Driftless Region
Beef Conference

Proceedings

February 4–5, 2016

Grand River Center
Dubuque, Iowa

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NORTH CENTRAL SARE
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Lameness disorders in cow/calf and feedlot cattle

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Common causes of lameness in cows and bulls

There is very little scientific data on the incidence of lameness in cow/calf operations; however observation and anecdotal information indicates that the occurrence of lameness in cow/calf operations is less frequent compared to the feedlot environment. Lameness disorders encountered in beef cows and bulls are frequently associated with injuries secondary to mounting and fighting behaviors. They may also occur due to accidental injury from slips and falls, or management and transport-related activities associated with handling, loading and unloading. Long bone fractures and subluxations of the hip and injuries to ligamentous structures of the stifle are not uncommon and may result in the need to slaughter or euthanize affected animals.

Foot problems have multiple underlying causes. The most common infectious conditions are foot rot and digital dermatitis. Conditions occurring secondary to metabolic diseases and mechanical factors are sole ulcers, white line disease and traumatic lesions of the sole associated with penetration by foreign bodies or thinning of the sole. Claw lesions predisposed by heritable, genetic or developmental factors include screw claw and vertical and horizontal wall cracks.

Corkscrew claw (otherwise known as screw claw)

Corkscrew claw is most commonly observed in the lateral claw of the rear leg in cattle older than 3-5 years of age. It is observed in all breeds of cattle and most consider it to be a heritable condition. However other factors such as age, previous claw disease and housing conditions are believed to influence its occurrence. It is characterized by rotation of the toe that displaces the sole, axial (inside or medial) wall and white line in an axial direction.

Figure 1. Corkscrew claw in a red Angus cow.

There are a couple of important abnormalities present in the heritable form of this condition: 1) a misalignment of the second and third phalanges and 2) a long and narrow third phalanx (pedal bone) that has an abaxial (outer or lateral) to axial curve. This curving of the claw and its internal structures results in weight bearing on the mid to caudal (rear) portion of the outer or abaxial wall. The corkscrew claw is also normally larger and bears the majority of weight in the foot. As a consequence, the inner claw frequently atrophies (gets smaller) from the lack of weight bearing. These abnormalities contribute to a greater potential for white line lesions in the abaxial region of the toe since the corium is likely to be in an abnormally close proximity to the weight bearing surface in this region. In addition, white line horn in this region is frequently weaker and more easily compromised by external factors. Trimming generally requires great care as it is quite easy to expose the corium in this region during the trimming process. Overgrowth of the corkscrew claw is common and often predisposes to the development of sole ulcers as a consequence of elevated weight bearing.

Lameness in feedlot cattle

A review of records from five western feedlots found that 13% of 1,843,652 animals treated for health problems. Of these, lameness accounted for 16% of health disorders and 5% of deaths. Closer inspection of these data indicated that lameness was responsible for 70% of all sales of non-performing cattle and that the salvage value of these animals was only 53% of the original purchase price. Seventy percent of lameness disorders involved foot problems, 15% upper leg conditions, 12% septic joints and 3% injection site lesions. Foot problems were primarily due to mechanical injuries from handling equipment, foot rot and traumatic lesions of the sole from excessive wear.

Griffin et al. reported that most cattle are pulled for limping or lameness, given a diagnosis of foot rot and treated with a long-acting antibiotic or combination of antibiotics “Griffin et al. (1993)”. The primary reason for this is the difficulty associated with examining and treating a foot in the traditional restraint facilities popularly encountered in feedyards. This antibiotic treatment strategy normally results in a lengthy withdrawal period. Possibly more important is the fact that observation indicates that less than 10% of lameness in feedlot cattle is actually due to foot rot. Few operations are aware of the costs incurred from an inaccurate diagnosis and treatment of a condition for which antibiotic therapy cannot possibly be effective (deep digital sepsis conditions, injuries, white line disease, toe lesions and more). Beyond being ineffective and costly is the concern that these types of treatment practices risk increasingly greater scrutiny regarding drug use in livestock production. The importance of an accurate diagnosis prior to instituting treatment is essential for the achievement of a successful outcome.

Foot rot

Footrot is an infectious disease of the interdigital skin characterized by the presence of an interdigital lesion, swelling, and moderate to severe lameness. Fever ranging from 103-105oF (occasionally higher) is a consistent finding during the acute stages. Although evidence is inconclusive, most believe that footrot develops following injury or abrasion of the interdigital skin. This interdigital injury is secondarily infected by a combination of bacterial organisms which encourage progression to a more severe and necrotic-type of lesion. Failure to institute treatment early in the course of the disease may lead to complications involving the adjacent soft tissues (joints, tendons, tendon sheaths, and bone) ultimately resulting in deep digital sepsis. At this stage, response to medical therapy is quite often unrewarding, thus limiting one's options to either surgery, or possibly euthanasia, in particularly severe cases.

Fortunately, foot rot is susceptible to treatment with most antibiotics in common use for cattle. In fact, dose and duration of treatment are likely more important than antibiotic selection. The key to achievement of a successful therapeutic outcome is dependent upon prompt recognition and early implementation of treatment procedures. Systemic antibiotic therapy plus topical treatment of the interdigital lesion have long been the preferred methods of treatment. In uncomplicated cases, improvement is noticeable within 24-48 hours with good recovery attainable in 3-4 days from the onset of treatment.

Digital dermatitis

The lesions of digital dermatitis (DD) typically occur on the skin of the plantar aspect of the rear foot on the skin adjacent to the interdigital cleft, on the interdigital skin or at the skin-horn junction of the heel bulbs. On front feet lesions are often found bordering the dorsal (front) interdigital cleft. Lesions are often circular or oval with clearly demarcated borders. Hypertrophied hairs often surround the lesion borders and should be distinguished from epithelial outgrowths that look like long hairs extending from the surface of chronic lesions. Chronic lesions without these epithelial outgrowths are generally thickened and have a granular surface.

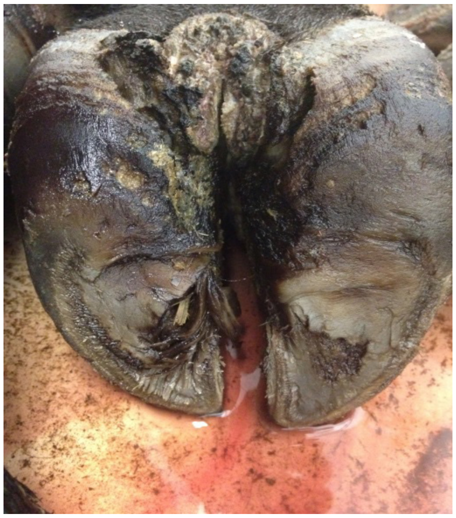

Figure 2. Digital dermatitis affecting the plantar interdigital cleft. Note the thickened skin and undermined horn on both heels from heel erosion that commonly accompanies these lesions.

Lesions are very tender and even a mild disturbance of the inflamed tissue tends to result in extreme discomfort and mild to moderate bleeding. Cows will alter their posture and/or gait to avoid direct contact between lesions and the floor or other objects. This is often one of the earliest visual indicators of a DD lesion. These pain avoidance adaptations also lead to abnormal wear of the weight bearing surface of affected claws. As a result, when lesions are on the back side of the foot, animals will walk on their toes and the heel becomes abnormally long.

Numerous studies have demonstrated a response to topically applied antibiotic treatment. In fact, topical treatment is more effective than systemic therapy (i.e. by injection of antibiotics). Response to topical treatment is rapid with most animals showing remarkable improvement within 24 hours of treatment. On the down side, studies also show that remission of the disease is short-lived and that reoccurrence is common. The use of a walk-through footbath is the most practical method for treating large numbers of animals. Various compounds have been used the most common being copper sulfate (5-10%) and formalin at 3-5%.

Figure 3. A white line lesion in the toe that has resulted in a toe abscess. Treatment requires paring out the loose undermined horn adjacent to the lesion.

Foot problems associated with metabolic disease and mechanical factors

Sole, heel and toe ulcers, white line disease, traumatic punctures of the sole or lesions caused by excessive wear are important causes of lameness in feedlot cattle. They are predisposed by metabolic diseases such as laminitis and mechanical factors such as abrasive flooring conditions in alleyways and chutes that accelerate hoof wear. If left untreated claw disorders can progress to more complicated lesions that may require surgical correction or in the worst case scenario euthanasia.

Treatment of these conditions requires corrective trimming with a hoof knife and possibly application of a foot block to the healthy claw to relieve weight bearing on the damaged claw. Good restraint is essential for conducting these procedures. Systemic antibiotic therapy without corrective trimming to remove necrotic horn and provide drainage of the abscess is of little or no value in treatment of claw lesions.

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Developmental programming: How cow nutrition and management during pregnancy impact calves long-term

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Introduction

We know that genetics and environment both contribute, often through their interaction, to phenotypes such as growth, health, fertility, and carcass quality. As our tools for genetic selection improve, it is critical that we manage animals appropriately to allow them to express their genetic potential. This is especially true when it comes to nutritional management, and a growing area of research known as "developmental programming" or "fetal programming" has shown us that in order to produce cattle than meet their genetic potential, proper nutrition is essential beginning at conception.

Developmental programming is the theory that the environment an animal is exposed to early in life, especially during the prenatal and pre-weaning periods, affects its development and has lasting impacts on its health and performance. Producers have long known that keeping pregnant cows well-nourished and healthy is important for the successful birth of live, healthy calves. Despite this, beef cows often are fed low quality hay or pasture during gestation, which may not meet the dam's nutrient requirements for maintenance and growth of the fetus. Research on developmental programming in beef cattle is a growing area that demonstrates the importance of providing proper nutrition during gestation to allow for optimal fetal growth and development.

Nutrient demands of pregnancy

Beef cow nutrient requirements increase dramatically in mid- and especially late gestation due to rapid fetal growth (NRC, 2000). For example, the energy requirements (NEm requirements) of a 1200 lb beef cow increase from 9 Mcal NEm/day on day 120 of gestation to 13.5 Mcal NEm/day on day 270 of gestation (Figure 1). During this time, the proportion of total energy requirements that goes to fetal growth increases from less than 4% at day 120 to 38% on day 270 of pregnancy. Protein requirements increase similarly to energy requirements during pregnancy. Thus, when weaning occurs and nutrient requirements decrease because lactation ends, nutrients needed for gestation and fetal growth increase.

Early lactation is the most nutrient-demanding time of a mature cow's life, as energy and protein requirements increase from calving through peak milk. This is why as producers, we typically take this into consideration and provide higher quality forage or feed for early lactating females.

Furthermore, growing females (especially first- and second-calf heifers), require additional energy and protein for their own growth during both gestation and lactation. Cold stress can also greatly increases energy requirements (but not protein requirements), and can cause pregnant or lactating cows to be in a negative energy balance during winter and cool, wet springs.

Critical periods of development

Cows that do not consume enough nutrients during gestation will partition nutrients to the developing fetus, even utilizing body stores of fat and protein to protect the fetus, but this has its limits. When nutrient requirements are not met during gestation or nutrients are diverted to growth (growing heifers) or lactation (early gestation), fetal growth may be impaired. The effects of this vary based on the specific periods during fetal and neonatal life in which this nutrient restriction occurs.

The first weeks after breeding are important for embryo development and recognition of pregnancy by the cow. The placenta, or site of fetal and maternal attachment and nutrient and waste exchange during gestation, begins to develop during this period also, then has rapid growth in early to mid-gestation. The organ systems of the fetal calf form and begin to develop during early to mid-gestation, and then grow rapidly as the calf increases growth in late gestation. The time immediately around birth and early calf life are both important for the final maturation of organs to prepare the calf for life outside of its dam.

Recent research indicates that nutrition during gestation impacts milk production of the cow and ewe as well, even when her nutrient requirements are met postpartum. This means that effects of nutrition during pregnancy can extend past calving and decrease the amount of quality of milk produced, further affecting calves. We have also long known that nutrition of lactating cows greatly impacts milk yield and quality as well. Thus decreased nutrients available in milk for calves can be caused by cow nutrition pre- and postpartum.

Impacts on calves

Depending on what nutrients are restricted during pregnancy (e.g. all nutrients, protein, energy, minerals, etc.), and the period in which this restriction takes place, calf growth, development, health and performance can be greatly affected. Calves from dams that have been nutrient restricted during late gestation typically have decreased fetal growth, which may result in lighter birth weights. These lower birth weights are not necessarily good, however; low birth weights can mean poor development, increased sickness, and possibly death loss.

Although many producers strive for low birth weights to decrease dystocia, decreased birth weights caused by poor cow nutrition are not a good way to accomplish this. Calves that have not reached their genetic potential for birth weight may have had poor development, be immature at birth, and are often not ready to face the challenges of life outside of the uterus. This is especially concerning when calving in cold conditions.

Whether birth weight has been decreased or not, nutrition of the dam during gestation can affect pre- and post-weaning growth of calves. This leads to decreased weaning weights, heifer weights at breeding, and steer slaughter weights because of reduced average daily gain. Additionally, feed efficiency has been altered in some calves due to nutrition during gestation.

Altered growth and feed efficiency are not the only results of nutrient restriction during pregnancy, however. Nutrition during gestation can affect many important organ systems in the body, which decreases or changes their functions in the animal. These changes that have been observed in beef cattle research include decreased carcass weight and yield, reduced marbling and carcass quality, decreased heifer reproductive performance, and poor health after birth and into the feedlot (summarized in Table 1). Although many of these impacts have come from poor nutrition of cows during late gestation (approximately last 90 days of pregnancy), some have also been observed with poor early- and mid-gestation cow nutrition. Although much more research is needed to determine why these effects are present and how they may be reversed, it is apparent that nutrition of cows during pregnancy has many effects on calves.

Summary

Developmental programming occurs in beef cattle, often because of maternal nutrient restriction during the critical periods of fetal or calf growth. Calf growth, health, reproductive performance, and carcass quality can be negatively affected. Additionally, milk production of the dam may be impacted by nutrition during pregnancy, having further effects on nursing offspring. Nutritional management of beef cows should allow them to meet the increasing nutrient requirements due to fetal growth during gestation to prevent negative effects on calves.

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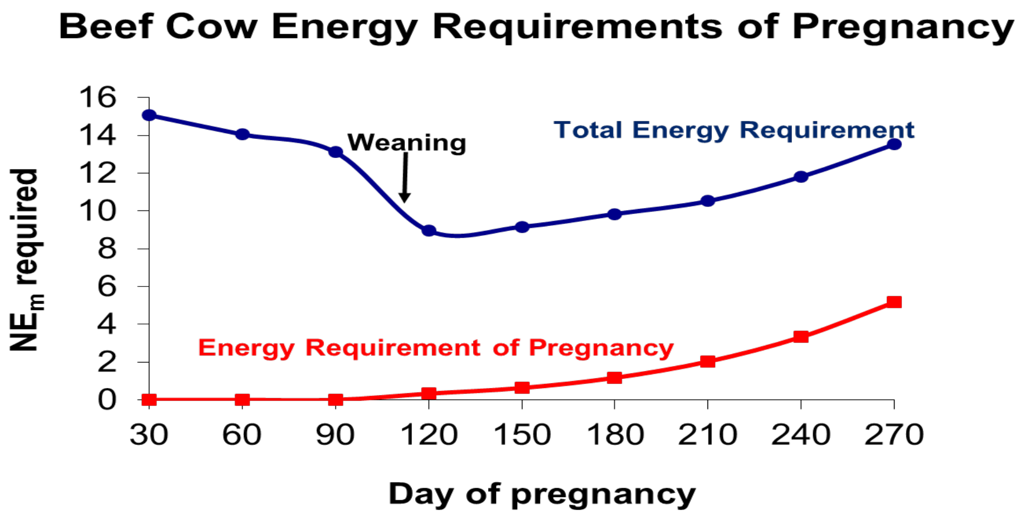

Figure 1. Beef cow energy requirements of pregnancy (adapted from NRC, 2000)

Table 1. Impacts of Nutrition during Pregnancy on Calf Performance*

Trait affected	Effects of altered nutrition during pregnancy
Growth traits	Decreased average daily gain Decreased weaning weights Decreased breeding weights Decreased slaughter weights Altered feed efficiency
Carcass composition	Decreased hot carcass weight Decreased muscle mass Decreased marbling and quality grade Altered tenderness
Reproductive performance of daughters	Increased age at puberty Decreased conception and pregnancy rates Altered hormone production Decreased milk production
Health	Increased calf sickness Increased feedlot morbidity

*Data summarized from Caton and Hess, 2010; Du et al., 2010; Funston et al., 2010; Meyer et al., 2012, and Wu et al., 2006

Remodeling retired dairy barns for beef housing

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Introduction

There are a large number of dairy farms in the Midwest that are not milking cows, but might like to continue to raise dairy beef animals on the farm. The existing dairy barn or other sheds on the farm with some remodeling could accommodate that need. New functional designs for dairy beef housing and feeding or cattle handling could adopt the use of new appropriate technology.

In particular the one or two story dairy barn on the farm may still be standing and in good condition. The building shell may still have some useful life for a different housing and feeding system for dairy beef. This paper was developed to address some of the possible uses for the dairy barn and other sheds that might be on a farmstead to raise or handle dairy beef of various stages of growth.

There are several options for using the barn in a new type of system for housing, feeding, or handling dairy beef cattle. These uses might include:

- Weaned Calf Housing
- Growing Cattle Housing
- Finishing Cattle Housing
- Cattle Handling Facility

Typical dairy barn construction

Many older two story barns were designed as timber frames structures with posts and beams supporting the building shell walls, hay mow floor, and roof system. The barn foundation walls were usually constructed with stone or concrete block. The timber frame or wood stud frame second story was placed on top of the foundation wall and was typically used for hay storage. Figure 1 shows a plan and cross section view of a two story barn with two rows of posts, longitudinal beams and ceiling (hay mow floor). Figure 2 shows a photo of the interior lower level of a two story barn.

Two story dairy barns are typically 28'-32' wide. The outside walls and two longitudinal (king) beams divide the barn width into approximately thirds. Each king beam is supported by a row of posts spaced approximately 7'-8' on center within the row. Wood ceiling joists are supported by the king beams and walls which in turn support the hay mow floor deck. Hay was usually stored in the second story above the cows housing space. The hay mow floor is also the ceiling of the lower level of the barn which was housed the cows.

Figure 2. Interior Photo of Two Story Dairy barn with two rows of posts and beams.

