's lipid membrane). Ionophores also reduce the amount of feed needed to meet maintenance requirements by 7 to 10%. Currently, monensin is the only ionophore approved for use in reproducing cows. It should be fed at a rate of 100 to 200 milligrams per head daily.

Producers who do not have facilities to handle bulk grain and other commodities can use commercial feed available in ⅜- or ¾-inch (range) cubes as long as they meet nutritional requirements. Range cubes are designed to be fed with hay at 0.5% of an animal's body weight and may not be appropriate as the sole energy and protein source. Determine the range cube's

quality and nutrient profile before feeding. Consult a nutritionist or your local K-State Research and Extension agent to determine proper feeding rate.

Mineral Supplementation

Evaluate mineral composition. Limit-fed diets, which typically consist of by-products and grains, may not provide all required nutrients. Grain products tend to be low in calcium and high in phosphorus, potassium, and sulfur. In contrast, pasture-based diets tend to be low in phosphorus, requiring producers to supply cattle with a high-calcium mineral to meet requirements. Work with a nutritionist to balance the calcium-to-phosphorus ratio to between 1:1 and 6:1. Provide a well-balanced vitamin and trace-mineral package to supplement limit-fed diets, which typically contain minimal green forages. Green forages are often great sources of important minerals and vitamins.

Roughage

To maintain rumen function, a cow must consume a minimum amount of roughage. Typically a minimum roughage requirement for cows in a limit-fed diet is 0.5% of the cow's body weight as hay or silage (on a 90% dry matter basis). For example, a 1,300 pound cow should receive at least 6.5 pounds of roughage per day. Research from Oklahoma State, suggests feeding long-stemmed hay amounting to 0.25 to 0.5% of an animal's body weight. When returning cows to pasture and a "normal" management system, keep in mind that limit-fed cows may consume less forage.

Diet Adaptation

To minimize digestive upsets, move cows from a forage diet to a high-grain diet gradually over a two-week period, feeding animals at the same times every day. Although it is preferable to feed several times a day, feeding once is okay if there is enough bunk space for all cows to eat at delivery time. Observe cows daily for signs of digestive upset and other health disorders. When cows approach the bunk, score them on body condition and adjust diets accordingly. This helps maintain proper body condition based on the cow's stage of production.

Pen considerations

Limit-Feeding Confinement

Pens used to limit-feed dry cows can be designed to meet various production stages, weather conditions, and flooring types. Cows require between 125 and 700 square feet of pen space. If smaller cows (1,000 to 1,200 pounds) are housed in a well-drained, hard-packed, typically-dry feedlot pen, for example, they will need at least 125 square feet per animal in dry conditions and 250 square feet per animal during wet conditions. Keeping cows and calves together requires more pen space. Start with a minimum of 400 square feet per pair in lots that are dry and add space as calves grow. Regardless of feeder or bunk type, each cow needs 24 to 30 inches of bunk space, and horned cattle even more. Fences should be sturdy enough to withstand a mature cow rubbing and reaching under the fence for grass.

Regardless of facilities, water is the main concern because it is the number one nutrient for cattle. Each cow consumes 15 to 20 gallons per day. You must able to provide a continuous supply of water for the number of animals in the pen. During the summer, water consumption usually peaks in early afternoon. Table 1 shows estimated daily water requirements for cattle.

