3.0 SITE SELECTION AND PLANNING

3.1 Site Selection

The selection of a site for a feedlot is an important decision that has a strong influence on the economic and environmental sustainability of an operation.

A good site will provide many of the elements required for a feedlot to be successful in both the short and long term. Feedlot operators must balance the economic forces affecting their operation with consideration of issues such as environmental protection, animal welfare, food safety and other stakeholder concerns.

Selection of the appropriate site for feedlot development will also provide the opportunity to meet longer-term goals such as future expansion. Expansion opportunities are largely determined at this time and therefore should be considered when selecting a feedlot site.

Whether selecting for a large commercial feedlot or a small backgrounding operation, the site selection principles remain the same. However, finding an appropriate site for a large feedlot may require additional investigation to accommodate present and future needs. All beef cattle feedlots require similar resources to operate effectively, while ensuring environmental sustainability and acceptable levels of impact on neighbours and neighbouring land uses. The size of the feedlot does not change these requirements, only the level of demand and the magnitude of potential impacts.

Expansion of an existing feedlot will require equal consideration of the feedlot's business plan resource requirements and environmentally sustainability issues.

This section will provide feedlot operators with the basic process for site selection. When considering a new or expanded feedlot, operators should contact the Natural Resources Conservation Board (NRCB) Approval Officer for information and advice.

When evaluating potential sites, it is important to include the interests of other stakeholders, such as neighbours (residence and landowner) and the local municipality.

The following steps outline the process that follows the business plan:

- Assess local/community perception of feedlot developments.
- Gather development application requirements from the NRCB.
- Evaluate the ability of the site to meet development requirements of Minimum Distance Separation (MDS), land base, soil and groundwater investigation.
- Evaluate resource base, water supply, land, and rural services.
- Complete management plans as they relate to specific site.
- Share intent with stakeholders.
- Complete and submit required applications.
- Build upon approval, or return to development process.

When a suitable site has been located, based on the preceding checklist, apply to the NRCB for the approval. To speed up the decision-making process, work with the NRCB Approval Officer to ensure all the necessary information is included. The permit process is dependent on having complete information for the application. Delays in providing this information will delay both the process and a decision on the application.

Refer to the NRCB offices or Web site www.nrcb.gov.ab.ca/ILOpage.html for an application form.

3.1.1 Assess local/community perception of feedlot developments

Assess community and neighbours' perceptions of the feedlot industry and the potential development. Determine how previous concerns regarding livestock developments in the area were handled. Identify community and local leaders who will have an impact on or be impacted by the development. This allows analysis of the risk of future opposition and saves time and money. It is important to address all concerns, both real and perceived.

3.1.2 Gather development approval requirements

At this stage, producers should contact the NRCB Approval Officer to determine application requirements. The Approval Officer will describe the applicable approvals required under the *Agricultural Operation Practices Act* (AOPA), *Water Act* and *Public Lands Act.*

The application form must contain all the necessary approvals for the feedlot operation (e.g., an application for *Water Act* licence from Alberta Environment). Once the application is prepared and submitted to the NRCB, the Approval Officer screens the application to ensure the necessary information is included. The Approval Officer will then forward the completed application to other agencies for approvals, such as a *Water Act* licence. Alberta Environment is responsible for the allocation of water resources, under the *Water Act.* Any water diversion also requires a permit from Alberta Environment.

The application is reviewed to ensure that it has all of the relevant information required to make a decision on the application. Once this information is provided, the application is deemed complete. Depending on the size of the operation (approval vs. registration), the NRCB may be required to notify affected parties of the proposed operation. Municipalities are always notified of an application.

Parties that might be affected by the operation, such as neighbours or municipalities, may submit statements of concern. These statements of concern will be reviewed. Attempts will be made to resolve issues raised by affected parties. Once all the input from the municipalities, Alberta Environment *(Water Act),* etc., have been received, the Approval Officer makes a decision on the application. The Approval Officer has three options: to approve the application, reject it, or approve with conditions.

An approval for the development must be issued before construction begins on the feedlot operation.

Regional health authorities, Alberta Environment, Sustainable Resource Development (Public Lands) and Alberta Transportation may receive referrals on development applications. These provincial government agencies have the responsibility to investigate and take action if a livestock operation has or exhibits the potential to have significant negative impact on public health, the environment or transportation infrastructure.

3.1.3 Conduct a site assessment

Assess the site's capacity to meet the geographical, physical and regulatory requirements of a livestock development. A general assessment of the geographical requirements of the development should have been done in the business plan phase. Assess the site based on its ability to provide convenient access to the infrastructure and resource base required to manage the proposed operation.