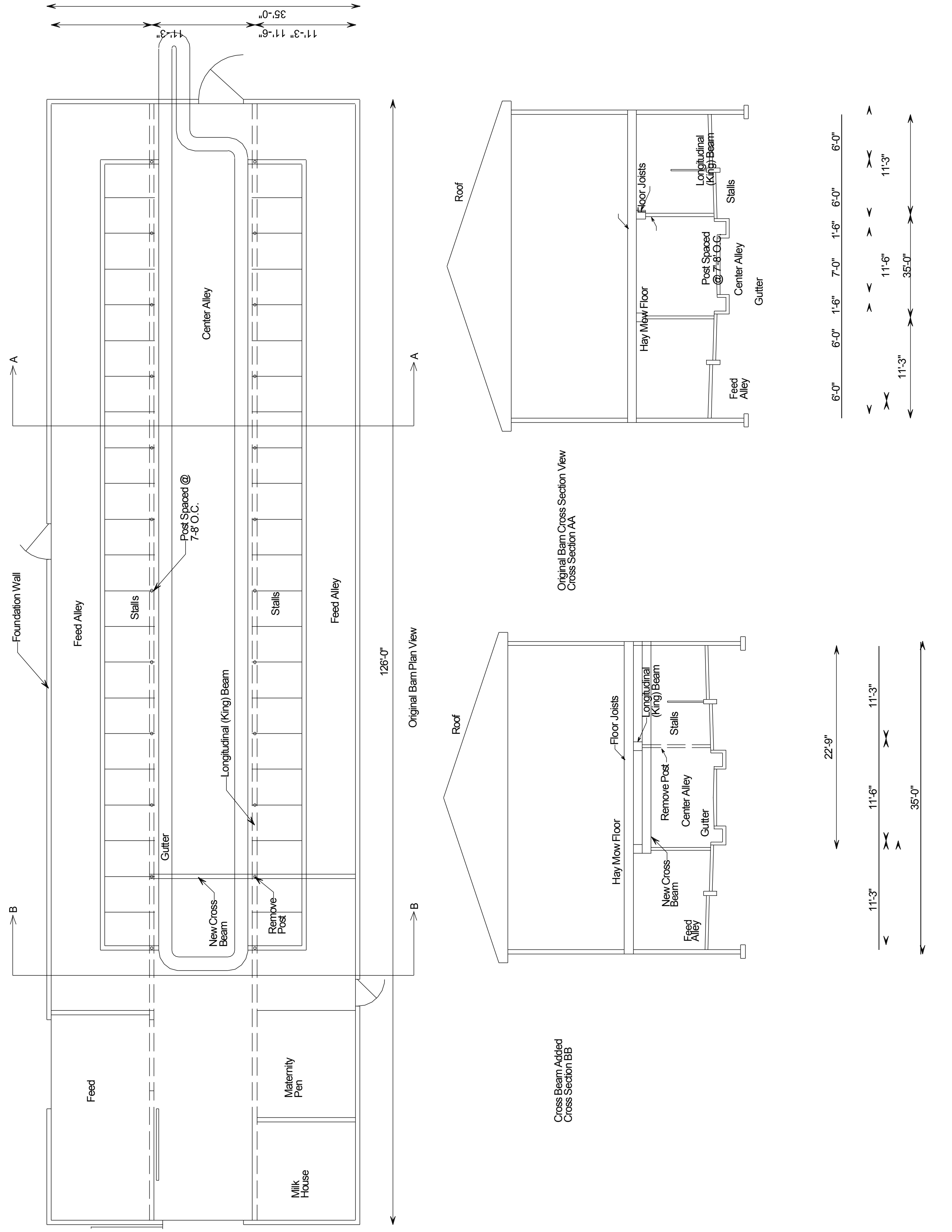

Figure 1. Typical Tie/Stanchion Stall Dairy Barn Design

In the case of a timber frame structure, the posts, king beams, and mow floor are an integral part of the structure of the barn. Removing or changing the arrangement of these components may compromise the entire structural integrity of the building. Newer two story barns have posts and beams supporting the mow floor, but the second story walls and building roof may be supported on the perimeter walls and foundation.

Since many two story barns no longer use the second floor or hay mow space for hay storage, the hay mow floor may not need to carry the load it once did. In this case moving a few posts a short distance within the row to accommodate a new interior layout may be possible assuming the beam and mow floor can carry the intended loads. On the other hand moving posts too far apart or removing posts effectively increases the span of the king beam. This may not be reasonable and/or require engineering analysis to determine the new loading conditions and determine if the king beam can handle the new loading conditions and increased span.

Moving the king beam and increasing the span of floor joists also may not reasonable and/or require engineering analysis. Floor joist may not be long enough to span the distance or may not be the correct size to carry the intended loading. An engineer or company that straightens or raises old barns should be consulted if any major structural changes are planned for the barn. In some cases cross beams can be used to span the barn width to carry the load of removed post that supported the king beam. See Figure 1. This option can span areas where the functional layout requires additional width or the existing posts are in the way of the desired layout.

Single story dairy barns are typically slightly wider (32'-36') with a concrete block, wood post or stud wall foundation walls which in turn support a clear span truss. This type of construction eliminated interior posts and provides much more design flexibility. The lower chord of the truss was usually lined with steel or plywood and insulated to provide a ceiling for the cow housing. There was usually no storage above the ceiling.

First floor ceiling heights range from 8'-9' in most barns and may be less than that in some older barns. Sidewall openings in dairy barns usually included 7-8' wide end wall doors in the center ally, window openings in the sidewall, and several walk doors for cattle access out the side of the barn. Each of these openings uses a header to support the opening below it. It may be possible to increase the opening width but that would require a larger header to be placed above the opening.

Evaluating the barn for a new use

Consider objectively if the new use of the barn can provide suitable ventilation, manure handling, feed handling, and animal handling systems in the design. Just because it was well suited as a dairy barn does not necessarily mean it is going to function well as a dairy beef cattle barn. The barn site, orientation, building dimensions, and ability to adopt new technology should be considered. The location of the barn should provide access for cattle loading and unloading if that will be one of its primary uses.

Additional improvements in the area around the building may also be required to provide convenient manure collection and handling, feed equipment access, or cattle loading access. Outside lots should also be evaluated to determine how best to handle barn yard lot runoff from rain and snow fall adequately and in an environmentally friendly way. In some cases the existing barnyard lot runoff system may be suitable, but it may require some redesign to meet a larger animal capacity from what it was originally designed to handle.

The ventilation system can be evaluated and or redesigned to meet the needs for larger or different animal group requirements. Both the inlet system and fan capacity and placement may need some redesign. Mechanical ventilation will likely be needed to provide reasonable air quality in the barn. Either positive or negative pressure systems with designed inlets or outlets can be used. In many situations a positive pressure system may be more appropriate to allow the space design desired. Table 2 has design information to determine ventilation capacity.

The building structural features should be assessed to determine if they will suit the needs of the new design. These include the:

- Foundation and walls
- Structural frame
- Post spacing
- Headers over openings
- Electrical and plumbing

The foundation walls should be evaluated to determine if they are in good condition. Repairing cracked, leaning or otherwise damaged foundation walls can be an expensive proposition and should be considered carefully. The structural components such as purlins, joists, headers, posts, beams, and walls should be evaluated to determine if they are of suitable size and condition to serve a new use.

The ceiling height should allow for equipment access for manure handling, and feeding if desired. Door and window openings can potentially be easily increased in width with new headers. But if the ceiling is too low to get the skid steer into the barn for cleaning pens, the alternative of raising the ceiling may be cost prohibitive.

Interior concrete floors will not likely be used in their current condition or layout. A skid steer with a jack hammer can make short work of old concrete. When in doubt it is probably better to tear concrete out than to try and save it. Many farms live with inadequate slopes and poor drainage for the life of the building because they thought they could save some of the old concrete that should have been removed.

The electrical service capacity should be evaluated to determine if it will meet the needs of the new use. Plumbing and drain lines should be evaluated to determine if they can handle the water flows and allow the use of frost free water systems. While the old concrete is removed, it may be simpler to bury water lines underground rather than to try and protect above ground water lines from freezing.

It is assumed in this discussion that the dairy barn or shed:

- Is structurally sound
- Is in a suitable location
- Has an adequate space (width, length, height) to accommodate the new design
- Will require minimal structural changes

Economics of remodeling the structure

As a general rule if the cost of remodeling a dairy barn or shed exceeds two thirds to three quarters of the cost of a new building for the same use, it may be wiser to consider the new building over the remodeling. Obtain an estimate for the cost of a new building to serve a similar function using a similar footprint plan to help make the decision to remodel or build new.

Planning the space

The new facility plan should consider:

- Environmental needs of the animal group
- Animal traffic patterns
- Labor Savings
- Adoption of new modern technology
- Convenient materials handling (manure, bedding, and feed)
- Capital cost

Functional space planning should account for the space and environmental needs of the animal and the labor saving systems for the owner. The design should allow the adoption of appropriate technology for feeding, ventilation, cattle handling, manure handling and storage. The space plan will determine the capacity of the barn for a particular use. Table 1 has summary design information to develop the space needs for various sizes of cattle. Table 2 is used to develop a ventilation system design for the animal groups housed in the barn. Table 3 has summary design information to develop the space plan for cattle handling systems. The following discussion show several examples of how a barn can be remodeled for various uses.

Table 1. Summary Design Information (MWPS-6 Beef Cattle Handbook, 1987)

	Animal	
	Calves 400-800 lb	**Finishing 800-1200 lb**
Open Lot Resting Space		
Unpaved lot without Mound Space	300-600 ft^2/animal	400-800 ft^2/animal
Unpaved Lot with Mound Space	150-300 ft^2/animal	250-500 ft^2/animal (includes mound space)
Mound Space	20-25 ft^2/animal	30-35 ft^2/animal
Paved Lot	40-50 ft^2/animal	50-60 ft^2/animal
Sheltered Resting Space		
Bedded Resting Space with lot	15-20 ft^2/animal	20-25 ft^2/animal
Bedded resting space without lot	20-25 ft^2/animal	30-35 ft^2/animal
Feeding Space		
Self fed (grain)	3-4 in./ animal	4-6 in./animal
Self fed (roughage)	9-10 in./ animal	10-11 in./ animal
Once per day ration	18-22 in./ animal	22-26 in./ animal
Twice per day ration	9-11 in./animal	11-13 in./ animal
Bunk wall throat height	18 inches	20 inches
Water Space		
Perimeter length per animal	¾ inches per animal	
Number of animals per water location	25	20
Gallons capacity per animal-day		
Hot weather	8-15	15-22
Cold weather	4-7	8-11
Daily Manure production	0.4-0.8 ft^3/ animal	0.8-1.2 ft^3/ animal

Table 2. Ventilation Design for Dairy Beef (MWPS-6 Beef Housing Handbook, 1987)

	Cold Weather	**Mild Weather**	**Hot Weather**
	------------- cfm/ animal------------------		
Calves, 0-2 months	15	+35 = 50	+50 = 100
Feeder calves, 2-12 months	20	+40 = 60	+70 = 130
Yearlings, 12-24 months	30	+50 = 80	+100 = 180

Table 3. Cattle Handling Design Information.

	Animal	
	Calves - 400-800 lb	**Finishing - 800-1200 lb**
Holding Pen Space		
Overnight	45 ft² / head	50 ft² / head
2-4 hours	14 ft² / head	17 ft² / head
Crowd Tub	6 ft² head	10 ft² / head
Collecting Alley width	12′	12′
Working Chute length	20-24′	20-24′
Working Chute Width	18″	22″ (20-24″)
Loading Ramp Width	26″	26″
Loading Ramp Length	12′	12′
Loading Ramp Rise / foot	3-1/2″ to 4″/ foot	3-1/2″ to 4″/ foot
Loading Ramp Height		
Stock Trailer	15″	15″
Pickup Truck	28″	28″
Stock Truck	40″	40″
Tractor Trailer	48″	48″

Remodeled calf barn design

Figure 3 shows a remodel for a calf barn with several small group bedded pens. This would be appropriate for calves after weaning. The interior posts of the barn are not moved. The old concrete floor and curbs that don't fit into the new floor plan are removed. A new concrete floor with the correct slope and configuration is replaced. New water lines to the water locations should be placed underground before the new floor is placed. A series of double gates separate each pen and can be placed to vary pen size according to need. A small fence or gate can be used to separate pens near the feed lane. The area near the feeding fence may require hand scraping into the adjacent alley. The gates are hinged to swing and lock calves into different parts of the pen. This allows a calf group to be moved and locked into the bedded pen area (See Figure 3 pen # 5) while the manure is removed from the feed alley.

Calves can then be moved and locked into the clean feed alley of the pen while the adjacent bedded pen area is cleaned (See Figure 3 pen #2). The 16'-0" x 11'-3" resting area of a pen has a capacity of 7 calves @ 25 ft²/ calf (Table 1). Either the bedded resting area of the pen can be bedded or the entire pen can be bedded. Feed can be delivered by hand or motorized cart in the existing feed lane. Frost free waterers are placed near the feed fence to protect them from equipment. A single waterer can be shared between two pens or provided for each pen. A positive/negative pressure system could be placed in the barn with a duct providing fresh air into the barn and exiting out the sidewall of the barn. See Table 2 for fan capacity needs. If an existing tunnel ventilation system was in place it could be redesigned and controlled to meet the needs of the animal group housed.

Remodeled grower barn design

Figure 4 shows a remodel for a grower barn with several group bedded pens. The sidewall of the barn is opened to provide cattle access to the feeding bunk. A flat feeding floor or J bunk can be placed on the outside of the barn wall to allow drive by feeding from the outside. The interior posts of the barn are not moved.

The old concrete floor and curbs that don't fit into the new floor plan can be removed. A new floor with the correct slope and configuration is replaced. New water lines should be placed underground before the new floor is placed.

Waterers could be placed along the feed line or inside the barn if more convenient. Gates separate each pen and can be placed to vary pen size according to need. A fence between the resting area and alley with gated openings allows cattle to be locked into either area. This allows a group of animals to be moved and locked into the resting space while the alley is cleaned (See Figure 4 pen #2) or locked into the feed alley (See Figure 4 pen #4) while the resting area is cleaned. Frost free waterers are placed near the feed fence. A single waterer can be shared between two pens or provided for each pen. A positive pressure ventilation system can be placed in the barn. See Table 2 for fan capacity needs. The 16'-0" x 22'-9" resting area of a pen has a capacity of 12 head @ 30 ft²/ head (Table 1).

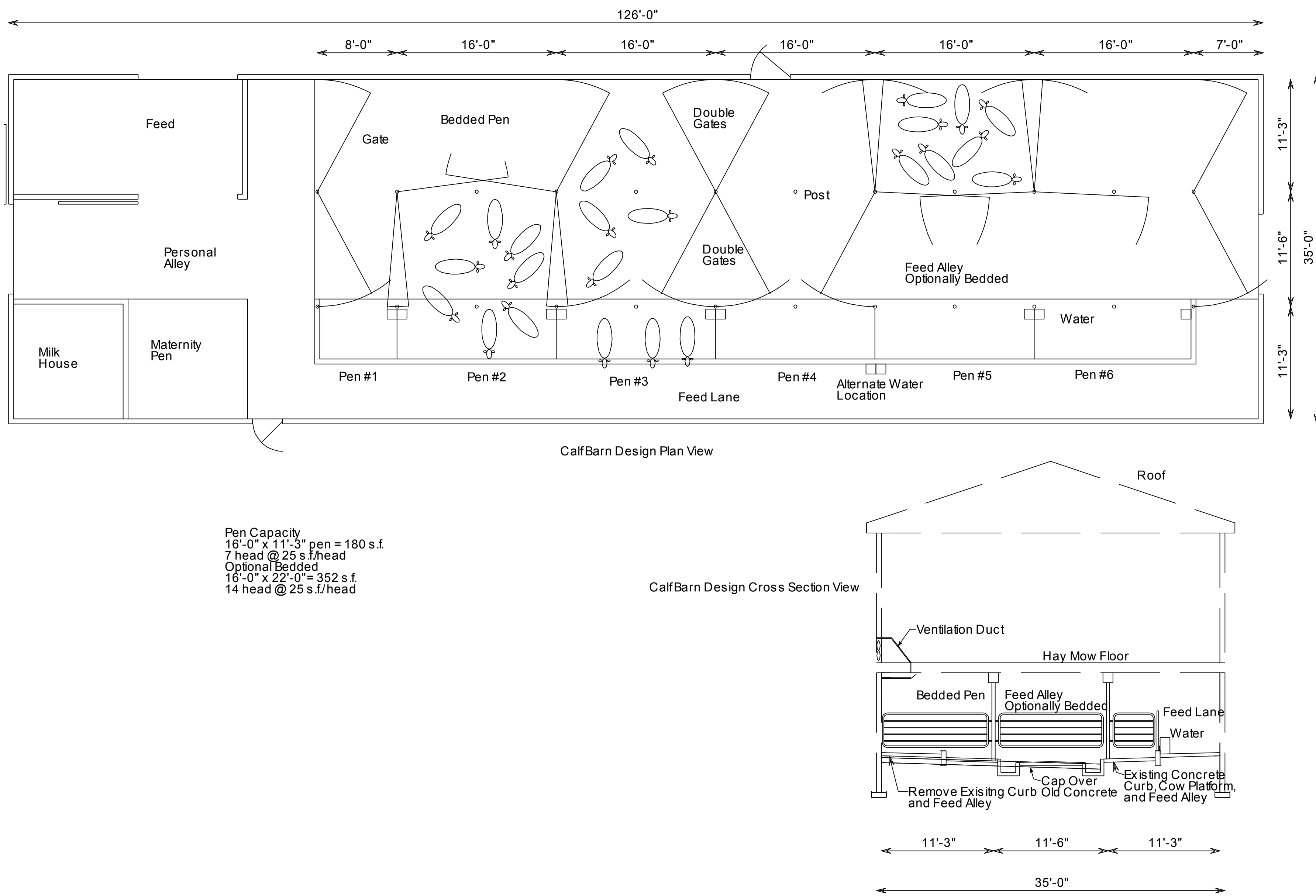

Figure 3. Remodeled Calf Barn Design in Tie/Stanchion Stall Barn

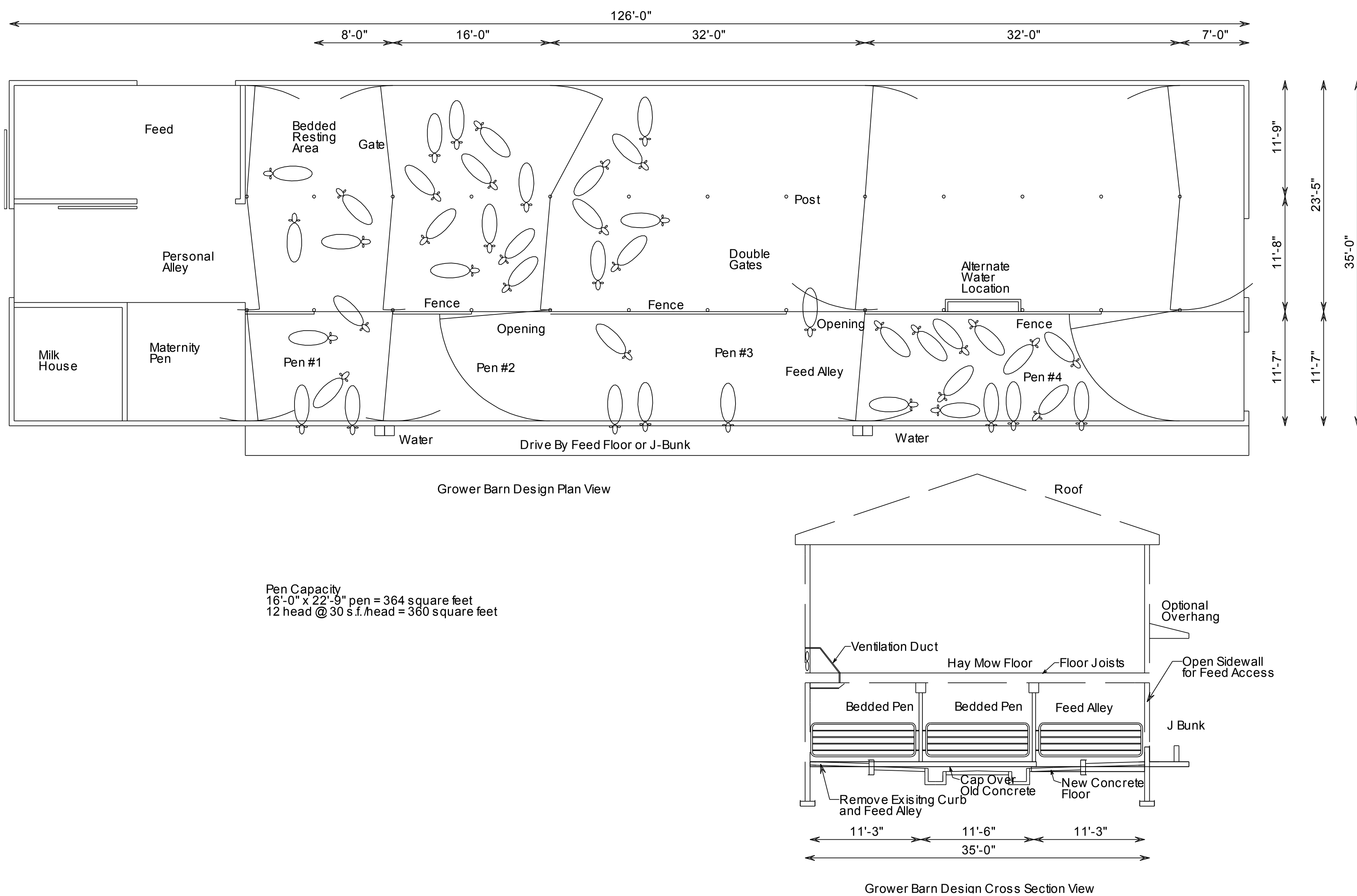

Figure 4. Remodeled Grower Barn Design in a Tie/Stanchion Stall Barn

Remodeled finishing barn design

Figure 5 shows a remodel for a finishing barn with several group bedded pens and access to an outside lot and drive by feeding platform. The interior posts of the barn are not moved. The old concrete floor and curbs that don't fit into the new floor plan can be removed. A new floor with the correct slope and configuration is replaced. New water lines should be placed underground before the new floor is placed. Waterers could be placed outside along the sidewall of the barn or if more convenient placed along the outside lot feeding fence line. Gates separate each pen and can be placed to vary pen size according to need. Place gated openings in the sidewall to allow cattle access to the outside lots. This allows a group of animals to be locked into the outside lot while the bedded resting area is cleaned (See Figure 5 pen #1) or into the bedded resting space while the outside lot is cleaned (See Figure 5 pen #3).