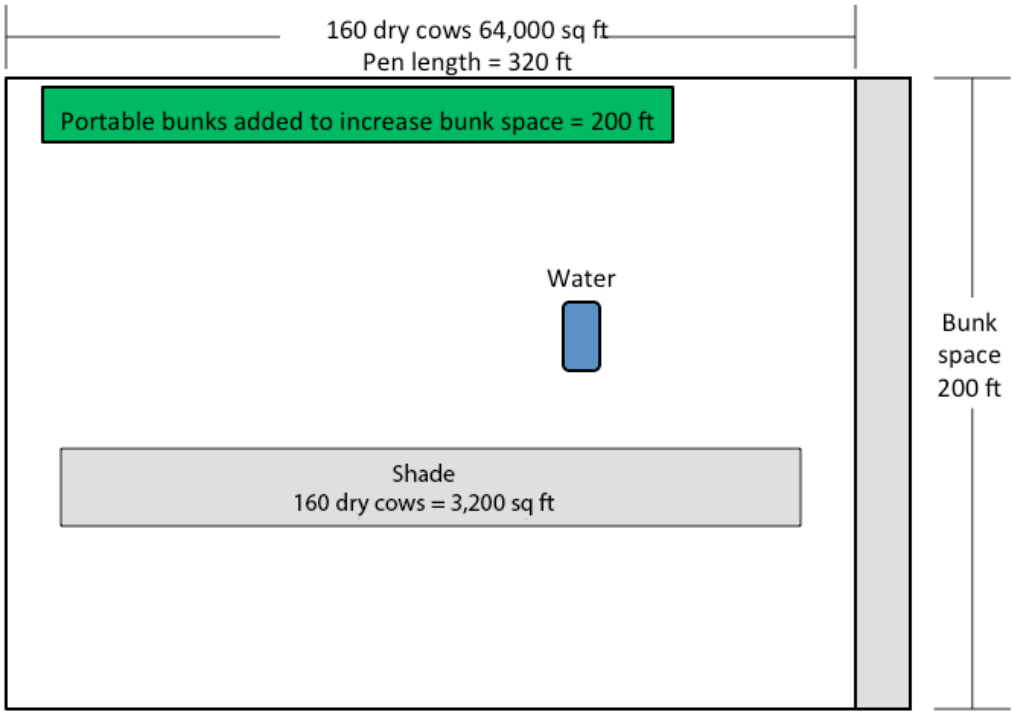
Table 1. Estimated daily water intake of cattle in gallons[1].

Daily High Temp (F°)	Cows Nursing Calves[2]	Dry and Bred Cows	Bulls	Growing and Finishing Cattle			
				400 lb	600 lb	800 lb	1,000 lb
35	11	6	7	4	5	6	8
50	13	7	9	5	6	7	9
65	16	8	11	6	7	9	11
80	18	11	13	7	9	10	14
95	20	15	20	11	15	17	19

[1]Table originally published by S. Gadberry (Univ of Arkansas), adapted from a table by P.Q. Guyer (Univ of Nebraska).
[2]First four months of lactation.

If existing structures and pens do not provide enough bunk space, portable bunks can be added. Figure 1 shows how to modify an existing confinement pen to house a large number of cows by attaching portable bunks to the fenceline. Provide shade to minimize heat stress. Plan on 20 to 25 square feet of shade per head, placing the shade in the middle of the pen for continuous protection throughout the day. Confinement pen space calculations (Figure 1) are based on 400 square feet per cow.

Figure 1. Confinement pen design.