Ensuring suitable climatic conditions is generally not a pressing issue, as most locations in Alberta have a climate suitable for successful beef production. However, there may be local factors that influence the siting of the development such as wind, air drainage, other livestock operations and environmental concerns.

3.2 Siting Considerations

3.2.1 Minimum Distance Separation standards (MDS)

MDS is the setback or buffer established between the outside walls of neighbouring residences (not property line) to the point closest to the developing livestock facility, manure storage, runoff catch basin, compost area, feeding pen or barn of the Confined Feeding Operation (CFO). MDS for various sizes of livestock operations are identified in AOPA, Schedule 1 (www.nrcb.gov.ab.ca/aoparegs.html).

3.2.2 Setbacks from physical features

Proper site selection includes a constant awareness of environmental sustainability. Each site consists of a unique set of physical circumstances that include topography, surface water (both seasonal and continuous) and physical barriers, such as trees. These features also need to be considered when evaluating a potential site.

3.2.3 Separation between livestock operations

Consider other livestock operations when selecting a site for a new operation. Providing an adequate separation distance from other livestock operations is an important step in preventing the spread of livestock disease and cumulative nuisance effects. Consult a veterinarian to determine adequate separation distances from other livestock to prevent the transfer of disease.

3.2.4 Separation from water bodies

Protection of surface water involves both appropriate siting and manure management. Properly designed and constructed feedlot pens are not considered to be manure storages. However, feedlot catch basins are considered to be manure storages. For information on the siting of the structural component of a feedlot, refer to AOPA (www.nrcb.gov.ab.ca/aopa.html).

3.2.5 Steps to avoid nuisance

All physical elements of the site will have an impact on potential nuisance levels. Prevailing wind intensity, direction, duration and frequency play an important role.

Wind. Prevailing wind is an important factor to consider, but the direction can vary between seasons. During summer, when odours are more intense and neighbours are outdoors more often, it is important to consider the direction of the prevailing winds. Also consider the effects of the absence of wind on summer evenings; for example, under calm conditions, odours will not disperse as readily.

Air drainage. Under calm, summer conditions, the air near the ground can cool and drift down a slope. This is known as air drainage. This may occur frequently during calm summer evenings. This is also the time when people are most likely to be outdoors.

Annual precipitation levels are also an important consideration. Topography and elevation will also have an impact. Natural physical features can provide both visual screening and actual filtering. Awareness of the unique physical features of the site will enhance utilization of its strengths, and help to manage its weaknesses.

3.2.6 Permeability of the site

A primary component of feedlot site selection is protection of the groundwater. Soil physical characteristics must ensure a maximum permeability rating. Avoid porous soils or sites that may consist of fractured bedrock.

3.2.7 Groundwater investigations

Groundwater investigations are required to confirm site suitability. The proposed site must offer water conditions that minimize the potential for groundwater contamination.

Water table evaluation will impact the design and cost of manure storage structures. Avoid shallow groundwater areas or areas close to surface water bodies.

3.2.8 Evaluate resource base

Determine whether the site offers the required resource support necessary for the proposed operation. This will include availability of water, feed or land base necessary to produce feed and proximity to purchased input requirements and labour.

3.2.9 The water resource

An integral part of site selection is the availability of a reliable water source for livestock consumption.

- An ample supply of good quality water is essential to any livestock operation.
- Water quantity is usually more important than water quality.
- Water requirements will vary with animal size, air temperature, diet, moisture content of the feed, and water quality.

The following chart, summarized from information developed by the Department of Animal Science, University of Nebraska, gives an estimate of water intake of feedlot cattle at different weights and average air temperatures.

Figure 3.1 Effect of Temperature on Water Intake

	Animal weight			
Average temp.	**600 lb.**	**800 lb.**	**1000 lb.**	**1200 lb.**
	gal (U.S.)			
2°C	5.5	7	8.5	9.5
10°C	6.5	8	9.5	10.5
20°C	8.5	10	12	14
25°C	9.5	12	14	16
30°C	14	17	20	22.5

Conversions: 1 U.S. gallon = 3.8 litres, 1 U.S. gallon = 0.8 Imperial gallons

As a rule of thumb, a typical Alberta feedlot, holding cattle weighing 250–550 kilograms, will use about 38–57 litres of water per head per day, but that could increase to about 76 litres per head per day on peak demand days. Design the system to supply 152 litres/day during peak consumption (e.g. finished cattle on high-energy ration during hot summer). The following factors should also be considered:

Water sources. In Alberta, water wells and dugouts are the most common sources of supply. Preferred are wells that can supply a consistent quantity of quality water. Dugouts are used where groundwater is not an option. These dugouts are filled by collecting spring runoff or are filled from irrigation canals, creeks, rivers, or lakes.