The entire barn can be bedded. A flat feeding floor or J bunk can be placed along the perimeter of the concrete barn yard to allow drive by feeding. In many cases there is more than enough outside lot space for the cattle. Part of the existing barnyard can be also be used for the driveway for feeding equipment. A positive pressure ventilation system can be placed in the barn. Part of the pen gate partition can be replaced with a steer stuffer which is easily accessible from the drive by feeding lane for filling. The 32'-0" x 35'-0" resting area of a pen has capacity of 32 head @ 35 ft^2/ head (Table 1).

Remodeled cattle handling design

Figure 6 shows a plan design for a crowding tub cattle handling area developed inside an existing stall barn. The interior posts were not removed. The south side of the barn between the south sidewall and a row of posts is developed as the entrance lane and holding pen. The cattle enter one end of the barn at the southwest corner of the building. Partition gates allow separate groups to be loaded into the entrance lane.

Cattle move east toward a crowding tub area at the east end of the barn where they begin to turn north through the crowding tub and into a curved chute to the west toward the head gate or working chute area. Personal space is provided on both sides of the working chute and head gate as well as space on the inside of the working tub for moving cattle safely. There should be good footing at the exit from the head gate to prevent cattle from slipping as they leave the chute. At the exit of the head gate there are several options for exiting and or sorting the cattle. Cattle can be released into the exit lane (Option A), directed to a sort pen (Option B), or return to the entrance lane and holding pen (Option C).

Figure 7 shows a plan design for a "Bud Box" cattle handling area developed inside an existing stall barn. A few existing columns may need to be removed to provide a clear space for the bud box. The cattle enter one end of the barn at the southwest corner of the building. As cattle turn into the Bud Box the back gate is closed. As cattle turn back they do not see the opening they entered but do see the exit into the double alley and into the working chute where they can be restrained or sorted.

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Corrals for Handling Beef Cattle. Alberta Agriculture, Food and Rural Development. 7000- 113 Street, Edmonton, Alberta, Canada, T6H 5T6

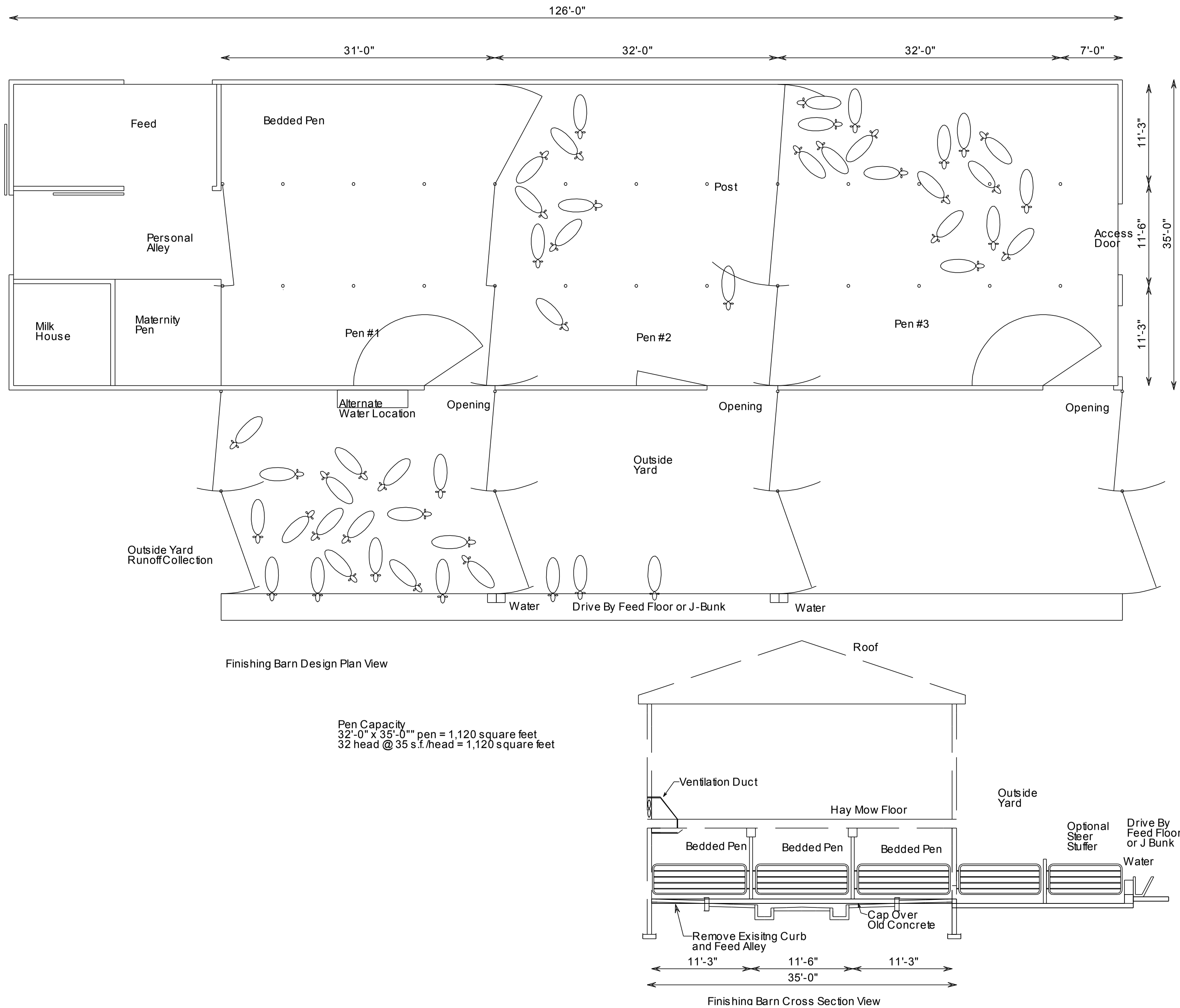

Figure 5. Remodeled Finisher Barn Design in a Tie/Stanchion Stall Barn

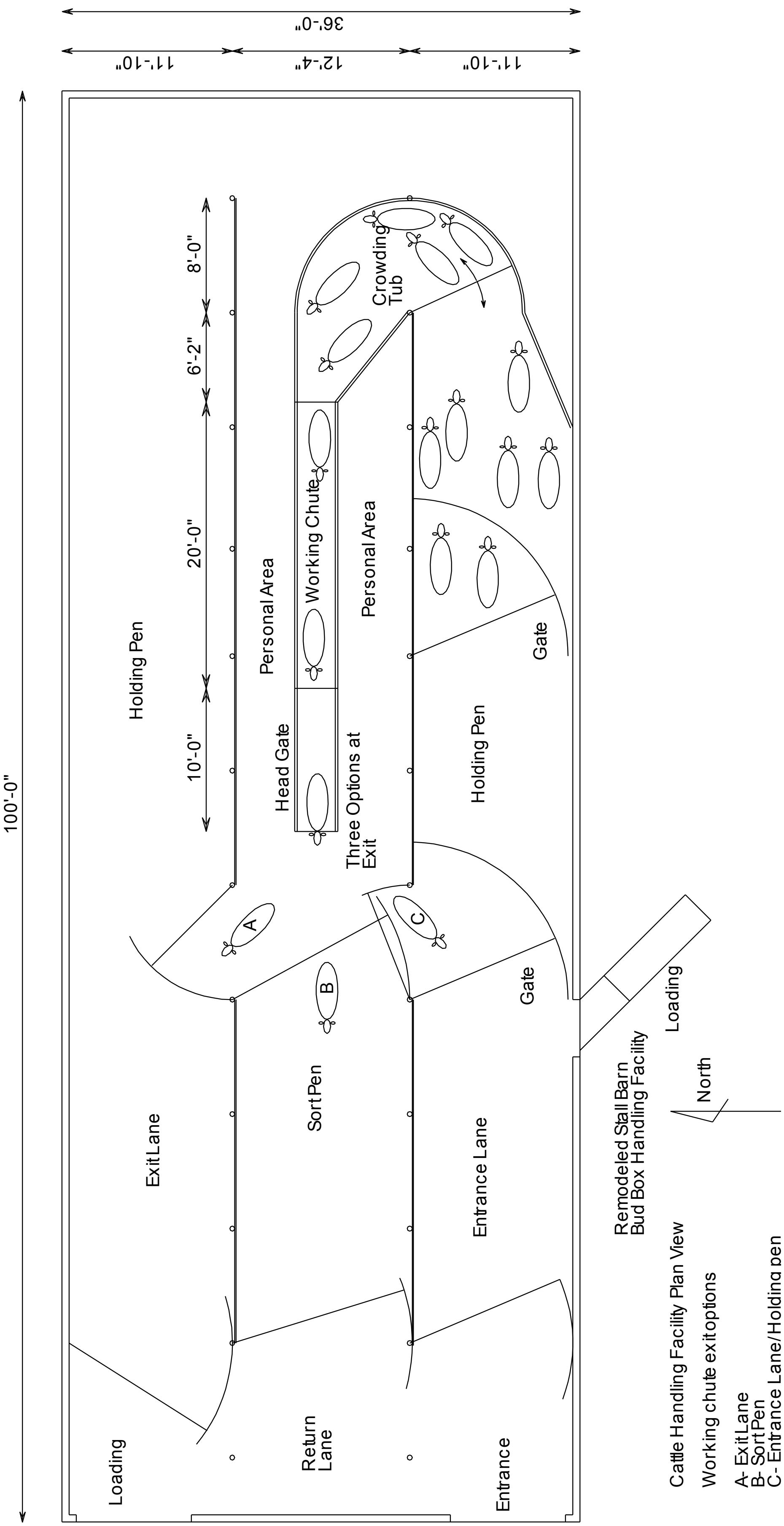

Figure 6. Remodeled Cattle Handling Tub Design in a Tie/Stanchion Stall Dairy Barn

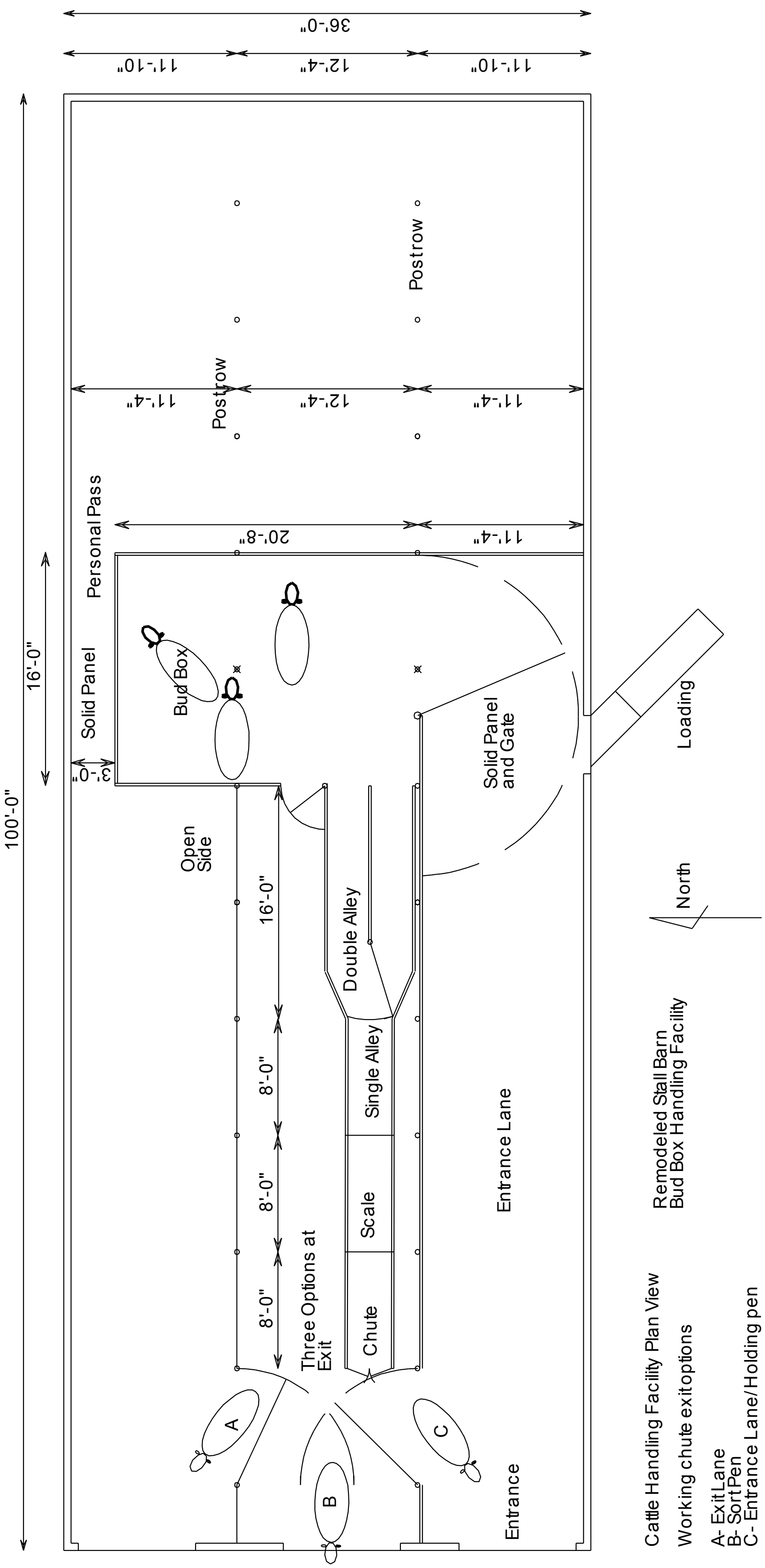

Figure 7. Remodeled Cattle Handling Bud Box Design in a Tie/Stanchion Stall Dairy Barn

Managing fertility and longevity in the beef herd through feed efficiency

Patrick J. Gunn, Ph.D., Beef Cow-calf Extension Specialist, Iowa State University; Garland Dahlke, Ph.D., Assistant Scientist, Iowa Beef Center, Iowa State University; Werner Family Angus, Diagonal, Iowa

Introduction

It is anticipated that by 2050 the global food demand will be 65% greater than it was in 2015. Thus, in today's global marketplace, the need for an efficiently produced, sustainable food source is not only needed, but demanded by consumers. The trickle-down effect of this demand coupled with ever-volatile feed, fuel, and fertilizer costs stemming from extreme shifts in weather patterns and increased utilization of feed for fuel production further magnifies the need to increase efficiency of meat animal production from the producer perspective. Furthermore, as feed costs have historically been 50% or more of the total cost of production in beef enterprises, it is logical that improvements in feed efficiency would yield significant gains in overall production efficiency and profitability of the beef system as well as improve global food security.

Feed efficiency

Feed efficiency of beef cattle (6 pounds of feed: 1 pound of gain) is in last place when compared to competitors in the lean meat trade such as pork (3:1), chicken (2:1) and fish (1:1). However, it should be noted that these species can only convert at these stated ratios in a fairly narrow, controlled environmental temperature and on a highly digestible diet comprised primarily of grains. However, cattle can be competitive in the sense that they do have the ability to convert less digestible grain byproducts and forage into protein. Nonetheless, it should be noted that beef feed efficiency has been largely unchanged over the last few decades, primarily due to lack of selection pressure stemming from costs associated with facility and labor requirements needed to individually measure intake needed to develop selection indicators. However, individual feed intake systems such as GrowSafe System, Ltd., Calan Broadbent Feeding System, and IDology GAIN systems are being inserted into research facilities, bull test stations, and seedstock operations at rapid rate. Although still cost prohibitive for the small to medium sized producer, data derived from these existing systems are being used to quickly develop selection indexes and genetic markers that will be able to be utilized by the entire industry. Up-to-date information on beef feed efficiency can be sourced through the National Program for Genetic Improvement of Feed Efficiency in Beef Cattle, a collaboration of ten universities funded by the USDA, at www.beefefficiency.org.

Currently, the Beef Improvement Federation approved test period consists of a minimum of 91 days, with the first 21 days being a warmup period. However, recently reported data will likely result in the BIF guidelines accepting a shorter testing period in the next year or two. At the end of the testing period, changes in body weight and body composition coupled with individual feed intake are utilized to calculate numerous growth and efficiency indicators which can all be used differently for selection purposes. These include average daily gain (ADG) , feed conversion ratio (feed:gain), feed efficiency ratio (gain:feed), adjusted feed conversion, Residual Feed Intake (RFI), Residual Average Daily Gain (RADG; sometimes referred to as residual gain or RG), and adjusted dry matter intake.

Table 1. Comparison of feed efficiency terms. More information on data output and calculations of these efficiency indicators available at http://www.iowabeefcenter.org/Docs_cows/IBC41.pdf.