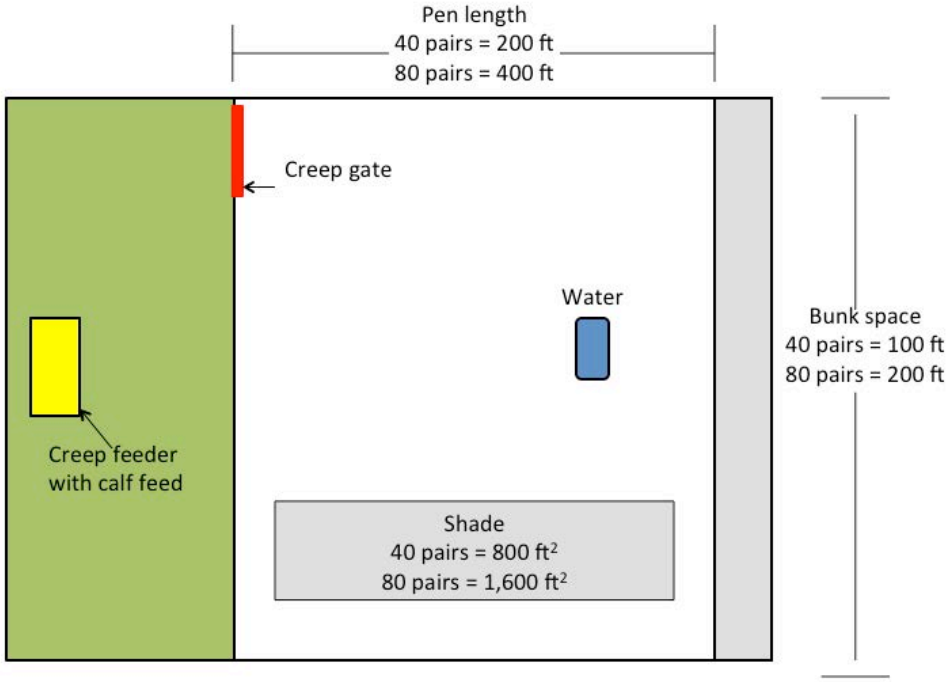


This confinement pen provides enough pen space for 160 pairs (400 sq ft/dry cow). Animal capacity is calculated by taking the area of the pen (200 ft x 320 ft = 64,000 sq ft) and dividing by the amount of space needed per cow (64,000 sq ft /400 sq ft = 160 dry cows). To determine if existing bunk space is adequate, determine the total feet of bunk space needed for the cows. Divide by the bunk space requirements for the number of head in the pen (160 dry cows x 30 inches per cow bunk space ÷ by 12 inches (1 ft) = 400 ft of bunk space). Because there was only 200 ft of bunk space in the original pen, another 200 ft of portable bunk space should be added to maximize use of a pen this size.

Semi-confinement

Semi-confinement feeding pens should provide at least 500 square feet per animal. Bunk space, 24 to 30 inches, is the same as confinement pens. The fence next to the pasture or paddock should be sturdy because cows may try to escape to pasture. The creep gate or panel should allow calves to pass freely in and out of the pen but not allow even the smallest cows to escape. Place a creep feeder in the pasture as a bunk for calves because it is the right height. Water access and other concerns are the same for semi-confinement as for limit-feeding. Calves must have access to water. Begin to offer water to calves at three to five days of age. Place a calf waterer in the pasture if necessary or make sure calves can get to ponds. Figure 2 shows a semi-confinement pen design.

Figure 2A. Semi-confinement pen design.



Figures 2A and 2B show a semi-confinement pen design with room for 40 or 80 pairs, based on 500 square feet per cow. Bunk space calculations are for cows only because a creep feeder is available for calves. The pasture is the best location for the creep feeder. Creep gates or the panel that allows calves to escape to the pasture should be sturdy. Consider placing one end of the panel at the corner post and securing the other end with reinforced pipe so cows cannot push down the gate or panel (Figure 2B).

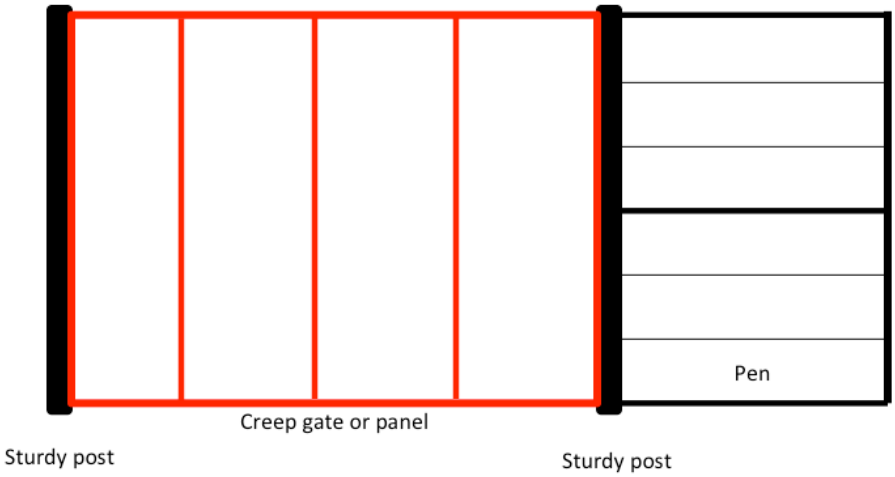


Figure 3. Options for sacrificing an acre of pasture for confinement opportunities.