Wells and water licensing. It is extremely important that the amount of water pumped from a well does not exceed the recharge capacity of the aquifer supplying the well. If the recharge is exceeded, the groundwater will be "mined," and the operation will not be sustainable.

Before starting construction of a feedlot, assess the groundwater potential. This is not only good planning; it is required as part of the licensing process administered by Alberta Environment. The onus is on the developer to prove that water supplies are adequate.

The best approach is to consult with a hydrogeologist (AAFRD, PFRA, or private), to assess the groundwater potential for the area, supervise the drilling and testing and assist with the licensing process.

A water licence must be applied for under the *Water Act.* The well must be constructed to Alberta Environment standards and may only tap into one aquifer. The well must be pump tested for at least 24 hours and the results must be interpreted by a qualified hydrogeologist to estimate the safe yield of the well. A survey of neighbouring domestic water requirements and other well licences in the area will also be required. Ongoing monitoring of water use and water levels may be required as conditions of the licence.

Once a licence is issued, the operation will have first priority on the amount of water that is stipulated by the licence, over any other licensed users that apply later.

For more detailed information on licensing contact an Alberta Environment office at:

Peace River: 780-624-6167
Stony Plain: 780-963-6131
Edmonton: 780-427-5296
Red Deer: 403-340-7740
Calgary: 403-297-6675
Lethbridge: 403-381-5994

Dugouts and water licensing. The size of dugout required for a given feedlot will vary with the water requirements of the operation, the refill frequency of the dugout and assumptions for seepage and ice thickness.

Dugouts that are filled only by spring runoff should be designed to hold at least a two-year water supply, unless an alternative source can be used to fill the dugout in a drought year. Dugouts in the irrigation area of the province or dugouts adjacent to rivers or lakes must be at least large enough to supply water from the time the water is not available in the fall until water flows again in the spring. A one-year storage capacity is the recommended capacity for these dugouts. Planning and design information is available through Prairie Farm Rehabilitation Association (PFRA) or Alberta Agriculture, Food and Rural Development (AAFRD) water specialists.

Dugout water sources for feedlots will also require a licence. The licence protects the licensee from other water users that may be competing for the same water. If a new water user (other than a household) has a negative impact on a feedlot's water supply, the feedlot operator will have priority for the licensed amount. When issuing a licence, Alberta Environment will want to ensure that the water use will not negatively affect other licensed users, household users or the watershed itself.

Approvals are also required to pump water from lakes and rivers, even if the situation is temporary.

For licensing information, contact Alberta Environment at the numbers listed above or through their Web site: www.gov.ab.ca/env/water/Legislation. Feedlot operators can also link to the Alberta Environment's site through Ropin' the Web at www.agric.gov.ab.ca.

Steps to prevent contamination of wells and dugouts. Agricultural activities around a well or dugout may have negative impacts on water quality. To prevent well and dugout contamination, ensure the following:

Wells

- Wells must be properly constructed and sealed.
- Locate wells up-slope, away from sources of contamination.
- Properly plug any old unused wells to prevent contamination of newer wells.
- Do not over-apply manure; nitrate seepage can contaminate groundwater.
- Build manure storage structures or catch basins so that they will not seep into groundwater.

Dugouts

- Construct dugouts in proper drainage areas, away from potential sources of contamination.
- Apply manure and fertilizers to meet crop nutrient needs. Excess soil nutrient levels can lead to excess nutrient levels in the runoff water. This causes increased algae and weed growth in dugout water.
- Do not spread manure on snow or frozen ground. If it is necessary to do so, follow AOPA, Schedule 3. Research in Manitoba showed 10 to 60 times as much phosphorous in spring runoff from winter-spread fields, compared to control fields.
- Maintain manure storages, catch basins, sewage lagoons to prevent runoff or seepage.

Contact the local AAFRD Water Specialist to develop a plan to protect the operation's water resource.

3.3 Water Quality

Water quality assessment should consider:

- Mineral content.
- Aesthetic qualities (taste and odour).
- Microbiological quality or biological parameters.
- Depending on the water quality, feedlot diets should be adjusted for any excesses or deficiencies in water quality. Contact a nutritionist.