Efficiency Indicator	More Desirable	Less Desirable	Difference
Raw F:G – Raw Feed Conversion: usually on dry matter basis (lbs feed/ lb of gain)	Lower values Example: 4.5 lbs	Higher values Example 7.5 lbs	Example: 3.0 lbs of feed
Adj. F:G – Adjusted Feed Conversion: usually on dry matter basis (lbs feed/lb of gain)	Lower values Example: 4.5 lbs	Higher values Example: 6.5 lbs	Example: 2 lbs of dry matter
RFI – Residual Feed Intake: usually on dry matter basis	Negative values Example: -1.7	Positive values Example: +1.5	Example: 3.2 lbs of feed
R-ADG – Residual Average Daily Gain: usually on lbs gained per day	Positive values Example: +0.86	Negative values Example: -.63	Example: 1.49 lbs of average daily gain
Adj. DMI – Adjusted Dry Matter Intake: should be on dry matter basis	Negative values Example: -0.9	Positive values Example: +0.8	Example: 1.7 lbs of feed

RFI is defined as the difference between actual feed intake and that predicted on the basis of the animal's gain and maintenance requirements for its body weight. RADG is defined as the difference between actual weight gain and the gain predicted on the basis of dry matter intake, maintenance of body weight and fat cove. Both RFI and RADG are calculated using from a regression equation formed from actual gains, feed intakes, average weights on test and fat cover of an animal's herd mates. Of these indicators, RFI has gained the most traction among researchers, centralized bull test operators, and seedstock producers as the gold standard for feed efficiency.

Feed efficiency in the cowherd

The traditional thought process of many producers has been that smaller cows are more efficient. However, data collected by Dr. Dan Shike's lab at the University of Illinois has proven this is not necessarily the case. This is in part because there is a wide variability in feed efficiency between animals. A bull test on a group of healthy contemporaries where no selection for efficiency has been practiced can and does give ranges of raw feed to gain ranging from 10:1 to 4:1 consistently within the group. This variability makes selection with favorable outcomes possible over a relatively short time. Particularly as research has shown RFI to be moderately heritable, and thus when used as part of a selection process, feed efficiency can be improved within a herd. Unfortunately, at this time no phenotypic indicators of RFI have been discovered. Although selection for RFI can improve feed efficiency in a population, multiple questions exist as to how RFI may interact with fertility and longevity of females within the herd. Because cattle with a desirable RFI eat less than expected, some questions have arisen, particularly by researchers in lower input/extensive systems, as to whether or not cows in these systems will eat enough to maintain body condition, lactation, and still be able to become pregnant over multiple years. To this point, data out of Australia indicates that while low RFI cattle do not appear to be less fertile, they may have longer yearly calving intervals compared to higher RFI cattle. Thus, some research in the U.S. is being aimed at proving or disproving that selection for RFI in the cowherd is a good thing. At current, most all U.S. data would suggest that RFI does not impact fertility and longevity in the cowherd.

With this said, there is little doubt that both volatile input costs and cattle prices will continue to place an emphasis on more efficient cattle. Therefore, the use of RFI as part of a selection program is likely here to stay. As such, the question shifts from whether or not RFI is good or bad, but rather how to utilize RFI as part of a larger selection process. As with any genetics program, single trait selection is bound to have some negative impact(s) on other production parameters of the herd. However, an astute cattleman will blend new selection opportunities with other traits that help them meet their production and marketing goals. When we circle back around to the data that is synthesized as from a feed efficiency test, all measurements and calculated efficiency indicators are correlated to each other with the exception of ADG and RFI. If we can select for cattle that eat less than expected (desirable RFI) while also having above average ADG, we would like to suggest that we are selecting for cattle that can do more with less, perhaps even in a more extensive environment. If this is the case, we might expect that such females would have improved longevity within the herd.

Data collected on over 500 heifers over the last 7 years at Werner Family Angus, Diagonal, IA would support this notion. The Werner Angus herd has been developed with the goal of delivering little or no supplemental feed to the herd. All heifers in the herd go through their feed efficiency system and are primarily only culled as a result of being open at the end of the breeding season. Approximately 25% of the heifers tested have both a negative (desirable) RFI and above average ADG. In the typical production system where 15-20% of the herd is replaced annually, it seems that identifying low RFI, high ADG females for replacement purposes would be advantageous. In the Werner herd, those females that meet these criteria tend to have better yearling pregnancy rates, and a greater of these females make it to 3 years of age and beyond. This is of particular interest to the Werner family as getting first-calf females to rebreed in this extensive system has been one of their largest production quandaries. Furthermore, when we select for low RFI, high ADG females, data would indicate that those females are not any different in size at birth, weaning, or as a yearling and do not differ in their milk EPD or genetic indices such as $EN, $W, $F, and $B. While this selection theory needs to be tested on a larger scale and more locations, we believe that using RFI as part of a multi trait selection process does have the opportunity to improve feed efficiency of the herd while at least maintaining, if not improving fertility and longevity.

Implant strategy comparison when feeding heavy Holstein steers

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The United States is home to more than 9.2 million dairy cows, which provide a generous number of dairy bull (steer) calves to be fed for beef production. We estimate that Holstein steers accounted for 10% of fed steer and heifer production in 2015. Holstein steers are known for their predictability in growth and carcass traits which make them attractive for feeders not only in the Midwest, but across the country. Over the past 15 years, the average dairy cow has increased milk production by roughly 300 lbs per year, primarily achieved by a larger mature cow size, and greater daily feed intake. Although milk production has continued to increase, there has been no selection for muscling (possibly selection against!). It can be a daunting task to utilize their male offspring to create a desirably marbled and muscled carcass, all while meeting the packer's limitations on carcass size or age. However, there are nutritional strategies and technologies available to producers to enhance muscle accretion with minimal effects on carcass quality.

The list of technologies available to enhance beef production is continuously growing, yet one technology continues to be highly utilized. Anabolic implants have been available for use in feedlot cattle since the 1950's. From then until now, the genetics of the Holstein cow have changed as indicated above. The trial below was conducted to evaluate various implant regimens in modern, large-frame, heavy Holstein steers, and observe growth parameters over time.

This summary will only focus on the following trial; however, readers are encouraged to read the article by Peters (2014), and to visit http://fyi.uwex.edu/wbic/dairybeef/ or http://www.extension.umn.edu/agriculture/dairy/beef/ for a more comprehensive understanding of the dynamic dairy-beef industry.

Trial overview

Holstein steers were procured from a single source at 500 lbs in April 2014 and allowed to graze, or fed hay when pasture forage was limited, from procurement to late August. Animals were moved to the feedlot located on the Lancaster Agricultural Research Station, Lancaster, WI, where veterinary practices (clostridial and respiratory vaccinations, and de-worming) were uniformly administered. Steers were transitioned to a high concentrate diet (56 % dry cracked corn, 20% dry corn distillers grains, 20% corn silage, and 4% supplement on a DM basis; CP = 12.6% and NEg = 0.63). Treatments administered were Control (non-implanted), Encore (implanted on d 0), and E/S/S (implanted with Encore, Revalor-S, and Revalor-S on days 0, 109, and 169 respectively) and fed for 244 days. Steers were blocked by weight and fed in 6 group pens, each containing 10 steers where treatments were balanced within each pen. Due to this design DMI was not measured for each steer, but previous data (Beckett, 2002) was used to assign an intake for each steer given the pen DMI (Encore = 105.7% and E/S/S = 107.9% DMI vs Controls, respectively). All pens were fed once daily at approximately 0900 h, and slick bunk management was implemented. Pens had concrete floors, outside exposure to the south, and manure packs bedded with corn stalks. Pen stocking density allowed for greater than 2.2 ft. of linear bunk space and 150 sq. ft. per animal. All steers were harvested on the same day at JBS Packerland in Green Bay, WI, and carcasses were chilled for 48 h before measurements were collected.

Trial results: Implant strategy

Both implant regimens increased steer overall average daily gain (ADG) (> 20%) compared to the Control treatment (Fig. 1). Growth rate was increased additionally for E/S/S from days 109 to 195 and 196 to 244 compared to steers only receiving Encore. Administering a single Encore implant at the start of the feeding period increased final BW and HCW by 139 and 82 lbs, respectively, compared to the Control treatment. Utilizing additional Revalor-S implants in the E/S/S regimen tended to further increase final BW (52 lbs) and HCW (39 lbs) compared to the Encore treatment (Table 1). The E/S/S treatment resulted in a greater ribeye area than the other treatments and averaged 13 sq. in., which is comparable to some beef breed carcasses. Muscle score was similar across treatments and is a ribeye muscle depth measurement made by JBS Packerland, Green Bay, WI personnel at the time of chilled carcass grading. It is used to discount carcasses in which the lateral portion of the ribeye is shallow. Marbling score numerically decreased with intensifying implant regimen, but was not statistically different than the Control treatment. All 59 carcasses in this dataset graded USDA Choice or Prime, highlighting the quality of beef attainable by Holstein steers.

Using the information from this dataset, an economic analysis was also conducted using the observed treatment averages. Starting weight was assigned a price of $130/cwt, while finished weight price was $115/cwt. Feed costs were charged as

$0.08/lb DM, and implants were billed as Encore = $3.00 and Revalor-S = $3.50, with each implanting occurrence charged $2 for a chute fee. When Encore was the only implant given, the net return was $124 greater than the Control. When additional implants (E/S/S) were given, the net return increased to $167 greater than the Control. When Holstein steers are fed a high concentrate diet, implanting continues to be an economically viable technology as it increases weight gain and minimally affects carcass quality grade.

Trial results: Performance within the feeding periods

When Holstein steers enter the feedlot (350 up to 800 lbs) it is understood that they will be fed for at least 200 days. It is common to see feed intakes peak or plateau between day 100 and 150 for long fed animals when slick bunk management is utilized, and corresponds with the observed data (Fig. 2; 1250 lbs). In this trial, intakes remained steady for the last 70 days and did not decline, perhaps in part due to the early warm-up in March and April (normal+10º F) 2015, as feed intake typically increases in the spring of the year.

Steer growth rate and feed efficiency over the entire feeding period were as expected, with the exception of growth rate during the last 56 days (Fig. 2, last 2 data points). Steer ADG was greater than expected (3.3 lb/d observed vs 2.5 lb/d expected) and intakes were as expected which resulted in favorable F:G ratios despite this typically being the most inefficient component of the finishing phase. These two periods aligned with the months of March and April, and the unseasonably warm weather could explain 0.3 lbs/d; however, the remaining 0.5 lb/d is unaccountable.

Unlike beef steers and heifers, Holstein steers accumulate a negligible depth of backfat, minimizing the potential for yield grade deductions. Therefore, the criteria for selling finished Holsteins steers are rooted in the avoidance of overweight carcasses and the animal's inability to create enough daily value (weight and quality) to offset its daily cost. Our data suggest Holstein steers were able to gain efficiently at 1500 lbs, and therefore selling decisions can be largely based on avoidance of discounts for overweight carcasses. These results are consistent with the current mature weight of Holstein cows (>1600 lbs) and its delaying effect on steer maturation. It should be noted that this group of cattle was finished in early May with warmer than normal temperatures. Holsteins are notorious for being cold intolerant and more observations of end-period performance are needed for cold weather months (January or February) to determine if similar growth rates would be observed.

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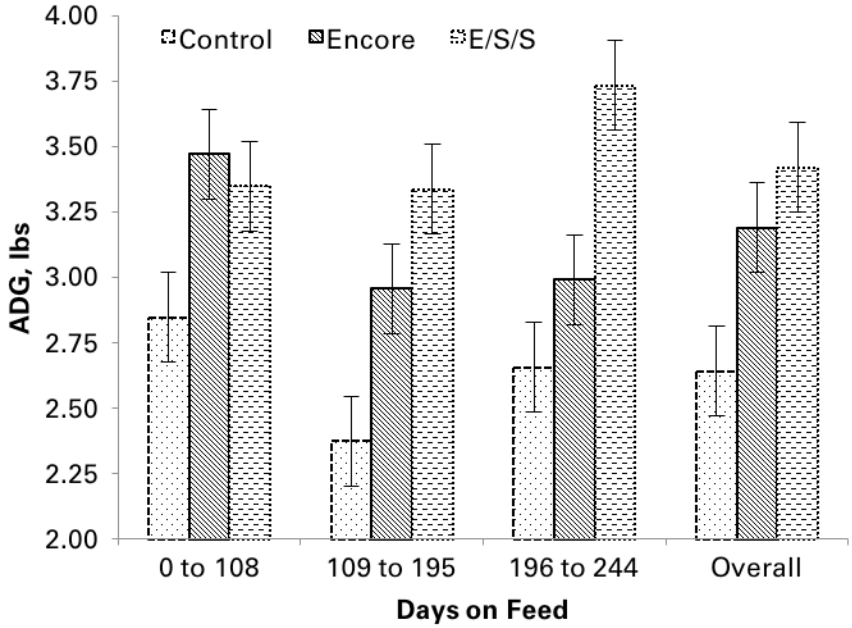

Figure 1. Interaction between ADG and feeding period when administered differing implant regimens.

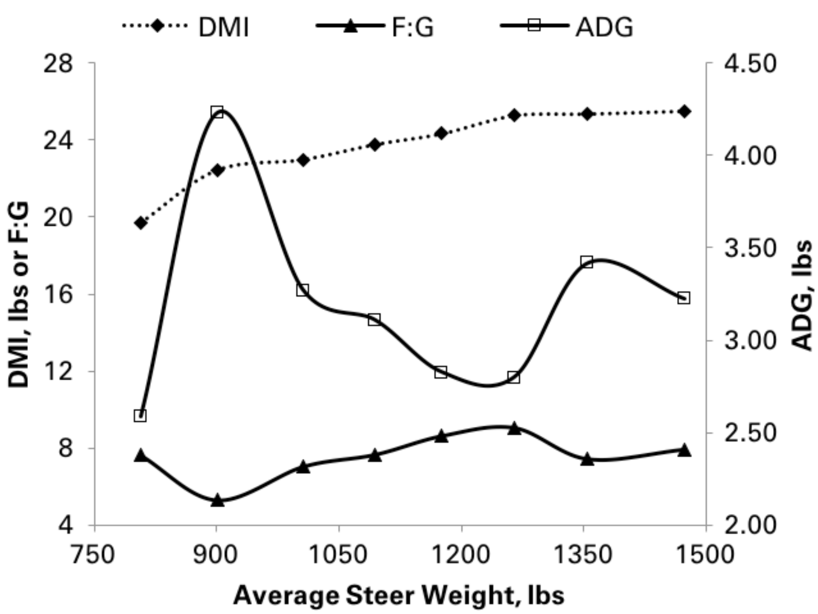

Figure 2. Holstein steer performance during the finishing period; data were collected at 28 day intervals.

Table 1. Holstein steer performance when administered various implant regimens and fed a high concentrate diet for 244 days.

Item	Implant Regimen[1]			SEM	P-Value	
	Control	Encore	E/S/S		Treatment	Encore vs. E/S/S
No. of steers	19	20	20	-	-	-
Initial BW[2], lbs	772	776	773	28	0.80	0.66
Final BW[2], lbs	1416[a]	1555[b]	1607[b]	19	0.01	0.09
ADG, lbs	2.64[a]	3.19[b]	3.42[b]	0.12	0.01	0.06
pDMI[3], lbs	22.8	24.1	24.6	-	-	-
F:G	8.6	7.5	7.2	-	-	-
HCW, lbs	833[c]	915[b]	954[a]	13	0.01	0.04
REA, in^2	11.6[b]	11.7[b]	13.0[a]	0.3	0.01	0.01
Muscle score ≥ 2[4], %	84	90	95	7	0.55	0.61
BF, in	0.18	0.21	0.20	0.02	0.14	0.58
Marbling[5]	700	680	660	20	0.34	0.39
USDA Prime, %[6]	32	40	10	10	0.09	0.04
Yield Grade	2.9[a]	3.2[b]	2.9[a]	0.08	0.01	0.01
Dressing Percentage	58.8	58.8	59.3	0.3	0.16	0.15
Net return over Control[7], $	-	$124	$167	-	-	-

1 Control = non-implanted, Encore = administered Encore (E) on d 0, and E/S/S = administered E on d 0, Revalor-S (S) on d 109 and 196.

2 All live body weights (BW) collected were shrunk 3%.

3 pDMI = predicted dry matter intake based on actual pen intake and treatments adjusted using observations of Beckett (2002) which estimated Encore and E/S/S to be 105.7 and 107.9% of Control, respectively.

4 Muscle score is a ribeye muscle depth measurement made at a distance which is 75% of the medial (0%)-lateral (100%) width of the ribeye. Muscle scores of 1, 2, and 3 refer to ribeye depths of ≥2, ≥1.9, and < 1.9 inches, respectively, and ribeye areas per cwt of carcass of ≥1.5 sq. inch/cwt, ≥1.0 sq. inch/cwt + 1 sq. inch, and <1.0 sq. inch/cwt + 1 sq. inch. A carcass price discount is assigned for muscle score = 3.

5 600= $modest^0$ and 700 = $moderate^0$.

6 Based on marbling scores assigned by two trained UW meat graders with reference to USDA photo standards.

7 Calculation based on selling on a live weight basis.

a, b, c Means in a row with unlike superscripts are different ($P < 0.05$).

Use of a VFD feed

How do I use a VFD feed?
The VFD feed must be used according to the information specified in the labeling and on the VFD. This means for example that the feed can only be used for the indications and duration of use specified on the label and VFD, and in the animals at premises specified in the VFD. Furthermore, if the VFD authorizes use of a VFD drug in an approved combination, that combination also must be used according to the labeling and VFD.

What is the difference between an "expiration date" on the VFD and duration of use?
While the VFD expiration date defines the period of time for which the authorization to feed an animal feed containing a VFD drug is lawful, the duration of use determines the length of time, established as part of the approval, conditional approval, or index listing process, that the animal feed containing the VFD drug is allowed to be fed to the animals. For example, in swine the currently approved VFD drug tilmicosin has a duration of use of 21 days and an expiration date of 90 days, which means the client has 90 days to obtain the VFD feed and complete the 21 day course of therapy.

As a client can I feed a VFD feed past the VFD expiration date?
No. A VFD feed or combination VFD feed must not be fed to animals after the expiration date on the VFD.

My VFD order is set to expire before I can complete the duration of use on the order, what should I do?
A VFD feed or combination VFD feed must not be fed to animals after the expiration date on the VFD. You should contact your veterinarian to request a new VFD order.

Extralabel use

What is an "extralabel use" of a VFD drug and is it allowed?
"Extralabel use" is defined in FDA's regulations as actual or intended use of a drug in an animal in a manner that is not in accordance with the approved labeling. For example, feeding the animals VFD feed for a duration of time that is different from the duration specified on the label, feeding VFD feed formulated with a drug level that is different from what is specified on the label, or feeding VFD feed to an animal species different than what is specified on the label would all be considered extralabel uses. Extralabel use of medicated feed, including medicated feed containing a VFD drug or a combination VFD drug, is not permitted.

Extra-label use of VFD feed (or any other medicated feed) is not permitted

Client's responsibilities

What are my responsibilities as the "client"?
As the client, a producer must:

- only feed animal feed bearing or containing a VFD drug or a combination VFD drug (a VFD feed or combination VFD feed) to animals based on a VFD issued by a licensed veterinarian;
- not feed a VFD feed or combination VFD feed to animals after the expiration date on the VFD;
- provide a copy of the VFD order to the feed distributor if the issuing veterinarian sends the distributor's copy of the VFD through you, the client;
- maintain a copy of the VFD order for a minimum of 2 years; and
- provide VFD orders for inspection and copying by FDA upon request.

