Pasture Planner

A guide for developing your Grazing System

PASTURE PLANNER SPONSORS

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This Manitoba Pasture Planner was created to assist producers with the development and/or modification of their grazing system. The Planner was written by Fraser Stewart and Michael Thiele of the Manitoba Forage Council (MFC) and edited by Wayne Cowan, (WC Rural Resources), Corie Arbuckle, (Corie Communications), and Glenn Friesen, Manitoba Agriculture, Food and Rural Initiatives (MAFRI).

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Additional information is available at:
Manitoba Forage Council: www.mbforagecouncil.mb.ca
Ducks Unlimited Canada: www.ducks.ca
MAFRI: www.gov.mb.ca/agriculture/crops/forages/
Grazing Planning by: David W. Pratt at http://www1.foragebeef.ca/$foragebeef/frgebeef.nsf/all/frg37/$FILE/grazeplanning.pdf
Grazing Systems Planning Guide at http://www.extension.umn.edu:80/distribution/livestocksystems/DI7606.html

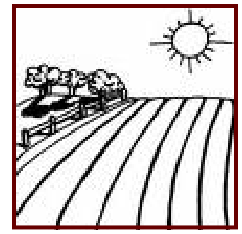
1

GRAZING SYSTEMS

A grazing system involves the interaction of the following five components:







Producer + Livestock + Forage + Weather + Land

Unfortunately, producers have no control over the weather and only limited control over their forage production. To have a successful grazing system, producers must focus on the management of the two components they can control; their land and livestock.

Producers can become adept at observing nature and adapting their management methods to optimize production and sustain our valuable landscape resources. Good grazing management is truly a combination of art and science - the art of observation and the science of agricultural production.

There are three grazing methods:

1. **Continuous Grazing**

   This type of grazing requires a low level of management, however, it results in the repeated grazing of new growth. This reduces the productivity of the plants.

2. **Rotational Grazing**

   Rotational grazing involves dividing pastures into paddocks and grazing the stock based upon the rate of re-growth. This type of grazing provides an opportunity for plants to rest and recover.

3. **Complimentary Grazing**

   This plan utilizes a combination of native land and seeded land to maximize the growing potential of the forages. The seeded pasture is grazed during the spring and fall, and the native pasture throughout summer. The seeded forage can be either perennial or annual forage.

2

DEVELOPING YOUR PASTURE PLAN

To develop a successful grazing plan you must first examine your objectives and the characteristics of both yourself and your farm.

Objectives of a Grazing System

- Control the grazing animals;
- Provide rest and recovery time for the plants;
- Extend the life of the most productive species in the pasture;
- Keep the plants in a vegetative state;
- Improve the nutritional value of the plants;
- Improve the soil fertility by growing nitrogen-fixing legumes and recycling crop residues and;
- Lower the cost of feed by extending the grazing season.

In order to implement a new plan you must:

- Be flexible with your farm operation;
- Understand the interaction between effective grazing and maximum productivity and;
- Have adequate facilities and equipment to control your stock.

Steps for Developing your Pasture Plan

Step 1.

Determine what you have on your farm now. Identify the plant species and assess the level of management required to maintain the productivity of each one. How can you reduce the impact of poorer quality forages on your land?

Highly productive plants are:

- Legumes;
- Deep rooted seeded grasses that have good re-growth potential and;
- Productive native species.

Slower growing plants are:

- Native and seeded grasses that have poor productivity and re-growth.

Poor quality forages are:

- Shrubs and weeds.

Native plants are:

- Cool season grasses such as western wheat grass or warm season species like big bluestem;
- Better suited to harsh environments than introduced species; however, they require careful management because they are difficult to replace if lost.

Step 2.