Mineral content

- If the Total Dissolved Solids (TDS) is less than 1,000 mg/L, the water is likely of excellent quality.
- If the TDS level is high, nutritionists may adjust the salt levels and salt type in the ration to compensate for the water.
- TDS over 3,000 mg/L is questionable, but the suitability will depend on the specific minerals in the water.

Sulphate

- Sulphate levels over 500 mg/L may interfere with copper (and other trace mineral) absorption and can have a laxative effect on some animals.
- High sulphate levels give water a bitter taste and cattle will not drink it if there is an alternate water source.
- Information on the maximum sulphate level is quite variable. As a general rule, less than 1,000 mg/L is acceptable. Levels over 1,500 mg/L caused reduced weight gain in one study. Very high levels of sulphate in water and feed can cause a brain disorder called polioencephalomalacia. If using high-sulphate water, monitor animal performance closely.

Nitrate. Levels less than 100 mg/L are considered safe for livestock, but levels over 10 mg/L can be considered contaminated and unsuitable for human consumption. The 100 mg/L level is a conservative figure, based on the potential for nitrate poisoning in weak, young or pregnant animals. Most feedlot animals should be able to tolerate higher levels. High nitrates in the feed supply can compound the problem. Nitrate poisoning symptoms include bluish or brownish discolouration of nonpigmented areas (around the eyes and mouth), sluggish or staggering gait, rapid heartbeat, frequent urination and laboured breathing. Elevated nitrate levels are a warning sign of nitrate poisoning. Investigate the source of nitrate and eliminate, if possible. Seepage from manure stockpiles, inactive feedlot pens, or over-application of manure are the most likely sources of nitrate in water.

Taste and odour. Taste and odour qualities of the water supply are often overlooked, but can be very important. If the water tastes or smells bad, livestock will consume less. Odours, such as hydrogen sulphide, can reduce water consumption and affect production. These odours are usually associated with decaying aquatic plants and algae in dugouts. Some wells also contain significant levels of hydrogen sulphide.

Biological parameters. Pathogenic organisms may be present in manure. Maintain a good water supply by minimizing the risk of manure contamination. Fecal coliform bacteria tests are used as an indicator of fecal contamination. These bacteria will not likely cause illness themselves; however, their presence may suggest the presence of other fecal pathogens. Several diseases can be spread through animal waste including leptospirosis, and salmonellosis. Parasites can also be spread through contaminated water, e.g., *Cryptosporidia, Giardia.*

Another major biological concern is algae toxin. Heavy blooms of blue-green algae can result in animal illness or death. These algae can be a problem in surface water sources. Thriving in warm stagnant water, they can kill animals within minutes. Control algae blooms with appropriate treatment of the water reservoir. Often simple aeration will prevent the conditions preferred by toxic species. Treatment with hydrated lime, alum or copper sulphate will often control algae. It is important that algae be controlled before they become a problem.

Often an adjustment period is required when cattle are moved. Sometimes, to maximize production, poor quality water must be diluted with better quality water during this adjustment period.

Land base. The land base must meet the agronomic and proximity requirements to be economically feasible. In short, the land needs to be suitable for the required crop production and close enough for economic feed production and manure application. The land base required must be based on the agronomic use of manure. It may be necessary to engage in spreading agreements with neighbours or explore alternate uses for the manure. For the minimum land base requirements, contact the development officer at the NRCB and review AOPA, Schedule 3.

Rural service. Any off-site inputs require reasonable access to related agribusiness and human resource sources. Good road access to the site is critical. The availability of utilities, such as power and gas, are also significant factors affecting site selection.

3.3.1 Complete management plans as related to specific site

It is extremely important for feedlot producers and the stakeholders, that clear, functional and appropriate management plans are developed. This includes the overall operational plan as it relates to AOPA. A comprehensive nutrient management plan, with supporting records, is also to be completed as per AOPA. The management plan should outline pen management, transport to storage, storage period and land application as directed by the nutrient management plan, as well as information on disposing of waste, such as dead animals and pesticides (see Section 8).

It is important to be prepared with a clear, informed message regarding management intentions as they relate to minimizing nuisance (specifically odour) and meeting the requirements for a livestock operation.

3.3.2 Share intent with stakeholders

A new project generally represents some form of change to a community. Typically, 5 to 10 percent of community members will support the project initially and 5 to 10 percent will oppose it. Opponents or supporters are unlikely to change their position. The remaining 80 percent, called the silent majority, are either undecided, indifferent or skeptical about the project. Failure to bring the silent majority on side can lead to opposition and can seriously jeopardize the project. Various communication strategies can be used to win the support of this group. Open public participation is one communication strategy that has proven to be successful.