VFD has to be kept for 2 years

Veterinary Feed Directive (VFD)

Producer Requirements 2015

For more information:
AskCVM@fda.hhs.gov
Guidance for Industry #120
21 CFR 558.6 (VFD)

http://www.fda.gov/safefeed

A VFD feed can only be used under the professional supervision of a licensed veterinarian

VFD drug and combination VFD drug

What is a "VFD drug"?
A"VFD drug" is a drug intended for use in or on animal feed that is limited to use under the professional supervision of a licensed veterinarian

What is a "combination VFD drug"?
A "combination VFD drug" is an approved combination of new animal drugs intended for use in or on animal feed under the professional supervision of a licensed veterinarian, and at least one of the new animal drugs in the combination is a VFD drug.

How do I know if a drug is a VFD drug, rather than an OTC drug?
Read the label. All labeling and advertising for VFD drugs, combination VFD drugs, and feeds containing VFD drugs or combination VFD drugs must prominently and conspicuously display the following cautionary statement: "Caution: Federal law restricts medicated feed containing this veterinary feed directive (VFD) drug to use by or on the order of a licensed veterinarian." Over-the-counter (OTC) drugs do not have this statement.

VFD statement

What is a VFD?
A VFD is a written (nonverbal) statement issued by a licensed veterinarian in the course of the veterinarian's professional practice that authorizes the use of a VFD drug or combination VFD drug in or on an animal feed. This written statement authorizes the client (the owner of the animal or animals or other caretaker) to obtain and use animal feed bearing or containing a VFD drug or combination VFD drug to treat the client's animals only in accordance with the conditions for use approved, conditionally approved, or indexed by the FDA. A VFD is also referred to as a VFD order.

What is an "expiration date" on the VFD?
The expiration date on the VFD specifies the last day the VFD feed can be fed.

VFD drug labeling and advertising must prominently and conspicuously display the VFD caution statement

Obtaining a VFD feed

How does a producer obtain a VFD feed?
Use of a VFD feed requires the professional supervision of a licensed veterinarian. Producers must obtain a VFD order from their veterinarian, then send, or take, the VFD order to a feed manufacturer or supplier to get the VFD feed. Producers who manufacture their own feed must have a VFD in order to get the medicated VFD feed to manufacture from. Producers who also manufacture feed for others should be aware that they are acting as a distributor and additional requirements apply. More information on manufacturing and distributing VFD feeds is available at: www.fda.gov/safefeed

"Caution: Federal law restricts medicated feed containing this veterinary feed directive (VFD) drug to use by or on the order of a licensed veterinarian."

What does professional supervision mean?
The veterinarian-client-patient relationship (VCPR) is the basis of professional supervision. Veterinarians who issue a VFD order must practice veterinary medicine in compliance with all applicable veterinary licensing and practice requirements, including issuing the VFD in the context of a VCPR as defined by the state. If applicable VCPR requirements as defined by such state do not include the key elements of a valid VCPR as defined by Federal law, the veterinarian must issue the VFD in the context of a valid VCPR as defined by the Federal law.

What should be on a VFD order?

This information is required on a lawful VFD order:

- veterinarian's name, address, and telephone number;
- client's name, business or home address, and telephone number;
- premises at which the animals specified in the VFD are located;
- date of VFD issuance;
- expiration date of the VFD;
- name of the VFD drug(s);
- species and production class of animals to be fed the VFD feed;
- approximate number of animals to be fed the VFD feed by the expiration date of the VFD;
- indication for which the VFD is issued;
- level of VFD drug in the feed and duration of use;
- withdrawal time, special instructions, and cautionary statements necessary for use of the drug in conformance with the approval;
- number of reorders (refills) authorized, if permitted by the drug approval, conditional approval, or index listing;
- statement: "Use of feed containing this veterinary feed directive (VFD) drug in a manner other than as directed on the labeling (extralabel use), is not permitted";
- an affirmation of intent for combination VFD drugs as described in 21 CFR 558.6(b)(6); and
- veterinarian's electronic or written signature.

You may also see the following optional information on the VFD:

- a more specific description of the location of the animals (for example, by site, pen, barn, stall, tank, or other descriptor the veterinarian deems appropriate);
- the approximate age range of the animals;
- the approximate weight range of the animals; and
- any other information the veterinarian deems appropriate to identify the animals at issue.

A lawful VFD has to be complete

VFD and VCPR, Client

What is required for veterinarian supervision?
The veterinarian-client-patient relationship (VCPR) is the basis of professional supervision. A VFD must be issued by a licensed veterinarian operating in the course of his/her professional practice and in compliance with all applicable veterinary licensing and practice requirements, including issuing the VFD in the context of a veterinarian-client-patient relationship (VCPR).

What VCPR standard applies?
FDA provides a **list** of states whose VCPR includes the key elements of the federally-defined VCPR and requires a VCPR for the issuance of a VFD. If your state appears on this list you must follow your state VCPR, if your state does not you must follow the federal VCPR as defined in 21 CFR 530.3(i).

Who is the "client" on the VFD?
"Client" is typically the client in the VCPR; the person responsible for the care and feeding of the animals receiving the VFD feed.

What is an "extralabel use" of a VFD drug and is it allowed?
"Extralabel use" (ELU) is defined in FDA's regulations as actual or intended use of a drug in an animal in a manner that is not in accordance with the approved labeling. For example, feeding the animals a VFD for a duration of time that is different from the duration specified on the label, feeding a VFD formulated with a drug level that is different from what is specified on the label, or feeding a VFD to an animal species different than what is specified on the label would all be considered extralabel uses. Extralabel use of medicated feed, including medicated feed containing a VFD drug or a combination VFD drug, is not permitted.

Reorders (refills)
When can I authorize a reorder (refill)?
If the drug approval, conditional approval, or index listing expressly allows a reorder (refill) you can authorize up to the permitted number of reorders. If a drug is silent on reorders (refills), then you may not authorize a reorder (refill).

Use of medicated feed is authorized by a VFD not Rx

A lawful VFD has to be complete

What do I have to include in a VFD?

You must include the following information on the VFD for it to be lawful:

- veterinarian's name, address, and telephone number;
- client's name, business or home address, and telephone number;
- premises at which the animals specified in the VFD are located;
- date of VFD issuance;
- expiration date of the VFD;
- name of the VFD drug(s);
- species and production class of animals to be fed the VFD feed;
- approximate number of animals to be fed the VFD feed by the expiration date of the VFD;
- indication for which the VFD is issued;
- level of VFD drug in the feed and duration of use;
- withdrawal time, special instructions, and cautionary statements necessary for use of the drug in conformance with the approval;
- number of reorders (refills) authorized, if permitted by the drug approval, conditional approval, or index listing;
- statement: "Use of feed containing this veterinary feed directive (VFD) drug in a manner other than as directed on the labeling (extralabel use), is not permitted";
- an affirmation of intent for combination VFD drugs as described in 21 CFR 558.6(b)(6); and
  veterinarian's electronic or written signature.

You may also include the following optional information on the VFD:

- a more specific description of the location of the animals (for example, by site, pen, barn, stall, tank, or other descriptor the veterinarian deems appropriate);
- the approximate age range of the animals;
- the approximate weight range of the animals; and
- any other information the veterinarian deems appropriate to identify the animals at issue.

The veterinarian must keep the original VFD for two years

Veterinary Feed Directive (VFD)

Requirements for Veterinarians 2015

For more information:
AskCVM@fda.hhs.gov
Guidance for Industry #120
21 CFR 558.6 (VFD)
Website: http://www.fda.gov/safefeed

For Veterinary Students

VFD drug and combination VFD drug

What is a "VFD drug"?
A"VFD drug" is a drug intended for use in or on animal feed, which is limited to use under the professional supervision of a licensed veterinarian.

What is a "combination VFD drug"?
A "combination VFD drug" is an approved combination of new animal drugs intended for use in or on animal feed under the professional supervision of a licensed veterinarian, and at least one of the new animal drugs in the combination is a VFD drug.

What is a VFD?
A VFD is a written (nonverbal) statement issued by a licensed veterinarian in the course of the veterinarian's professional practice that authorize the use of a VFD drug or combination VFD drug in or on an animal feed. This written statement authorizes the client (the owner of the animal or animals or other caretaker) to obtain and use animal feed bearing or containing a VFD drug or combination VFD drug to treat the client's animals only in accordance with the conditions for use approved, conditionally approved, or indexed by the FDA. A VFD is also referred to as a VFD order.

VFD Statement

VFD Drugs and Prescription Drugs

What is the difference between a VFD drug and a prescription (Rx) drug?
FDA approves drugs in these two separate regulatory categories for drugs that require veterinary supervision and oversight for their use. When the drug being approved is for use in or on animal feed (a medicated feed), FDA approves these drugs as a VFD drug. When the drug being approved is not for use in or on animal feed, the drug is approved as a prescription drug.

Why VFD instead of prescription?
When the VFD drug category was created, the Federal Food, Drug and Cosmetic Act (the Act) made it clear that VFD drugs are not prescription drugs. This category was created to provide veterinary supervision without invoking state pharmacy laws for prescription drugs that were unworkable for the distribution of medicated feed.

FDA approves a drug for feed use as Over-the-Counter (OTC) or as VFD

Veterinary Students and VFD

I don't plan to practice food animal medicine, why should I learn about VFD?
The law allows any licensed veterinarian to issue a VFD in the course of his or her practice and you may find yourself in a situation that requires one. For example, your pet owner client could ask you to issue a VFD for the flock of his/her backyard chickens.

Veterinary students and medicated feed

What is really important for me to know about medicated feeds in addition to VFD?

FDA regulates medicated feeds;

Every use of a drug in feed has to be approved;

There are three types of products in relation to medicated feed use:
- Type A medicated article,
- Type B medicated feed, and
- Type C medicated feed;

Type A medicated article and Type B medicated feed can be used only for further manufacture of other products. Only Type C medicated feed can be fed to animals;

Medicated feeds are approved only as over-the-counter or VFD; they cannot be used under prescription;

All drugs approved for use in feed are placed in two drug categories on the basis of their potential to create unsafe drug residues. Category I drugs have lower potential for unsafe drug residues than Category II drugs; and

Finally, extra-label use of medicated feeds is prohibited by law.

How are VFD (blank) orders obtained?
VFD drug sponsors may make the VFD order for their drugs available, or, as a veterinarian, you will be able to create your own VFD.

How do I send a VFD to the feed distributor?
You must send a copy of the VFD to the distributor via hard-copy, facsimile (fax), or other electronic means. If in hard-copy, you are required to send the copy of the VFD to the distributor either directly or through the client. You must keep the original VFD in its original form (electronic or hard copy) and must send a copy to the distributor and client.

ELU of VFD feed is not permitted

Veterinarians' responsibilities

must be licensed to practice veterinary medicine;

must be operating in the course of the veterinarian's professional practice and in compliance with all applicable veterinary licensing and practice requirements;

must write VFD orders in the context of a valid client-patient relationship (VCPR);

must issue a VFD that is in compliance with the conditions for use approved, conditionally approved, or indexed for the VFD drug or combination VFD drug;

must prepare and sign a written VFD providing all required information;

may enter additional discretionary information to more specifically identify the animals to be treated/fed the VFD feed;

must include required information when a VFD drug is authorized for use in a drug combination that includes more than one VFD drug;

must restrict or allow the use of the VFD drug in combination with one or more OTC drug(s);

must provide the feed distributor with a copy of the VFD;

must provide the client with a copy of the VFD order;

must retain the original VFD for 2 years, and

must provide VFD orders for inspection and copying by FDA upon request.

Major and Minor Animal Species

What are "major and minor animal species"?
FDA regulations define cattle, horses, swine, chickens, turkeys, dogs, and cats, as major species. All animal species, other than humans, that are not major species are minor species.

When is a VFD needed for a minor species?
The VFD requirements apply to all VFD drugs for use in major or minor species. One VFD drug is already approved for use in minor species (e.g., florfenicol in aquaculture). Other medicated feed drugs for minor species are expected to convert from their present over-the-counter (OTC) status to VFD (e.g., oxytetracycline in honey bees) and at that time a VFD will be required for their use.

Managing higher starch diets

Erika Lundy, Beef Program Specialist, Iowa Beef Center, Iowa State University Extension and Outreach

Introduction

In the past decade, rapid expansion of the ethanol industry has supplied the beef industry with a steady stream of high-quality, corn co-products that have become perhaps the most popular byproduct in beef cattle diets. However, the recent ethanol industry changes to maximize the value of end products through further extraction of nutrients has altered the popular co-products as we once knew them (Lundy and Loy, 2014). The decreased nutrient value of co-products coupled with cheap corn prices has encouraged the shift from dependency on co-products making up the majority of a finishing diet to using the product solely as a protein source or ration conditioner. As low to no inclusions of corn co-products in finishing diets become the norm, now is the time to re-evaluate how to successfully feed higher starch diets and make the most of our already tight cattle margins.

Why process grain?

The starch in corn is the primary energy source to support rapid growth of our feedlot cattle. Thus, processing the grain through dry-rolling, cracking, or steam flaking increases the surface area of the grain allowing for increased starch availability to the animal. Increased starch availability leads to increased starch digestion and ultimately, increased growth performance and improved feed efficiency.

In a Kansas State University survey of Midwestern feedlots across seven states during the winter of 2013-2014, the average dry-rolled corn particle size was ~4,200 microns – the equivalent of breaking the corn kernel into 3 unequal parts – with a range of approximately 1,100 microns to 6,800 microns (Schwandt et al., 2015). Because measuring fecal starch concentrations can be used to predict starch digestibility, perhaps the most notable data from this survey comes from overlaying average corn particle size with average fecal starch concentration (Figure 1).

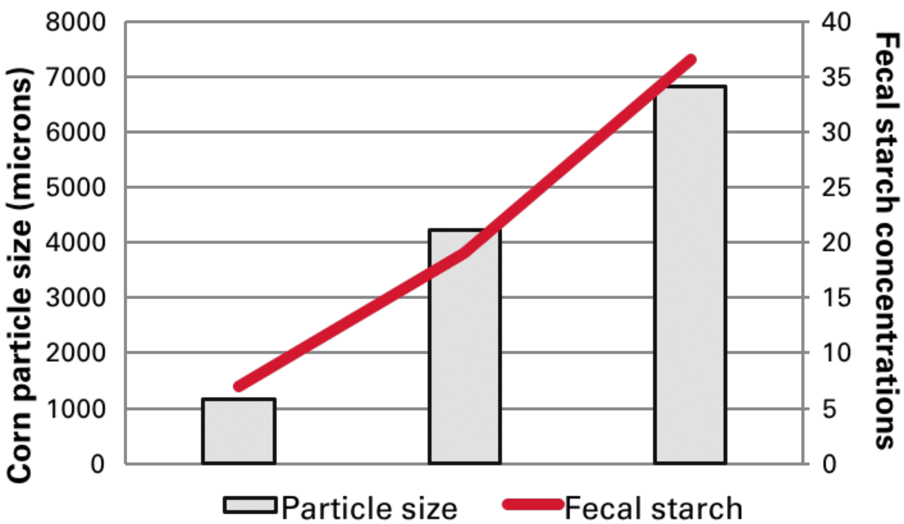

Figure 1. The effect of corn particle size on fecal starch concentrations from a Midwestern feedlot survey (Schwandt et al., 2014).

As noted in Figure 1, there is a direct relationship between corn particle size and starch digestibility. The finer the corn particle size, the lower the fecal starch concentration, indicating improved starch digestibly. At a particle size of 4,200 microns, approximately 20% of the available starch is unutilized by the animal. As we look at the extreme particle sizes, approximately 95% of the starch is utilized with fine ground corn at 1,100 microns. However, when feeding whole shelled corn, 6,800 microns, approximately 65% of the available starch is unutilized by the animal – representing a very inefficient utilization of the grain product!

Walking a fine line of optimizing starch digestibility and avoiding digestive upset

While it's clear that reduced particle sizes leads to greater starch digestion and improved efficiency, it becomes a balancing act of preventing a "starch overload" in the rumen and avoiding acidic conditions and optimizing starch digestibility. If cattle experience a starch overload or a mild acidic condition for an extended duration of time, the integrity of the rumen wall can be damaged and lead to digestive disorders including bloat, laminitis, and liver abscesses.

Several techniques and management practices can help moderate the rumen pH and eliminate the concern of digestive disorders, but feed bunk management plays the primary role. Feed bunk management not only includes delivering a consistent, well-balanced ration but also feed delivery decisions and feedstuff quality control (Lundy et al., 2015). Even though feed bunk management procedures vary across farms, having a set protocol for management techniques can improve cattle feed efficiency. In a time of volatile cattle prices, optimizing starch digestion and taking preventative steps to manage digestive disorder can improve feed efficiency and have a big impact on producer's bottom dollar.

References

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The impact of feedlot facility design on the fertilizer value of manure

Nicole M. Kenney-Rambo, Assistant Extension Professor, University of Minnesota Extension, Mid Central Research and Outreach Center, Willmar, MN and A. DiCostanzo, Professor, University of Minnesota, Department of Animal Science, St. Paul, MN

Over the years, considerable modifications have been made to feedlot facility designs to optimize cattle performance, improve cattle comfort and also ensure safe and effective working conditions for feedlot personnel. Additionally, increased awareness and changes in regulatory climate towards greater environmental protection measures has strongly influenced the development of new facility designs. Environmental concerns are largely centered on preventing or eliminating excessive nutrient or waste discharges to state or federal waters.

There are essentially three main feedlot facility designs, although within each category there are a number of variations; open lot with runoff control, confinement with bedded-pack, and confinement with slatted floors over a deep pit. In the Great Plains states cattle are essentially exclusively finished in open lot facilities; however, in the Upper Midwest facilities range from open lots to intensive confinement buildings due to the challenges associated with raising cattle in a northern climate.

There has been a renewed interest in confinement cattle facilities in the Upper Midwest due to a variety of reasons, but one major incentive is the potential to improve manure nutrient capture to remain in compliance with regulations and simultaneously improve the fertilizer value of manure. Manure may have been previously viewed as a byproduct of cattle production that needed to be disposed; however, producers with integrated livestock and crop operations are increasingly recognizing the value of manure as a fertilizer, especially in light of increased commercial fertilizer prices.

Manure serves as a source of nitrogen and phosphorus as well as sulfur and organic matter; however, there is considerable variation in the nutrient concentration in manure. Cattle type, diet, utilization of co-products, among other variables, all contributes to the variability. Nutrient content, retention, and ultimate bioavailability of manure nutrients for plant uptake are high-impact aspects of economic and environmental importance to cattle feeders with integrated cattle and crop operations.

A study was conducted at the University of Minnesota to determine the impact of feedlot facility design on the concentration of nutrients in manure and the resulting value of manure as fertilizer. Manure nutrient analysis results for solid (n = 689) and liquid (n = 186) manure samples were collected over four years to determine the impact of facility design (open lot, bed pack from confinement barn, stockpiled manure, pit under slatted floor, or lagoon), cattle type (beef or dairy), and dietary energy value (grower or finisher) on manure nutrient concentrations (Table 1).