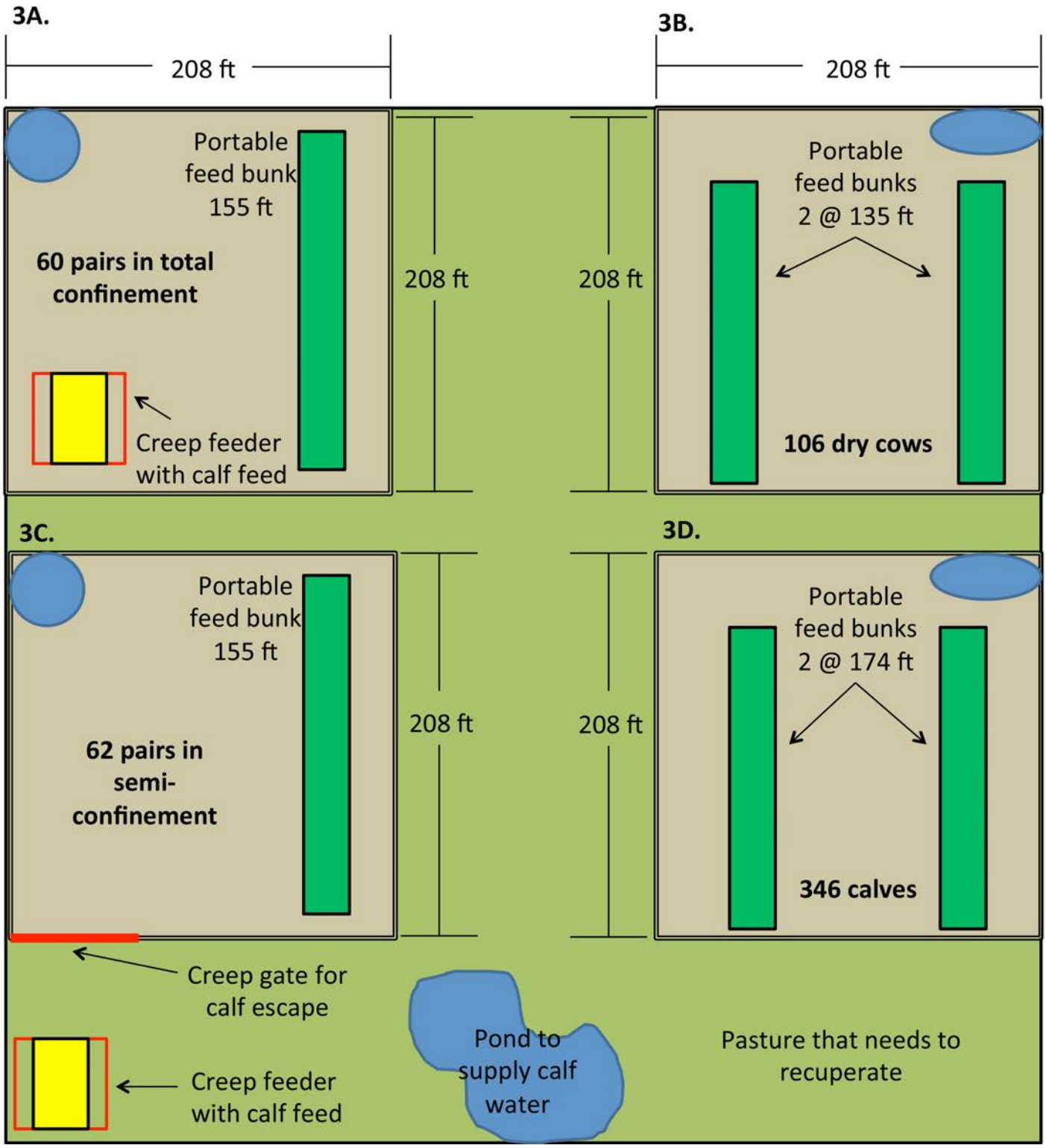


Figure 3A. Based on 700 square feet per cow, 62 cow-calf pairs can occupy 1 acre, but with bunks, creep feeder, and water trough taking up loafing space, 60 pairs is more realistic. Because this area is a portion of pasture, bunks should be provided along with a water source, if not installed when the pen was built. Figure 3B. Again, based on bunks and waterers, it is best to place 106 dry cows on 1 acre (400 square feet per cow). Figure 3C. Because the creep feeder is placed in the pasture outside the pen, 62 pairs can occupy a semi-confinement pen (based on 700 square feet per cow). Because calves will be the only animals on pasture, they are allowed to escape to gain access to shade trees and ponds.

Sacrificing a portion of pasture

To keep cows on-farm, the producer can sacrifice pasture to reduce grazing pressure. Grass will probably not come back in that portion of the pasture unless it is reseeded. Figure 3 shows various arrangements for an acre of ground. If a water source already exists, delivery plans will not have to be implemented. If not, a waterer will require additional space and pen size may need to be increased. Bunk and pen space calculations for sacrificing pasture are the same as they are for limit-feeding. Pairs, dry cows, and weaned calves can all be managed the same way. When placing cow-calf pairs in confinement, place a creep feeder with a ration for calves either in the pen (total confinement) or in the pasture (semi-confinement) to serve as "bunk" space.

Cattle concerns in confinement

Regardless of feeding system, it is important to sort cattle into uniform groups by weight, size, age, or body condition. Age becomes important in limit-feeding cows because younger cows typically are less aggressive than older cows about eating at the bunk. Sorting animals by body condition score enables you to offer different diets based on the goal of increasing, decreasing, or maintaining body condition. Sorting increases the operation's efficiency.