It is wise to begin by consulting with the community. This helps to build trust, understanding and support for the project. If the project proceeds too far before the public is informed, there may be problems with rumours and misinformation. Under AOPA, directly affected parties will be notified by the NRCB and will have an opportunity to review the application and raise concerns. Members of the public will also have an opportunity to review an application for an approval and may also submit statements of concern together with reasons why they should be considered to be directly affected parties.

Public participation is not the only way to gain community support, but it is a powerful approach for paving the way. The following points outline key considerations and communication strategies for public participation in a successful project.

Knowing your community is critical to building support. One of the first steps is to identify the individuals and organizations in the community who will be affected by the project. How might they be affected? What information do these individuals want and need? Could the project be changed to better meet their needs? What is the history of the community? What areas had problems initiating new projects in the past? Who are the people with power and influence? What is the perspective of community stakeholders? Gathering this type of information helps to develop a community's social profile. This profile is vital to effective communication strategies.

Keep the community informed. To build community support for the project, ensure that the community is well informed and, ideally, part of the initial planning for the project. Any communication about the project must be open, honest and timely. Keep in mind there are a variety of approaches suitable for reaching different groups.

To reach young families, communicate through the school newsletter or parent advisory meetings. The seniors' activity centre is a good place to reach that interest group. Quick lunch hour gatherings in a central location might appeal to the working crowd. Some approaches may be more effective at different developmental stages of the project. Consider which information to share, who to communicate with and when. Do not always rely on print material or meetings to get the message across. Try to use a creative variety of public participation approaches to provide information and receive feedback.

Gather meaningful feedback from the public. Inviting the public to express its views and concerns about the project can enhance community support and ultimately the success of the project. As initiators of the project, be prepared to listen, respond and incorporate feedback given by community members.

If the community does not support the project, stand back and try to be objective. It may be that not enough information has been provided. Perhaps the timing is off, or the location is wrong. Take advice from the community and let its members know where their input has made a difference. If the intention is not to use feedback, do not ask for it. There is no integrity in the public participation process if the decisions are already made. By allowing the community to provide input, it will attach some ownership to the project.

Plan communication strategies. These strategies have proven to be effective in communicating with the public and building support for a community project:

- Informal consultation.
- Use of media.
- Open house.
- Fact sheet with tear-off response.
- Reference centres.
- Public forums.

3.4 Site Plan Highlights

Once a site has been located, a site plan is required. The location and orientation of structures can influence the potential for environmental impacts. Good site planning can also prevent neighbourhood disputes. When designing a site plan, consider the following:

- Adhere to required permit criteria, such as setback distances from roads and property lines or water diversion pathways.
- Locate buildings and storage facilities for fuel, fertilizer, manure, compost or pesticides at least 100 metres from springs and wells and 30 metres from common bodies of water. If possible, choose a site with lower elevation than wells to prevent runoff or seepage of harmful substances into the water supply.
- Locate buildings and facilities on an adequately drained site, being careful to avoid low areas subject to flooding. Refer to AOPA for recommendations on site planning.
- Grade the area to divert polluted runoff and prevent it from entering surface or groundwater.
- Grade or berm outside yards to allow collection of contaminated runoff before it reaches surrounding waterways and to reduce nuisance impacts on neighbours.
- Ensure that emergency vehicles can access facilities in case of fire or other emergency.
- Position high activity buildings and work areas away from neighbours to minimize sight and sound impacts.
- Use screens, such as tree shelterbelts, to provide wind protection and reduce the operation's impact on adjacent property owners.
- Divert roof runoff and any clean water away from the site.
- Adhere to the recommendations of the Canadian Farm Building Code.
- Invest in good storage and processing facilities for feed and feed ingredients. Adequate facilities and proper management can help prevent pollution and reduce losses due to spoilage, insect and rodent damage and fire from spontaneous combustion.
- Before building new feed storage facilities, a complete storage and handling system should be designed. This design should incorporate both present and future requirements.
- Locate the feed processing and handling centre in an area that will allow large vehicle access and provide sufficient setback from neighbours. This will ensure they are protected from noise, dust, traffic and the threat of fire.

3.5 Managing Feedlot Shutdowns

Whether a feedlot is shut down for a few weeks, a few months or is permanently decommissioned, specific steps are necessary to protect people, the environment and animals. The unused feedlot poses a risk to surface and groundwater quality. It is also a potential health and safety concern for humans and neighbouring animals.