Table 1. Least square means ± standard errors of liquid or solid manure nutrient concentrations (as-is) for samples collected from pens within various feedlot designs

	Nitrogen	Phosphate, P_2O_5	Potash, K_2O
Liquid manure	--------------------------------*lb/1,000 gal*-------------------------		
Lagoon [a]	8.9 ± 5.7 [a]	5.1 ± 3.6 [a]	14.0 ± 9.3 [a]
Indoor pit [b]	49.9 ± 5.7 [b]	22.6 ± 3.6 [b]	36.6 ± 9.4 [b]
Cattle type			
Beef	26.0 ± 5.6 [a]	12.6 ± 3.5 [x]	22.8 ± 9.3
Dairy	32.9 ± 5.8 [b]	15.1 ± 3.6 [y]	27.8 ± 9.5
Solid manure	-----------------------------------*lb/ton*----------------------------		
Outdoor lot	16.6 ± 1.0	11.1 ± 1.1 [a]	14.8 ± 1.0 [x]
Manure pack	16.3 ± 1.0	9.3 ± 1.1 [b]	14.9 ± 1.1 [x]
Stockpile	17.2 ± 1.0	12.0 ± 1.1 [a]	16.2 ± 1.0 [y]
Cattle type			
Beef	18.0 ± 0.9 [a]	12.8 ± 1.0 [a]	16.4 ± 0.9 [a]
Dairy	15.4 ± 1.0 [b]	8.8 ± 1.1 [b]	14.3 ± 1.1 [b]
Energy value			
Finisher	16.4 ± 0.7	11.6 ± 0.9 [b]	14.3 ± 0.8 [y]
Grower	17.0 ± 1.3	10.1 ± 1.4 [b]	16.3 ± 1.3 [y]

[a, b] Means within category or source with uncommon superscripts differ ($P < 0.05$).
[x, y] Means within category with uncommon superscripts differ ($0.05 > P < 0.10$).

Data were analyzed using the MIXED procedure of SAS; effects of year and month were determined to have no effect and were dropped from the model. Dietary energy value was not included in the analysis of the liquid data set because only finisher diets were represented.

Nutrient concentration of liquid manure samples from indoor pits was greater ($P < 0.05$) than that from lagoons across all nutrients. Nitrogen concentration of liquid samples (lb/1000 gal) was greater ($P < 0.05$) for dairy type cattle, and P_2O_5 also tended to be greater ($P < 0.10$) for dairy type cattle. Nitrogen concentration in solid samples (lb/T) was not impacted by facility type ($P > 0.10$); however, P_2O_5 concentration was lower ($P < 0.05$) in bed packs compared to open lots and stockpiled manure. Concentrations of all nutrients in solid manure samples were greater ($P < 0.05$) for beef cattle as compared to dairy type cattle. Dietary energy value did not impact ($P > 0.10$) nutrient concentrations of solid manure samples.

A combined data set (n = 483) was analyzed with projected annual cattle manure production values of 3 and 5 ton/hd and 2,500 gal/hd, respectively, for open lot, bed pack, or pit under slatted floor, which were estimated in order to compare the effects of facility design on manure nutrient contributions per head space (Figure 1).

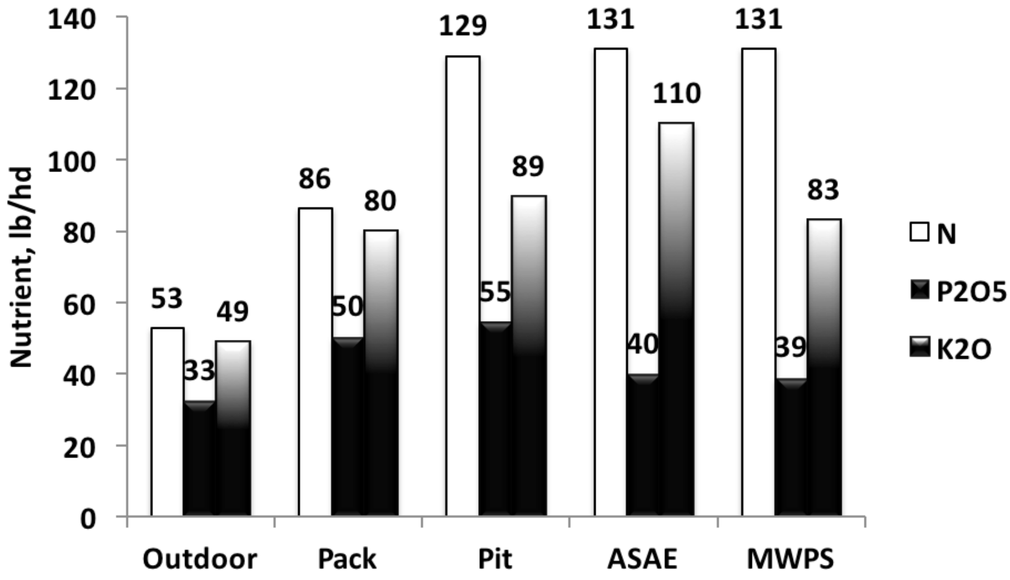

Figure 1. Estimated annual manure nutrient yield (lb/hd) derived from outdoor lot (manure yield: 3 ton/hd), manure pack (manure yield: 5 ton/hd) or confinement pit (manure yield: 2,500 gal/hd) cattle feedlots. Manure N or potash yield differed ($P < 0.05$) across feedlot design. Manure phosphate yield was only different ($P < 0.05$) between outdoor lot and confined feedlot designs. Estimates of manure nutrient yield derived from commonly accessed publications (ASAE D384.2 MAR 2005; MWPS-18 Sec. 1, 2nd ed. 2004) are provided as a reference.

Estimated annual manure N yield (lb/ hd) differed ($P < 0.05$) with feedlot design. Manure N yield (lb/hd/yr) was greatest for indoor pits, intermediate for bed packs, and least for open lots. Manure P_2O_5 yield (lb/hd) was greater ($P < 0.05$) for bed pack and indoor pit facilities as compared to open lots.

Applying the estimated annual nutrient yield values derived above in addition to annual average fertilizer prices, as reported by the USDA, and estimated hauling costs for each facility type ($4 or $3/ton for manure pack or open lot, respectively, or $0.015/gal for slatted floor confinement on pit) allows for the estimation of the impact of feedlot facility design and fertilizer price on the annual value of manure per headspace (Table 2).

Table 2. Impact of fertilizer price [a] on value of manure [b] from three feedlot designs

Crop Harvest Year	Ammonia, 82% N	DAP, 46% P_2O_5	Potash, 60% K_2O	Feedlot Design		
				Manure pack	Open lot	Slatted floor on pit
2004	$379.00	$276.00	$181.00	$2.62	$5.49	$1.73
2005	$416.00	$303.00	$245.00	$7.42	$8.45	$8.74
2006	$521.00	$337.00	$273.00	$10.73	$10.49	$16.00
2007	$523.00	$442.00	$280.00	$10.74	$10.50	$16.07
2008	$755.00	$850.00	$561.00	$48.39	$35.23	$69.14
2009	$680.00	$638.00	$853.00	$55.87	$38.72	$76.15
2010	$499.00	$508.00	$511.00	$30.86	$23.34	$39.96
2011	$749.00	$703.00	$601.00	$44.66	$32.29	$64.46
2012	$783.00	$726.00	$647.00	$48.28	$34.53	$69.93
2013	$847.00	$640.00	$595.00	$42.13	$30.39	$64.38
2014	$851.00	$621.00	$601.00	$41.71	$30.05	$63.99

[a] Fertilizer (DAP = diammonium phosphate) prices from USDA NASS.

[b] Contributions of N, phosphate and potash from Table 1 adjusted for first-year availability, yield (5 ton or 3 ton/hd space yearly for manure pack or open lot, respectively, or 2,500 gal/hd space yearly for slatted floor confinement on pit) and hauling costs ($4 or $3/ton for manure pack or open lot, respectively, or $0.015/gal for slatted floor confinement on pit).

These results confirm that greater manure nutrients are captured by confinement feedlot facilities and the increase in nutrient capture translates to greater manure value on a per headspace basis. Shifts in the economics of commercial fertilizers over the past decade have resulted in dramatic differences in the impact of feedlot facility design on manure value. In 2004, the value of manure captured by each facility design was small (<$6.00/head) and favored open lots as a result of the low expense of hauling manure in this facility design; however, a decade later the value of manure has increased up to ten-fold and the greatest return is realized with slatted floor over deep pit facilities due to increased nutrient capture.

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Where have we been, where are we at and where are we going?

Kris Ringwall, Director, North Dakota State University Dickinson Research Extension Center and Extension Livestock Specialist, North Dakota State University Extension Service

So, costs are going up, production is stagnant and prices are falling. What can a producer do? Is it true, the way to maximize profit from calf weight is knowing and controlling direct and overhead costs incurred? Let's visit on where we have been, where we are at and where are we going. Just some thoughts.

I thought I was doing better than that

Getting a better handle on expenses involves keeping track of costs. When evaluating the cow herd, production and financial records are the report cards.

But we all know from school that what goes into the individual grades is what determines the final grade. Having taught class, as well as raised some children, a learning point always comes up when a student or child says, "I thought I was doing better than that!" as he or she tries to explain why the grade is not an "A" and actually turned out to be a "B."

The point is, the good grades were remembered and the poor grades were dismissed. If 10 exams are each worth 10 points and the total points were 100, even if a student gets 9 to 10 points on nine of the exams but skips one and receives a zero, the grade of "A" no longer is possible when a score of 90 is required for an "A." And then the whining for mercy starts.

But the real world seldom grants compensation for one's mistakes. Thus, the teacher gives the student a "B."

The process happens with beef producers, or producers of anything. At the end of the year, one totals the income and expenses, and more times than not, the comment is the same: "I thought I was doing better than that!" Those forgotten expenses come to bite one's checkbook.

So how does a cattle producer start to get a better handle on expenses? It's not easy, but pen and paper are required. Memory always is appreciated, but a written note will trump memory any day.

The concept is one of breaking apart the operation into manageable units. Within these units, expenses can be more easily categorized and appreciated. So what would be some units? Perhaps six units, or managerial areas, would be a good starting point.

Take a sheet of paper and write down these areas: Genetics, Reproduction, Nutrition, Herd Health, Marketing and Waste Management. Now start listing the various activities that generate expenses within each area. Listing all the expenses is too much for this short article, but one can list some quick thoughts to start.

Tracking Cattle Expenses

Use these six areas to help you:

1. Genetics
2. Reproduction
3. Nutrition
4. Herd Health
5. Marketing
6. Waste Management

Starting with Genetics, list bull purchases, including travel to sales, hauling, veterinary examinations, vaccinations and registration documentation. Also list replacement heifer selection and processing, including vaccinations and all other associated costs with getting a heifer ready for breeding. And once breeding time is here, add semen expense, bull hauling, cattle moving and perhaps heat detection, reproductive synchronization supplies and labor to get cattle where they need to be.

Reproduction may overlap with genetics, but breeding soundness exams, cow herd vaccinations, pregnancy examinations, calving, assisting difficult births, grouping cows, taking body condition scores, sorting and replacing lame bulls, and even chasing the neighbor's bull out of the pasture are all common and needed activities.

Nutrition is a category that easily will account for 70 percent or more of the total expenses within a herd. Winter feed, upkeep of winter feeding facilities, summer pasture, pasture rotations, fence, and more fence, as well as fence repair, gate fixing, hauling hay, moving to seasonal pastures, checking water, providing mineral supplements, pasture evaluation, forage testing, ration development, appointments with a feed specialist, feed delivery, equipment maintenance, tractor repairs and even buying twine all add up to a rather large nutritional component.

Herd health seems obvious because veterinary care and vaccinations would be needed. But what about the gathering of the cattle, processing newborn calves, documenting parentage, sorting a cow versus the whole herd, hauling and disposing of dead cattle, monitoring the pinkeye patches and making the long drive to the veterinary clinic?

Marketing does not just happen, either, because processing facilities need upkeep, and transportation by pickup or trailer or maybe by semi; loading ramps; video recording; sorting calves; pens for cull bulls, cows and heifers; market plans for market bulls, cows and heifers; and full loads, half loads or just one cow hauled all the way to town are all market activities.

And last, waste management, including plans for nutrient storage and spreading, manure sampling and analysis, bedding, trucking, waste disposal, composting, dead animal removal and facility upkeep through paint, board repair and road maintenance for lot and pasture access are critical to any cattle operation.

The point at the start of this discussion was how easily one can forget a grade, or in the case of the cattle producer, forget an expense. Everything has a direct and an indirect expense, plus labor. Tracking all expenses avoids disappointment.

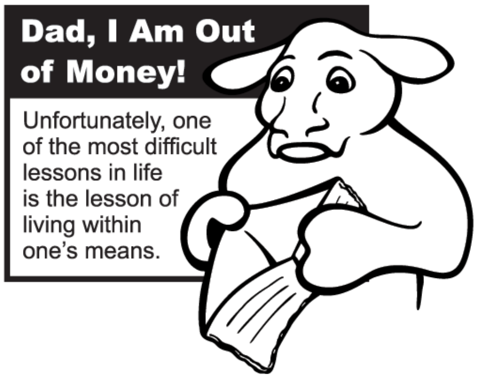
After-the-party blues

Beef fever, the recent attitude. Ever hosted one of those over-the-top parties? They seem to be enjoyable and many people attend. However, sometimes you look around and ask: Who invited that person because I don't know who he or she is? As the sun comes up the next day and the dust settles, it seems to be a good time to reflect on the good times had at the party.

However, about a week later, the bills start showing up. One can hear the questions: Did we really order that? I thought the ice was free. Only the first 50 cups were? Where did they ship the ice in from? Is that really my signature on that bill? Just how many people did we authorize to accept deliveries?

Not to be too pointed, but maybe there are some party similarities to what took place in the beef industry this past couple of years. For those who have had the great experience of introducing their children to the world, there is the after-party phase. Yes, the joy of watching a child get his or her first paycheck is precious, but you also realize that the paycheck does not even began to reflect the cost of raising a child.

That thought starts to become evident with the first overdraft notice or a desperate call home that starts with: "Dad, I am out of money!" Family disposable income generally has included funds for child rearing. However, there is a point when every family starts to think more about retirement by slowly but steadily shifting money from rearing to retirement funds. If this step is poorly done, then the child gets the call: "Son, I am out of money." Such calls are seldom returned with haste.



Meanwhile, the beef industry, at least in the cow-calf business, is nestled in the conservative upbringing of farm and ranch families. The call for more money for family living usually meant selling an extra cow, not driving to the bank to take out a loan. My memory is good, not always accurate, but still good.

Boom times are party times and not-so-boom times have caused those who are less conservative to stumble. The stumble actually may not be a fall, but sometimes it is. Sometimes it is simply a weakening of the farm or ranch infrastructure, but nevertheless the challenge remains. It goes without saying that the beef cattle world has ended recent years on a good note.

The cow-calf segment reflects the good prices received and desire to move forward. The move forward keeps those who project numbers busy. Those numbers set the feel for the future. As cow-calf producers, confidence is felt because cattle numbers seem low and interest in beef remains strong. Those who like to eat beef seem to be getting their share, so we have the party.

However, we do have the "but" word. Eternal optimism is not any better than perpetual pessimism. Real life exists somewhere in between. The question is, where in between?

Every day that someone lifts his or her hand to bid on the price of cattle, he or she votes. That person has helped set the current value that, we hope, is calculated by taking into account expenses and estimated future value.

Of course, such activity does not really happen in the absence of markets or those financial structures that facilitate marketing, so dollars are associated with that vote and ultimately change hands as the business day ends. When all the homework has been done, accounts should balance and the next day should be started in a positive fashion.

The word "homework" is the source of stubbed toes. Organizations that make dollars available pay considerable attention to the prices paid, projected expenses and projected future sale prices.

Agricultural product value, particularly food, is market-driven. Markets are driven by supply and demand. The demand is people, and people like to party, so the cycle continues.

The real foundation is in the homework. Who actually ordered all those supplies? Who was in charge of the guest list? Who was instructed on how to receive the supplies? Planning and more planning is important. If the numbers are not positive, dollars are withdrawn. Unfortunately, one of the most difficult lessons in life is the lesson of living within one's means.

The basic rule is that the amount of the sale check has no connection and no requirement to the future. The sales receipt only reflects the market on the day that the check was written. In the cattle business, the check was written on the day the cattle were sold.

Yes, call home and the folks will do what they can, but call the bank and one may find the account has been closed. Those who do their homework will lessen the pains of life, but even then there are no guarantees in this business.

The bottom line: If you are spending your own money and you have the money to spare, throw the party. However, if you are using someone else's money, stay home and do the next homework lesson. Cost control is the key to long-term success in the cow-calf business.

Grandma and grandpa are worried

Today's cow-calf producers are enjoying a revenue stream never before realized by the industry. This is good. So why are grandma and grandpa worried?

The current generational discussions - whether causal chit-chat while doing chores or a formal meeting of the minds - have indicated a breather from always having to worry about where the next dollar will come from. Those who have lived without never forget what that means.

However, unfortunately, those who never have lived without really cannot fathom what it means. This creates a bit of a divide between generations in what are some good times. Is the divide real? Yes, it is. Should the divide be a family talking point? Absolutely.

Those who have the wisdom of past cattle cycles know darn well that cattle prices are not the means to long-term success in the cow-calf business. The means to success is to control cost. Prices go up. Prices go down. At some point, income is less than costs. For those who know the feeling, times will change.

All those jokes about the banker tell more truth than one really wants to admit. Cow-calf producers do not control the price; they control the costs. All good prices come down; not all bad prices go up. Nothing is free.

So where is the beef industry? My favorite places for answers are the North Dakota Farm and Ranch Business Management Education Program (http://www.ndfarmmanagement.com) and FINBIN (http://www.finbin.umn.edu/) from the Center for Farm Financial Management, University of Minnesota.

A review of North Dakota numbers from FINBIN since 2000 certainly brings some points up for discussion. Since 2000, a lot has changed. In 2000, the available gross margin for North Dakota cow-calf producers was $466 per cow. In 2013, the available gross margin was $830 (up 178 percent), and in 2014, it was $1,310 (up 281 percent). That translates into considerable more total dollars coming into the operation.

Changes in North Dakota Beef Cattle Operations

	2000	2013	% Change in 10 years	2014	% Change in 11 years
Gross margin	$466	$830	up 178%	$1,310	up 281%
Cost of purchasing or keeping replacement females	$132	$268	up 203%	$297	up 225%
Cost of total direct and overhead expenses	$342	$583	up 170%	$648	up 189%

FINBIN (www.finbin.umn.edu/) from the Center for Farm Financial Management, University of Minnesota

Gross margin accounts for the purchase and sale of all calves, cull cows and bulls, plus the animals transferred in and any overall changes in cattle inventory. At the end of the day, this is the number direct and overhead expenses are subtracted from to calculate net return per cow without labor and management charges deducted.

Dollars coming into the beef enterprise are dramatically positive. This change is evident as cow-calf producers spend or invest the increased dollars generated. So what worries grandma and grandpa? Simple! Income means nothing without a cost calculation. Given that, what is the first cost that deducts dollars from the available gross margin? Most producers would say feed, but the first and greatest cost affecting the gross margin is maintaining the cow inventory.

Looking back at 2000, the cost for purchasing or keeping replacement heifers was $132, which was calculated by dividing the cost of the replacement heifers by the total number of producing cows in the herd. In 2013, this figure was $268 (an increase of 178 percent). In 2014, the same figure was $297 (an increase of 225 percent). In other words, replacement costs are accumulating within the beef herd.

Is that manageable? Well, grandma is worried, and grandpa is more optimistic. But let's look at the total direct and overhead expenses. In 2000, producers spent, on average, $342 per cow for total direct and overhead expenses. By 2013, that average value was $583 per cow, an increase of 170 percent. And in 2014, that average value was $648 per cow, an increase of 189 percent. Well, grandpa just started to worry as well.