Limit-fed cattle may appear gaunt and act as if they are hungry. Regardless, resist the temptation to feed more than the predetermined amounts because diets have been balanced to offer the exact amount of energy and protein needed to maximize efficiency. Within a couple of weeks, cows or calves should adapt to the reduction in dry matter intake, and physical responses such as vocalization and pacing should decrease. Cows may still appear gaunt and lose weight because of rumen fill, especially if shrink was not considered in the first weighing. During the first couple of weeks after being placed on a limit-fed diet, cows have been known to act hungry enough to eat bark off trees and paint off of fences.

Limit-feeding makes bunk management easier because all feed is consumed daily, eliminating the need to clean bunks. Another benefit is that with less feed consumed and greater feed efficiency, cows produce less manure, which reduces feed and manure handling costs. Lower feed intake also means cows produce less heat, which helps minimize heat stress.

Disadvantages and concerns with limit-feeding cows include weather fluctuations, machine malfunctions, and thin cows. Because limit-fed cows produce less heat, consider increasing feed by 10 percent during the winter to provide enough feed to generate body heat for the cow. Another concern is that in the event of mechanical failure, late delivery of feed ingredients, and natural disasters, feeding schedules may be altered requiring you to go through the step-up process again to return cattle to the limit-feeding program. Limit feeding might not be the best management option for producers without a history of timely feeding. Thin cows might not be the best cows to place in a limit-fed system, unless they can be grouped and given more bunk space to reduce competition for feed.

Summary

Limit-feeding cows in confinement is a way to retain cows when pasture is depleted, increase feed efficiency, and reduce production costs. Consult with your veterinarian to develop commingling vaccination programs for cows and to discuss potential health concerns of early weaned calves. For more information, contact your local K-State Research and Extension agent or area livestock specialist.

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