The development approval may define the period of time a facility is allowed to be empty before another approval is required for the operation. Under AOPA, the owner or operator of land or buildings that are a confined feeding operation must remove the manure from the land or buildings within one year, or a shorter or longer term set by the Board. For a feedlot shutdown, check with the NRCB or local municipality for decommissioning requirements.

For the purposes of this section, a feedlot is defined as an uncovered, outdoor feeding facility for any type of livestock and includes both paved and unpaved feeding areas. A few factors (such as soil nitrate accumulation and soil cracking) apply only to unpaved lots.

General points to remember when shutting down a feedlot:

- No matter how short the shutdown period, take steps to minimize the risk of unauthorized entry of people and animals, into storage areas and ponds. Manage debris basins and runoff ponds to prevent discharge and contamination of wells.
- During short-term shutdowns of one month or more, turn off water and unnecessary gas and electricity. Control weeds and insects and remove manure from the area.
- For longer-term shutdowns of six months or more, conditions of the permit and regulations may require a cleanup procedure within a certain time period.
- For a permanent shutdown, the area needs to be returned to crop production or other land use. For decommissioning (that is, termination of permitting conditions), notify the permitting authorities. Some jurisdictions may also require a demolition permit for site cleanup.

3.5.1 Site security

When a feedlot is shut down, the site must be secured to prevent trespassers. Post warnings and fence hazardous areas, such as storage structures, dugouts and water basins. The absence of regular worker traffic and monitoring makes abandoned sites prone to invasion by the curious and the criminal. Such unknowing individuals can put themselves in dangerous situations and the property owner at considerable liability unless responsible precautions are taken.

3.5.2 Removing solid manure

Remove manure. Even for a short-term shutdown, remove as much manure as possible down to the soil surface, immediately after the animals are removed. Manure removal is essential to reduce the risk of contaminants moving down to the water table or being carried by runoff to streams and lakes.

In an active pen, hoof action and compaction by the animals create conditions that minimize movement of nitrogen and salts into the soil below the manure pack. However, after removal of the animals, soil cracking (due to drying, freeze-thaw cycles, and other activities) changes the pen floor from mainly anaerobic to aerobic conditions. Aerobic conditions allow relatively immobile organic and ammonium nitrogen to be converted to mobile nitrate-nitrogen. The cracked soil may allow water to infiltrate deeply, thereby increasing the risk of nitrates reaching the water table.

Manure must be completely removed from fence lines and beneath feed bunks. This controls rodents and insects, preventing them from becoming problems for neighbouring farms. Whether the shutdown is short-term or permanent determines whether cleaning or complete removal of fences and feed bunks is most appropriate.

Haul manure away. In most cases, manure should be hauled for application on cropland or to a composting area soon after shutdown. Stockpiling manure is recommended only when field/soil conditions are not conducive to spreading. If stockpiling is necessary, control runoff seepage and odours from the stockpiling area, as well as insects, birds and rodents. Long-term stockpiling requires proper site design to protect surface and groundwater. Seek professional engineering advice on siting and design of stockpiling areas.

Apply manure to cropland at rates to meet anticipated crop needs (see Section 5).

3.5.3 Establishing plant cover

Plant cover. If the pen or feedlot is to be shut down for either a season or permanently, establish a plant cover as soon as possible. High nitrogen levels remain in the soil beneath the pens even after manure is removed. Plant cover will utilize the nitrogen before it moves down to the water table. As well, plant cover will reduce soil erosion. Crop production may also provide some economic returns.

Avoid fallowing. It greatly increases the risk of nitrates and other contaminants reaching the water table.

Soil sampling. Crop yields will likely be low in the first few years due to poor soil structure and to excess nitrogen and salt in the soil. Take soil samples for analysis to determine salt content, nutrient requirements and appropriate crop options (see Section 5).

Salt. In pen areas, much of the salt is concentrated in the top 30 centimetres of soil. In this layer, only very salt-tolerant crops will grow in the first few years. If sodium is the main salt of concern, gypsum may be applied to promote leaching of the salts.

Remove salt-laden layer. To speed crop establishment, remove the top 30-centimetre layer of salt-contaminated soil before seeding. This allows growth of moderately salt-tolerant crops. Take care to avoid simply moving the salt problem to a different area. Seek professional agrologist advice on site-specific soil remediation and land spreading.

Use perennials. A perennial crop is often a good choice for reclaiming a feedlot area. Tillage can aggravate the salinity problem. Perennials also have a high capacity for drying out the soil, which increases the potential for leaching of salts from the soil surface. Deep-rooted perennial crops, such as alfalfa, greatly enhance recovery of nitrogen located deep in the soil profile.