That means a 500-pound calf needs to bring $1.30 per pound simply to pay the obvious bills. That leaves nothing to pay the help, pay something for managing the place or buy a nice gift for grandma. Yes, we all know prices are better than that, but why are grandma and grandpa a little worried? Well, simply put, prices go up and prices go down. What's owned is yours, what's not will transfer, always a reality in business.

Grandma and grandpa have a right to worry; controlling costs are critical to survival. If there are lessons in life, with age, those lessons become more apparent. Granted, the younger generation has a lot of tools to use that previous generations did not, but the lessons of life do not need all the tools.

As long as money is positive, a producer has the choice of several managerial options, but once expenses exceed income, those choices can cease quickly. Choose financial commitments with diligence. One of the biggest expenses is total direct and overhead costs.

Cost of beef production up 200 percent

Are you sitting down? Data show beef production is becoming expensive.

I am not referring to the end product but rather to the weaned calf. The cost per pound weaned per exposed cow has jumped 200 percent since the turn of the century. That is not good news. Cost control is critical in every business. If costs are allowed to run out of control, the next step is liquidation.

The beef business is no different. Producers need to be cautious when operating within affluent prices. Those checks coming in can be very deceiving if not appropriately matched to the checks going out.

Historically, beef producers are not overly enthusiastic record keepers. With a fairly constant production phase, producers have kept costs at a minimum. They were willing to maintain when prices were typical and appreciate good prices when they cycled through.

With a tight checkbook and several multigenerational family members keeping their eyes on expenses, things worked fine. Dad was not asked to buy something that was not absolutely needed. And even then, why buy it if some other mechanism could be jerry-rigged to get the job done?

Where are these thoughts coming from? Again, my usual sources are the North Dakota Farm and Ranch Business Management Education Program (http://www.ndfarmmanagement.com) database and FINBIN (http://www.finbin.umn.edu/) from the Center for Farm Financial Management, University of Minnesota. Levi Helmuth, farm business management instructor at the Dickinson Research Extension Center, and other North Dakota instructors contribute to the database.

A review of North Dakota numbers from FINBIN since 2000 certainly shows the changes, compared with today. What has changed? The simple answer is that income means nothing without a cost calculation. While many producers generally understand that feed and the cost of maintaining the cow inventory are large, one of the biggest expenses is total direct and overhead costs.

In 2000, producers spent, on average, $342 per cow for total direct and overhead expenses. By 2013, that average value was $564 per cow, an increase of 165 percent. And in 2014, that average value was $648 per cow, an increase of 189 percent.

N.D. Beef Cattle Operation Costs Jump					
	2000	2013	% Change in 10 years	2014	% Change in 11 years
Total direct and overhead expenses	$342	$564	up 165%	$648	up 189%
Actual weaning weight	544	541	down .6%	547	up .6%
Pounds weaned per exposed cow	492	479	down 2.6%	471	down 4.3%
Cost per pound weaned per exposed cow	$.69	$1.18	up 171%	$1.38	up 200%

FINBIN (www.finbin.umn.edu/) from the Center for Farm Financial Management, University of Minnesota

Has calf output kept up with expenses? No. In 2000, according to FINBIN, the average weaned calf weight was 544 pounds. It was 541 pounds in 2013 and 547 pounds in 2014. Pounds weaned per exposed cow was 492 in 2000, 479 in 2013 and 471 in 2014. This amounts to a cost per pound of weaned calf per cow exposed of 69 cents in 2000, $1.18 (up 171 percent) in 2013 and $1.38 (up 200 percent) in 2014.

So, what is likely to go up and what is likely to go down? That is the painful question. Historically, costs tend to remain or increase through time. Occasionally, costs, particularly feed costs, will go down as prices fluctuate in the grain and hay market.

Supply and demand drive the market. Direct costs often are called variable costs because they do vary and respond to the current market. Overhead costs are certainly more long term, and a conservative approach to accruing long-term debt always is advisable. Those debt payments, locked in for a fixed number of years, can become problematic if the value drops out of the beef business.

As the beef industry interacts with the market, individual producers must decide their individual approach to survival, and meeting the family and operational goals. Invariably, those thoughts will include dollars. Why be in the beef business without a return to labor and management?

With the current demand for replacement cattle indicative of a positive industry stance to maintaining and expanding the beef business, now is the time to ponder some fundamental costs of the business. The direct costs are manageable, but remember, replacement of breeding stock is leading the pack in regard to negative impact on the gross margin per cow.

And then comes the long-term question: Is there enough revenue to maintain and expand, which means an adequate return on investment on total assets? The real answer to the question of profit rests with the ability to complete a process that fundamentally provides a proper business evaluation.

Why is this important? The dynamics of the beef business change, and yet the beef producer is trying to focus down the road. Increased direct and overhead costs, and retirement or family expansion create difficult questions. For now, buy wisely, spend thriftily and control costs. More later. Costs are going up, production is stagnant and prices are falling.

Can production efficiency offset costs

What happens when producers experience a 281 percent increase in the average price per hundredweight for calves in a 14-year period (2000 to 2014)?

Perhaps the tempting answer is "who cares!" There seems to be some truth to that answer, which is why the cow-calf business finds itself in a bit of a quandary. Costs are going up, production is stagnant and prices are falling. The response has changed and producers are saying "we care."

The cow-calf business always is caught between a rock and hard spot when market discussions are presented. Producers generally focus on the market price of calves and are fairly prompt in noting a change in market direction.

The record prices of the past year are gone. Today's backgrounders and feeder owners buy calves at a set price, projecting the expenses and income ability of calves on grass or in the feedlot.

As the market increased, feedlots managed cattle so carcass weights increased to help keep cattle in the yard and offset the price of incoming cattle. Ultimately, feedlots revisit costs and adjust the price of incoming cattle to manage increased costs.

The willingness of the consumer to buy beef is part of the equation as well. Producers recognize the need for the inputs and projections, and know costs must be subtracted from income to calculate break-even points and, we hope, some profit. At the end of the day, did the operation provide a return on the investment?

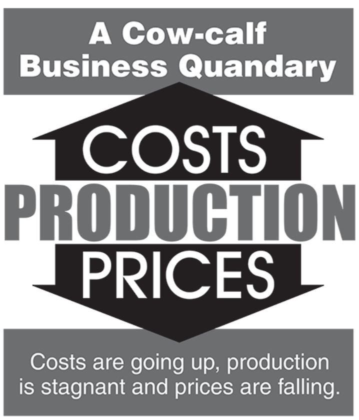
Where are these thoughts coming from? Once again, my usual source for some answers is the North Dakota Farm and Ranch Business Management Education Program database (http://www.ndfarmmanagement.com) and associated search tools in FINBIN (http://www.finbin.umn.edu/) from the Center for Farm Financial Management, University of Minnesota.

A review of North Dakota numbers from FINBIN for 2000 compared with 2014 certainly shows the upward spiraling change during the 14-year period.

Let's walk down the direct expense side of the numbers. FINBIN reports increases in expenses: feed supplements (protein, vitamins and minerals) up 294 percent, corn silage up 274 percent, alfalfa hay up 140 percent, grass hay up 165 percent, pasture up 200 percent and other feedstuffs up 154 percent. The total feed cost per cow is up 183 percent.

Veterinary costs are up 168 percent, supplies up 223 percent, fuel and oil up 311 percent, repairs up 231 percent and custom hire up 474 percent. Leases involved in livestock are up 103 percent. Marketing expenses are up 288 percent. Interest paid on operating is up 149 percent.

Total direct expenses have increased 191 percent since 2000. Overhead expenses also have increased 186 percent, and the cost of replacements have increased 225 percent.



So, costs are going up, production is stagnant and prices are falling. What can a producer do?

That is a difficult question because inflationary costs are going to happen. Service-orientated expenses also are inflationary. The service provider needs to have a salary increase to sustain the service. The same inflationary costs impact every business, and these costs are not unique to the cow-calf business.

The utilization of commodities offers some flexibility in moderating costs. However, hay costs are at the lower end of the percent price increase, indicative of commodity pricing. Calculating the cost per unit of energy and protein for all feed inputs is necessary to keep commodity prices as low as possible, although even the best input calculations spiral upward as feed wastage mounts up.

A good thought, but scary, as one drives down the feed lane spreading hay, is this: "Just how much of this hay are those cows actually eating?" Efficient feeding methods are critical to lower ever-increasing costs. Remember, any value-added commodity purchased reflects the cost of someone else's labor.

In short, these hidden labor charges inflate the cost of production. But once again, service is a component of value added. If producers can't do something themselves, they pay current labor rates to have someone else do the task.

To be honest, many businesses will look internally to increase production efficiency to offset inflationary costs. For the beef industry, as production has leveled, these added costs are very problematic. Producers cannot increase cost without any increase in output.

The increase in output is not occurring, so we need to ask, "Can the beef industry do as others do and increase production efficiency?" Perhaps, as difficult as it may be, peeking across the fence at the other competitive meats and asking how they manage efficiency would help. But cows are not chickens or pigs. The bottom line, weaning weight numbers imply that pounds of calf weaned off commercial cows are not increasing.

Pondering growth in the beef business

What is the beef industry doing with all the potential to grow meat in the business?

So much information is available today that producers need to make themselves stop and ponder what the information means. Continually marching down the path without input plus pondering does not create a thoughtful environment.

Recent discussions of costs and output in the beef cow industry need some of that pondering. As I ponder the concepts that make up the statement "Costs are going up, production is stagnant and prices are falling," lots of thoughts come up. In this ever-increasing cost environment, let's talk about production.

This was a point to ponder as I reviewed weaning weight averages from two sources of commercial cattle data. I grouped the data by five-year increments: 2000 to 2004, 2005 to 2009 and 2010 to 2014. The data is not directly comparable, but pondering certainly entails reviewing various sources of information.

The first set of data was heifers, steers and bulls in the CHAPS (Cow Herd Appraisal of Performance Software) data. The weaning weight numbers look like this: From 2000 to 2004, the average weaning weight was 550 pounds; from 2005 to 2009, the average weaning weight was 561 pounds; and from 2010 through 2014, the average weaning weight was 554 pounds.

The second set of data also was for heifers, steers and bulls in FINBIN from the Center for Farm Financial Management, University of Minnesota (http://www.finbin.umn.edu/). The weaning weight numbers from 2000 to 2004 noted the average weaning weight was 545 pounds; from 2005 to 2009, the average weaning weight was 558 pounds; and from 2010 through 2014, the average weaning weight was 545 pounds.

A lot of numbers go into those thoughts, thus the pondering point: CHAPS weights, 550, 561, 554; FINBIN weights, 545, 558, 545. That is the pounds weaned off commercial-type cowherds in North Dakota in five-year increments since 2000. The data is assumed to be typical of beef production and would imply that in the last 15 years, commercial beef producers are not increasing the pounds of calf weaned off the commercial cow.

That seems somewhat odd, but it also leads to my thought that production is stagnant. Actually, the CHAPS cattle leveled off in weaning weights even prior to the turn of the century, and these values for average weaning weight have been typical, even through the 1990s.

So has production truly stabilized? Keep in mind the reason for the question: If production is stable, then increased costs cannot be recouped by increased production pounds.

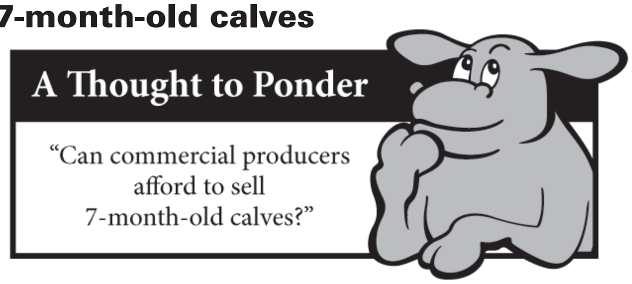
Just out of curiosity, I thought I should check out the American Angus Association because it publishes average weaning weights. The data were for bulls and heifers from the American Angus website (http://www.angus.org/NCE/AHIRAvg.aspx). The weaning weight numbers from 2000 to 2004 noted the average weaning weight was 606 pounds; from 2005 to 2009, the average weaning weight was 615 pounds; and from 2010 through 2014, the average weaning weight was 621 pounds.

I anticipated that the weaning weight values would be slightly greater than for the commercial producer, so now one can ponder CHAPS weights (550, 561, 554), FINBIN weights (545, 558, 545) and American Angus Association weights (606, 615, 621). Interestingly, the purebred weaning weights still are increasing in contrast to the commercial weaning weights. These numbers are moving in the same direction as the EPD (expected progeny difference) genetic trends for weaning weight within the American Angus Association (http://www.angus.org/NCE/GeneticTrends.aspx).

Going back an additional five years to account for the delayed effect of the genetic influence of purchased American Angus Association-registered bulls, the EPD value for weaning weight from 1995 to 1999 averaged 26.6 pounds; from 2000 to 2004, the average EPD value for weaning weight was 33.6 pounds; from 2005 to 2009, the average EPD value for weaning weight was 41 pounds; and from 2010 through 2014, the average EPD value for weaning weight was 48.4 pounds.

Here are more thoughts to ponder: If the cow-calf producer is not marketing the potential genetic growth that is bred into the cattle, why not? Or have we actually reached management levels that do not allow for full expression of growth? How does the cow-calf producer capture growth? Can a producer afford to sell 7-month-old calves? These questions lead to more thoughts and more pondering.

Can commercial producers afford to sell 7-month-old calves



We need to search for a profit. As costs rise and production levels off, spreading costs across a longer ownership period seems doable. But is it correct?

Let's look at the objective. By considering the 2014 calf prices abnormally high, budgeting for the future is challenging as prices drop. Budget development is challenging, but cost cutting is even more challenging. The actual implementation of a conservative budget, regardless of what business is being discussed, is never pleasant.

First, what are some realistic numbers to discuss? For income, after reviewing the last several years of income and expenses per cow from the Center for Farm Financial Management, University of Minnesota (http://www.finbin.umn.edu/), let's set expected gross margin conservatively at $600 per cow for the beef herd.

Why so low? Remember, gross margin accounts for the purchase and sale of all calves, cull cows and bulls, plus the expense of animals transferred in and overall changes in cattle inventory.

Let's ignore the abnormally high 2014 prices. For the years 2009, 2010, 2011, 2012 and 2013, cow herds garnered $630-plus in average gross margin for each cow. Building a budget on lower than average income creates more pressure on expenses. As long as total direct and overhead expenses are less than $600 per cow, some money remains.

But labor, management and return on investment need to be factored in for long-term success. Breaking even by generating dollars to meet expected gross margin doesn't work.

Let's keep moving and anticipate 2015 total direct and overhead expenses to exceed $650 per cow. Budget flags start to pop up as we ponder. As one thinks, the plan is to increase revenue and decrease expenses. Ultimately, the revenue side needs to be great enough to provide dollars for the cow-calf producer's labor, management skills and return on the investment.

Having taught cow-calf management for several years to typical university students, this is the point where faces become somewhat somber. The anticipation of returning home now has a cost. The cost has been manageable through the years, but with no homework, real-life failure starts to become a real possibility.

More Pondering Cow-calf Producer Points

How to make a $600 gross margin work with $650 expenses

I still am thinking on how to make a $600 gross margin work with $650 expenses. One way is to manage the total feed cost, which is 70 percent or more of the total direct costs. In addition, adding value to the calf is doable. Both suggestions were advanced by the students in this year's Dickinson State University cow-calf management class.

In simple terms, a thorough evaluation of feed costs is critical. A reminder: The goal for summer or winter feed needs should be evaluated and actual costs applied. Sometimes cows are on pasture when land charges make feeding in a dry lot more feasible. Other times, feed costs make pasture more feasible than the dry lot.

Perhaps, if a mistake is made in the evaluation of a budget, the main one often is not letting oneself think outside the constraints of the operation. Too many times, those constraints are set in a producer's mind but are not real when applied to the operation. Thinking past the present is critical.

Concluding thoughts

That being said, let's get back to the initial question: "Can commercial producers afford to sell 7-month-old calves?" The answer is imbedded in calving season, weaning time, grass turnout, labor requirements and many more intricate aspects of the whole cow-calf operation. These questions should lead to the assessment of the specific operational protocols on the ranch and, we hope, unveil hidden opportunities.

Within those opportunities are alternative marketing options. Fundamental to the answer on how to maximize pounds coming off the operation in respect to calf weight is knowing and controlling direct and overhead costs that have been incurred up to weaning so you can make comparisons of marketing alternatives.

What is the daily incremental cost of keeping the calf for additional days? Traditional thinking would imply backgrounding the calf, but most producers just want to run cows. But, as live weight at slaughter goes up and we market cattle at, say, 1,350 pounds of live weight, the opportunity for the producer to capture a greater percentage of the increased pounds of beef at harvest is real.

As cow-calf producers, do we actively seek an aggressive share of what we produced? Think about it.

Thank you for reading and may you find all you ear tags. Kris

UW Extension holstein steer finishing yardage cost survey[1]

Bill Halfman, UW-Extension Agriculture Agent, Monroe County; Adam Hady, UW-Extension Agriculture Agent, Richland County; Brenda Boetel, UW-Extension Livestock and Grain Marketing Specialist and UW-River Falls Department of Ag Economics, River Falls; David Kammel, UW Biological Systems Engineering Extension Specialist, Madison; Contributors: Hillary Bark, former UW Madison Animal Science Summer Intern, and Amy Radunz, UW-River Falls Animal and Food Science, River Falls; Reviewer: Gary Hachfeld, Farm Business Management Educator, University of Minnesota Extension

The objective of this survey was to gather information on yardage costs of production for Wisconsin dairy steer feedlot enterprises. Information was obtained from feedlot operations feeding at least 50% dairy steers. The data collected was producer's annual costs for finishing dairy steers from at least 300 pounds or reported higher placement weights though finishing. This data was then used to calculate costs on a daily basis.

This Holstein steer yardage survey focused on overhead, labor/management, bedding, and direct expenses generally associated with yardage costs. It did not include feed, animal, and veterinarian/ pharmaceutical related costs. This project was conducted by UW Extension and UW-River Falls and was partially funded with USDA Risk Management Agency grant funds.

Data was gathered by UW Extension Agriculture Agents from cooperating producers in 2012. There were 17 farm operations that had complete enough information to be included in the analysis.

Methods

Field data was collected by seven UW Extension Agriculture Agents and one summer intern using a general survey questionnaire to gather labor and bedding costs and use, and a spreadsheet that was adapted from the UW Extension Yardage Calculator (Hadley, Boetel and Halfman) to gather overhead data (cattle inventory, machinery, housing and facilities, feed storage, manure storage, etc.).

Labor and management data collected included paid and unpaid hours. Unpaid labor and management hours were hours of labor and management reported by the participants that they indicated as not paid a wage. Most of the unpaid labor and management were completed by the owner or their family, but we do not know that for sure. Wage rates were also collected from all cooperators who reported paid labor and management. For all unpaid hours of labor a wage rate of $10 per hour was assigned. A wage rate of $15 per hour was used for all unpaid management reported. A worksheet was prepared by Halfman that broke out tasks into daily, weekly, monthly, or less frequent tasks to help identify all the labor and management of the steer finishing operation.

Bedding data collected included type of bedding material(s) used, tonnage and cost. If farmers did not provide a cost/value due to using homegrown bedding, a standardized opportunity cost of $30 per ton for soybean stubble, $60 per ton for corn stalks and $90 per ton for straw was used.