Supplemental water needs. Any crops grown on former feedlots are very susceptible to drought due to high nitrogen availability, poor soil structure and high salt levels. Therefore, it is often beneficial to have supplemental water available when reclaiming a feedlot for crop production.

Remove harvest residue. Even if crop growth is poor, remove any harvested plant material to rid excess nutrients and salts from the site.

Test nitrate levels. Before feeding forage harvested from former feedlot sites, test the forage for nitrate accumulations. High levels of available soil nitrogen can result in high nitrate levels, particularly if the forage crop has had any sudden stresses such as drought, hail or frost.

3.5.4 Feeding areas

Clean feed bunks. Even for a short-term shutdown, clean the feed bunks and remove all debris. Feed can attract birds, such as sparrows and pigeons, which can be a nuisance to neighbours and contribute to spreading of weed seeds.

Check around feed bunks. Feed bunks and watering bowls set on risers. Scrape the debris and spread on cropland. The space and debris beneath the feed bunks and bowls attract rodents and provide a medium for insect reproduction.

Rodent control. If there is evidence of rodents, take control steps to help maintain Alberta's rat-free status. If rats are observed or suspected, contact a pest control officer in the local municipality, or a vertebrate pest specialist with AAFRD.

Feeding aprons. If built with slab-on-grade construction, rodent control is more difficult. The lack of cattle and vehicle traffic allows rodents undisturbed use of the space beneath the slabs. (New construction should include vertical foundations or grade beams at the edges of all slabs to reduce rodent burrowing.)

3.5.5 Feed storage

Bins and silos. Unless silage and grain products are stored in rodent-proof bins or silos, they soon become a major site for rodent reproduction. If silage is stored for future use in open bunker or trench silos, the exposed areas should be smoothed and covered with appropriately-supported or weighted plastic to minimize spoilage

Clean up tires, plastic. If materials, such as old tires, are used to weight the plastic on bunker and trench silos, accumulated water in tires and discarded plastic can become a reservoir for mosquito breeding. Either prevent water from accumulating or dispose of the tires in accordance with provincial regulations. For more information on tire disposal, contact the Tire Recycling Management Association of Alberta.

Clean up spilled feed. Spilled feed and grain around feed mixing and storage areas attracts rodents, birds and sometimes insects, increasing risks such as disease spread, environmental degradation and problems for neighbours. Clean up spilled feed and use as feed if suitable, or spread it on agricultural land. Feed contaminated with toxic materials must not be fed to livestock. Dispose of contaminated feeds in a manner appropriate to the contaminant.

Eliminate debris. Remove and properly dispose of all debris, such as plastic or other materials. Store lumber above ground to minimize possible rodent habitat.

- For decommission, the feed may be transported to be used by other livestock operators in the area. Old or spoiled silage should be removed and applied on agricultural land.

3.5.6 Utilities

Turn off utilities. During shutdowns of one month or more, turn off all unnecessary utilities such as water, gas and electricity to reduce the risk of erosion, wasted water, injury and fire in the event of damage to a service line by cleaning equipment or failure due to general deterioration.

Drain water lines. If shutdown occurs during freezing weather, drain water lines and watering bowls. A high-airflow capacity commercial air compressor can be used to remove water from lines that are not graded for self-drainage. Drain water tanks to prevent freezing and accumulation of stagnant water conducive to mosquito breeding.

Inspect electrical wiring. Many feedlots use electrically heated watering bowls. When the feedlot is returned to service, thoroughly inspect and test all systems. Faulty or improperly wired watering bowls can result in trickle voltage or even electrocution of cattle.

3.5.7 Water wells

Check wells. Even for a short-term shutdown, check all water wells to ensure they are properly sealed to prevent rodents, insects or water-carried contaminants from entering the well. Insect or rodent access to a well can cause serious contamination from feces and carcasses. Not only could the well become inoperative, the whole aquifer can be put at risk.

Prevent corrosion. Surrounding grades and surfaces must prevent runoff from entering into the well or around the casing to prevent chemical and microbial contamination. Consider pulling pipes and pumps from wells to avoid serious corrosion problems and to facilitate bringing wells back into production.

Protect the aquifer. In permanent decommission, pull pipes and pumps from wells. Seal wells and cap the casing below ground to adequately protect the aquifer. Details of procedures and standards are given in Alberta's *Water Act*.

For more information on well management, see the *Water Wells that Last* series of publications and videos available from AAFRD.

3.5.8 Weed control

Continually monitor and control weeds around the entire feedlot area, including the lot surface, debris basins, runoff control facilities, etc. Weeds can spread to nearby fields, encourage insect breeding and leave a poor impression for passersby.

3.5.9 Petroleum storage and spills

Remove petroleum products. Use or remove petroleum products, such as stored gasoline, diesel, greases and oils. Spills and leakage of these products could seriously harm the environment, pose a risk to human and animal health, and are a fire hazard. Ingestion of even small amounts of bituminous material by livestock can cause illness or death.

Remove fuel tanks. For a long-term shutdown, remove fuel tanks from the site. Use elsewhere or dispose of at a landfill site.

Reclaim soil. Areas of soil contaminated with oil or fuel (used oil spread, machine parking area, shop floors) can be reclaimed by the methods used in the oil industry. The range of alternatives includes land spreading of contaminated soil, bio-remediation on-site, hauling to a secure and capped landfill (Class 1), and hauling and decontamination at a hazardous waste facility. The choice will depend on the contaminants and the amount of material. For more information, contact the regional office of Alberta Environment.

3.5.10 Compacted areas

Permanent decommission and conversion to cropland may require the reclamation of highly compacted areas. Roads and parking lots may have to be deep ripped to 60 centimetres (25 inches) or deep plowed before crops can be grown adequately. Consider deep ripping other high/heavy traffic areas, such as the silage pit and dry feed staging area. For best results, deep rip when the soil is dry.

3.5.11 Drainage alleys

If the feedlot area is converted to annual crops, seed the drainage alleys to perennial forages and treat like any other grassed waterway to prevent soil erosion. For more information on grassed waterways, see *Watercourse Improvement and Gully Restoration* (Agdex FS573-5), available from AAFRD.

3.5.12 Landfilling debris

Permanent shutdown of a feedlot requires the removal of penning materials, bunks and buildings. While some materials can be salvaged, large amounts of material are waste and should be appropriately disposed of at a landfill. Burying of demolition debris on the feedlot site is not permitted under Alberta's *Environmental Protection and Enhancement Act.*

Contact the local landfill sites (Class 1 or 2) for site-specific details on times and regulations about demolition debris. For further details on landfills, contact the regional Alberta Environment office.

Contact the municipal development authority to determine whether a demolition permit is required. Since demolition is considered a change in land use, some jurisdictions may require a permit.

3.5.13 Medical supplies, sharps and pesticides

Remove medical waste and pesticides (see Section 8).

Many landfill sites have special areas and procedures for handling pesticides. Contact the local landfill for details.

3.5.14 Permit requirements

Permanent decommission of a feedlot requires notification of the permitting authority to terminate any conditions of the operation and to comply with any specific decommission requirements of that agency.

For a change of land use or feedlot demolition, contact the approval officer at the NRCB. To close water wells or change the water use, contact the regional office of Alberta Environment. To turn off utilities, contact the local suppliers of gas, electricity, etc.

For shutdowns of more than six months, discuss the permits and requirements with the municipality and the relevant authority for any existing permits.

3.6 General Farm Aesthetics

Often it is said that, regardless of actual physical measurements of odour-causing chemical compounds, a neat and tidy livestock operation is less odorous than a livestock operation that is less aesthetically pleasing.

The design and construction of a feedlot site can be enhanced to provide a more pleasing appearance. Trees or constructed shelterbelts provide visual screening, in addition to wind protection, dust and odour control. Vegetative strips and buffers provide a pleasing appearance and help filter runoff.

The key is to incorporate some thinking about overall public perception when planning the feedlot, then managing to provide overall site hygiene and a positive appearance.

3.7 References

References available through AAFRD:

- Canadian Council of Ministers of Environment. www.mbnet.mb.ccme.
- *Dugouts for Farm Water Supplies* – Agdex 716.B30.
- *Dugout Maintenance* – Agdex 716. B31.
- *Dugout Aeration With Compressed Air* – Agdex 716. B36.
- *Float Suspended Intake* – Agdex 716.B34.
- *Hydrated Lime for Algae Control in Dugouts* – Agdex 716.B37.
- *Seepage Control in Dugouts* – Agdex 716.B32.
- *Water Analysis Interpretation* (Agdex 400/716-2). Provides a summary of water quality information for livestock.
- *Water Wells that Last for Generations.* An 87 page manual and workbook on water wells.

Additional references are available through AAFC or PFRA at www.agr.gc.ca/pfra.