Machinery data collected was for machinery and equipment used directly in the cattle feeding enterprise, not for growing and harvesting feed. Farmers provided a percentage of time used in the cattle feeding enterprise for machinery and equipment that was used on several enterprises on the farm. Farmers were asked to provide model, size, age, estimated current market value, and years they intended to keep each piece of machinery. An ending/salvage value for the machinery and equipment, to determine straight-line depreciation, was determined using the "percentage of new list price" procedure outlined in the Iowa Ag Decision Maker Fact Sheet A3-29 Estimating Farm Machinery Costs (Appendix Table 1). New list prices for machinery and equipment were obtained from implement dealers in western Wisconsin. A five percent increase was added to annual depreciation to account for the cost of machine storage if the equipment was stored inside. Area implement dealers and Hotline Farm Equipment Guide were used to determine current market prices of items that the farmers were not sure of or did not provide current market values for.

Because of large variations in the age, design, and condition of buildings and facilities on surveyed operations, no single method of determining fixed costs for those items adequately fits all situations. In an effort to standardize determination of fixed costs for facilities across operations, a replacement value for feedlot, housing, feed bunks, cattle handling, and manure storage facilities was assigned using replacement values that were provided by Dr. David Kammel, UW Extension

Agriculture and Bio-Systems Engineer (Appendix Table 2). Grain bin values were obtained from Steel Grain Bins from the Michigan Department of Treasury (Appendix Table 3). All facilities were assumed to have a 20 year useful life and straight line depreciation was applied using the replacement cost. The justification for this procedure is that for an operation to be sustainable, it must generate enough revenue to be able to replace items when they are worn out, or pay for them over their useful life. If an item no longer has a debt assigned to it, but still has a useful life a cost should be charged to it that can be applied to replacing it, once that time is determined by the owner.

A list of related expenses typically considered part of yardage costs was collected from cooperating farms. These included, but are not limited to taxes, insurance, utilities, fuel, repairs, custom hire, interest, permits, and marketing. The cooperators were asked to report the total for the entire operation and estimate what percent of each was incurred by the cattle finishing operation.

Cattle days on feed were determined by the cooperating farms describing how many head they had on hand and how many days they would be on site. Most operations reported that they typically had a consistent number of head at the farm all year. We used the reported daily average number of cattle in inventory multiplied by 365 days to determine cattle days for farms reporting always having cattle in inventory. For farms that reported having cattle in inventory less than all year long we used the number of days reported.

Overhead costs were calculated for each operation using the data collected as described above and the data was pooled to calculate ranges and averages.

Results

There were seventeen cooperating farms with adequate data to calculate yardage costs. These operations ranged in size from 34 head on feed to 1000 head on feed. The average number of head on feed was 178 and the median was 127 head on feed. This wide range is typical of the variability of feedlot enterprise size that we see in Wisconsin.

The average yardage cost including paid and unpaid labor/management and bedding for cooperating farms was $0.96 per head per day. The median was $0.85 per head per day. The range was $0.47 per head per day to $1.45 per head per day. Table 1 is an itemized list with the ranges of costs for the different areas used to calculate yardage.

Figure 1 shows the yardage across the 17 farms in the survey. The costs are combined into the following similar groups; 1. Taxes, Insurance, Dues & fees, and Interest, 2. Fuel & oil and Utilities, 3. Paid labor and Management, 4. Unpaid labor and Management, 5. Machinery and Facility Repairs, 6. Hired Cattle Hauling, Miscellaneous, and Advertising. Machinery depreciation and leases, Building/ Facility depreciation and leases, and bedding are shown individually.

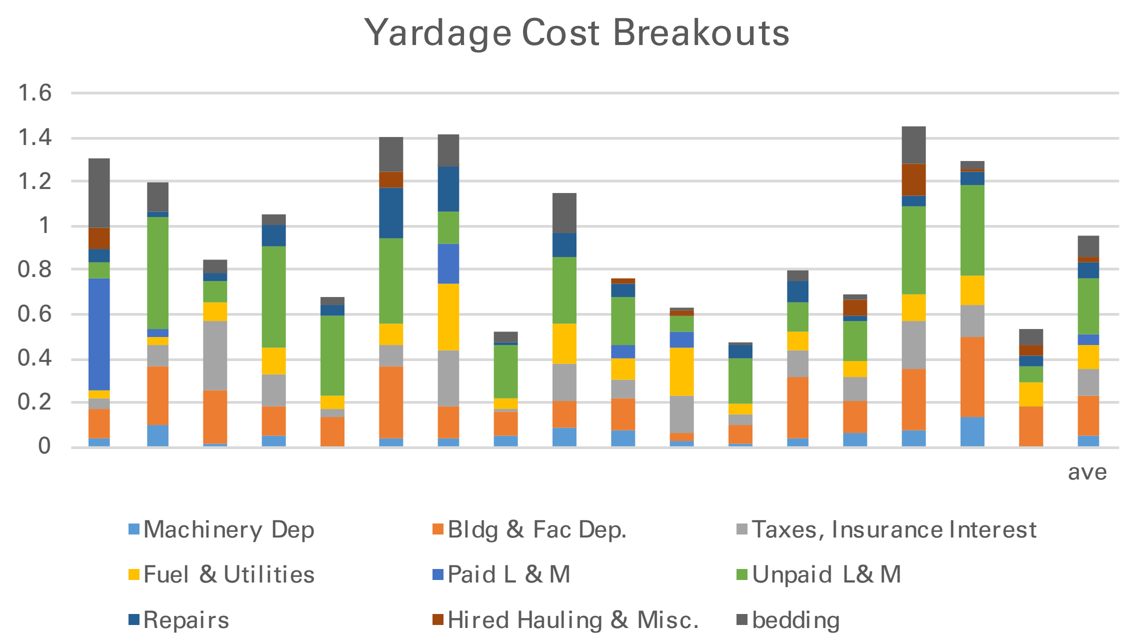


Figure 1. Yardage Costs Broken Out by Category

Table 1. Breakdown of Yardage Components (all costs in dollars per head per day)

Cost	Number of Farms Claiming	Low	High	Average	Median
		---------------------- $ per head per day ----------------------			
Taxes	15	0.00	0.08	0.02	0.02
Insurance	all	0.00	0.10	0.03	0.03
Dues and Fees	9	0.00	0.07	0.01	0.00
Intermediate and long term interest	11	0.00	0.22	0.06	0.01
Fuel and Oil	all	0.01	0.23	0.09	0.07
Utilities	14	0.00	0.07	0.02	0.02
Paid Labor	5	0.00	0.51	0.05	0.00
Paid Management	1	0.00	0.02	0.00	0.00
Unpaid Labor	16	0.00	0.44	0.19	0.17
Unpaid Management	16	0.00	0.24	0.06	0.05
Machinery Repairs	16	0.00	0.20	0.04	0.03
Facility Repairs	15	0.00	0.18	0.03	0.02
Hired Cattle Hauling	7	0.00	0.15	0.02	0.00
Miscellaneous	3	0.00	0.07	0.01	0.00
Advertising	3	0.00	0.01	0.00	0.00
Machinery depreciation and lease	all	0.00	0.13	0.05	0.04
Building /Facility depreciation & lease	all	0.03	0.37	0.18	0.15
Bedding	16	0.00	0.25	0.08	0.09
Permits and Certifications	0				

Values in the table are rounded to the nearest cent.

Summary

The average yardage of $ 0.96 is more than most producers would expect. There was a wide range in variability in yardage costs across participants, which was not unexpected. This variability demonstrates the extreme importance that cattle finishers calculate their own costs and evaluate them for their strengths and areas where improvements can be made.

Acknowledgements

The project leaders would like to thank the UW Extension Agriculture Agents who contacted cooperating farmers and collected the data, and the cooperating farmers who participated in this project.

Appendix

Appendix Table 1. Percentage Values used to Determine Salvage Values of Machinery adapted from Iowa Ag Decision Maker Fact Sheet A3-29 Estimating Farm Machinery Costs

Tractor <80HP		Tractor 80+HP		Pickup Truck		Other		Manure Spreader	
Age	% of New Similar Item	Age	% of New Similar Item	Age	% of New Similar Item	Age	% of New Similar Item	Age	% of New Similar Item
1	60	1	68	1	42	1	56	1	69
2	54	2	61	2	39	2	50	2	62
3	50	3	57	3	36	3	46	3	56
4	46	4	53	4	34	4	42	4	52
5	43	5	49	5	33	5	39	5	48
6	41	6	46	6	31	6	37	6	45
7	38	7	44	7	30	7	34	7	42
8	36	8	41	8	29	8	32	8	40
9	34	9	39	9	27	9	30	9	37
10	33	10	37	10	26	10	28	10	35
11	31	11	35	11	25	11	27	11	33
12	29	12	33	12	24	12	25	12	31
13	28	13	32	13	24	13	24	13	29
14	27	14	30	14	23	14	22	14	28
15	25	15	29	15	22	15	21	15	26
16	24	16	28	16	21	16	20	16	25
17	23	17	26	17	20	17	19	17	24
18	22	18	25	18	20	18	18	18	22
19	21	19	24	19	19	19	17	19	21
20	20	20	23	20	19	20	16	20	20
21	19	21	22	21	18	21	15	21	19
22	18	22	21	22	17	22	14	22	18
23	17	23	20	23	16	23	13	23	17
24	16	24	19	24	15	24	12	24	16
25	15	25	18	25	14	25	11	25	15
26	14	26	17	26	13	26	10	26	14
27	13	27	16	27	12	27	9	27	13
28	12	28	15	28	11	28	8	28	12
29	11	29	14	29	10	29	7	29	11
30	10	30	13	30	9	30	6	30	10
31	9	31	12	31	8	31	5	31	9
32	8	32	11	32	7	32	4	32	8
33	7	33	10	33	6	33	3	33	7
34	6	34	9	34	5	34	3	34	6
35	5	35	8	35	4	35	3	35	5
36	4	36	7	36	3	36	3	36	4
37	3	37	6	37	2	37	3	37	3
38	3	38	5	38	1	38	3	38	2
39	3	39	4	39	0	39	3	39	2
40	3	40	3	40	0	40	3	40	2

Other Column would include machinery like TMR mixers, feed grinders, skid loaders etc. To determine the salvage value of an item, the value of a brand new like item was multiplied by the percentage shown by age of the current item at its time of replacement.

Appendix Table 2. Building and Facility Cost Estimates Used, by Dr. David Kammel, UW Extension Bio-Systems Engineer. s.f = square foot, l.f. = linear foot, and c.f. = cubic foot

	Quantity	Unit	Cost
Outside Lots (exercise lots)			
Pasture		s.f	Cost reflected in fence cost
Dirt lot		s.f	Cost reflected in fence cost
Concrete lot		s.f	$2.75
Waterers			
Heated and insulated		each	
2′		each	$500.00
3′		each	$700.00
4′		each	$800.00
6′		each	$900.00
7′		each	$1,100.00
Energy free water			
2 hole		each	$700.00
4 hole		each	$900.00
Plastic water tank			
50 gallon		each	$100.00
100 gallon		each	$125.00
300 gallon plastic		each	$200.00
600 gallon plastic		each	$300.00
Sources: http://www.barnworld.com/sa/c/Stock_Tanks.htm http://www.livestockshed.com/livestock_feeders.html			
Feeding Systems			
Concrete H bunk		l.f.	$25.00
Concrete J bunk		l.f.	$25.00
3 ft flat floor platform with 21 in curb and posts 10 ft on center with rail			
With post and rail feeder barrier		l.f.	$30.00
With diagonal bar feeder barrier		l.f.	$36.00
Mechanical bunk feeder		l.f.	$100.00
Mechanical conveyor		l.f.	$75.00
Slant bar feeder wagon		l.f.	$275.00
Feeder wagon on running gear, feed on both sides		l.f.	$140.00
Steel feed bunk portable, feed both sides		l.f.	$50.00
Poly feed bunk portable, feed both sides		l.f.	$20.00
Round bale feeder		each	$400.00
Steer Stuffers:			
65 bushel, 50 head		each	$1,500.00
100 bushel, 50 head		each	$1,700.00
150 bushel, 75 head		each	$2,300.00
Sources: http://www.barnworld.com/sa/c/Stock_Tanks.htm http://www.livestockshed.com/livestock_feeders.html http://www.zabelequipment.com/conveyor-1600.html			
Cattle Handling			

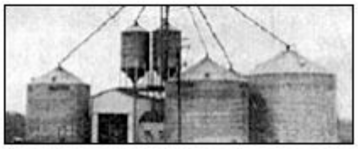
	Quantity	Unit	Cost
Hydraulic chute with headgate		each	$15,000.00
Squeeze chute restraint with headgate		each	$5,000.00
Self-catch headgate, mechanical		each	$1,500.00
Scissors headgate		each	$900.00
Palpation cage		each	$900.00
Portable loading chute		each	$5,700.00
Crowding tub 180 degree		each	$2,700.00
Scale, 2400 lb capacity		each	$5,000
Working alley, 2 panels/sides		l.f.	$60.00
50" high 2" pipe Fence panels		l.f.	$15.00
Corral panels		l.f.	$20.00
Holding pen, 10' x 10'		s.f.	$28.00
Sources: http://www.beavervalleysupply.com/sectionj/begates.htm http://www.livestockshed.com/livestock_feeders.html			
Shelter			
Shade shelter pipe frame			
20' x 20'		each	$1,200.00
40' x 40'		each	$3,300.00
60' x 60'		each	$6,500.00
100 x 100'		each	$14,100.00
200' x 200'		each	$49,000.00
Shade cloth, 16' roll		s.f.	$0.22
Shade cloth panels, hemmed grommetted		s.f.	$0.40
Source: http://www.farmtek.com/farm/supplies//ProductDisplay?catalogId=10052&storeId=10001&langId=-1&division=FarmTek&productId=13392			
Windbreak shelter pipe frame 10' high		l.f	$20.00
Hoop barn /no floor		s.f.	$6.00
Hoop barn materials only/no floor		s.f.	$4.00
Add concrete floor under shelter		s.f.	$2.75
Post frame roof open front/no floor		s.f.	$9.00
Steel frame roof open front/no floor		s.f.	$12.00
Post frame total confinement		s.f.	$20.00
Two story barn basement		s.f.	$5.00* (estimate)
Two story mow space		s.f.	$5.00*
Manure Storage			* Pro-reated value for old dairy barns
Concrete stacking pad with buck wall		s.f.	$3.50
Slatted floor tank under shelter		c.f.	$1.50 ($0.20/gal) *gallon= cf x 7.5*
Concrete vertical wall tank		c.f.	$0.90 ($0.12/gal)
Clay lined lagoon		c.f.	$0.25 ($0.03/gal)
Concrete line lagoon		c.f.	$0.50 ($0.07/gal)
Runoff Control			
Vegetative treatment area		acre	$1,000.00
Feed storage			
Horizontal silo concrete walls		c.f.	$0.52

	Quantity	Unit	Cost	
Vertical silo		c.f.	$1.40	
Concrete feed storage pad		s.f.	$2.75	
Asphalt feed storage pad		s.f.	$2.30	
Bulk feed bin				
3 ton		each	$1,200.00	
6 ton		each	$1,500.00	
9 ton		each	$2,200.00	
12 ton		each	$3,000.00	
Hay storage				
Post frame shelter no floor		s.f.	$9.00	
Hoop shelter no floor		s.f.	$5.00	
Hoop shelter materials only		s.f.	$3.00	
Fencing no labor costs				**2011 adj. costs**
Woven wire		l.f.	$1.07	$1.23
Barb wire 5 strands		l.f.	$0.82	$0.94
+/- 1 strand		l.f.	0.04	$0.05
HT wire 8 strands		l.f.	$0.79	$0.91
+/- 1 strand		l.f.	$0.02	$0.02
HT electric 5 strand		l.f.	$0.52	$0.60
+/- 1 strand		l.f.	$0.02	$0.02
Polywire electric 1 strand		l.f.	$0.16	$0.18
+/- 1 strand		l.f.	$0.03	$0.03
Polytape		l.f.	$0.21	$0.24
Source: Iowa State University, Estimated costs for livestock fencing 2005 costs				

Appendix Table 3

STEEL GRAIN BINS

STANDARD BINS: Costs are averages for utility-type storage bins usually found on farms and ranches. Costs of standard bins are for tank with door and manhole, erected on the buyer's slab. Height is to top of shell. Cost of ventilated floor includes floor, auger tube, and steel columns and beam supports of plenum assembly.



ADJUSTMENTS:

Ladders: . . . . $48.75 plus $6.90 per linear foot

For safety cages, add: . . . . $13.25 to $16.75 per linear foot installed

Auger and drive: . . . . $255.00 plus $25.00 to $30.50 per foot of bin diameter

For small feed tanks, use $75.00 to $90.00 per foot. Add $3,575 for scale.

For spreaders, add: . . . . $500.00 to $750.00

For stirrators, add: . . . . $130 to $200 per foot of bin diameter

DIAMETER (Feet)	HEIGHT (Feet)	CAPACITY (Bushels)	COST WITHOUT FLOOR	ADD FOR CONCRETE FLOOR	ADD FOR STEEL FLOOR	ADD FOR VENTILATED FLOOR	ADD FOR FAN AND HEAT
15	8	1,125	$ 3,150	$ 450	$ 330	$ 1,175	$2,400
	13	1,850	4,575	475	330	1,175	2,400
	16	2,275	4,975	575	330	1,175	2,400
18	11	2,250	4,600	600	440	1,600	2,550
	13	2,650	5,150	600	440	1,600	2,550
	16	3,275	5,725	625	440	1,600	2,550
	21	4,300	7,650	675	440	1,600	2,550
21	13	3,625	5,375	850	590	2,150	2,650
	16	4,450	6,075	850	590	2,150	2,650
	24	6,675	10,000	950	590	2,150	2,650
24	16	5,825	6,625	1,100	735	2,750	2,725
	19	6,900	8,475	1,125	735	2,750	2,725
	24	8,725	11,475	1,225	735	2,750	2,725
	32	11,625	14,775	1,300	735	2,750	2,725
27	19	8,750	10,300	1,475	910	3,475	2,850
	24	11,025	14,025	1,575	910	3,475	2,850
	32	14,725	17,575	1,675	910	3,475	2,850
30	19	10,775	11,525	1,650	1,130	4,250	2,950
	24	13,625	16,000	1,775	1,130	4,250	2,950
	32	18,175	20,100	1,975	1,130	4,250	2,950
33	24	16,475	17,725	2,050	1,320	5,100	3,025
	27	18,550	20,050	2,100	1,320	5,100	3,025
	32	21,975	24,950	2,550	1,320	5,100	3,025
36	24	19,625	21,575	2,575	1,540	6,000	3,025
	27	22,075	23,475	2,675	1,540	6,000	3,075
	32	26,150	26,100	2,775	1,540	6,000	3,075
	40	32,700	28,925	2,950	1,540	6,000	3,075
42	27	30,050	28,450	3,650	2,065	8,100	3,225
	32	35,600	32,525	3,875	2,065	8,100	3,225
	40	44,500	39,650	4,075	2,065	8,100	3,225
	48	53,425	47,200	4,400	2,065	8,100	3,225
48	27	39,250	41,150	4,775	2,640	10,450	3,350
	32	46,500	48,900	5,050	2,640	10,450	3,350
	40	58,150	55,000	5,300	2,640	10,450	3,350
	48	69,775	61,650	5,750	2,640	10,450	3,350

Source: Michigan Department of Treasury, 2003