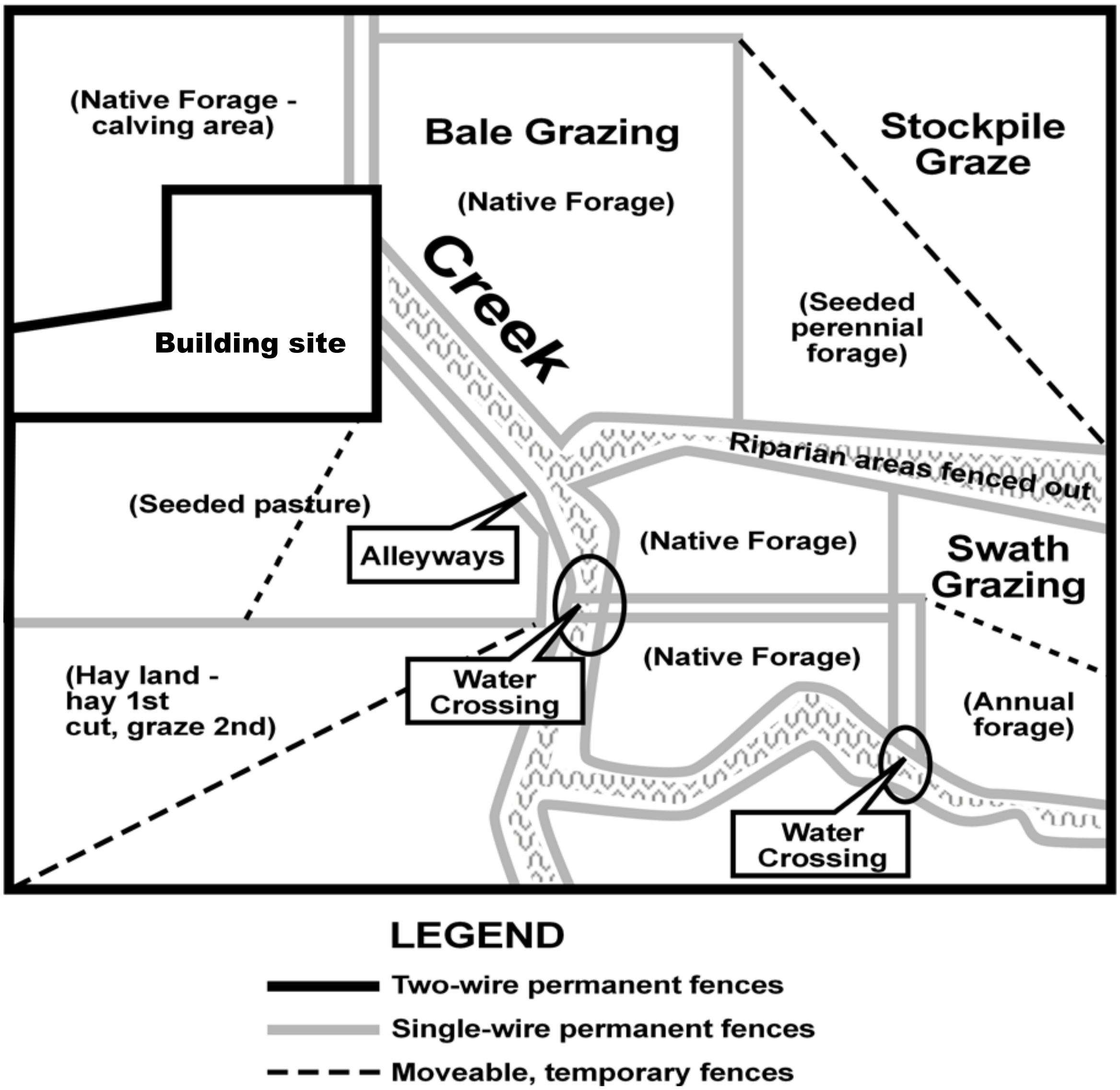
Obtain aerial photographs or sketch out a map of your land. Contact your district MAFRI office for aerial photographers in your area or use the Google Earth website www.earth.google.com Label your map with all the plant species and the available water sources.

Step 3.

Draw out some potential plans on paper – Involve your family in the process (page 31 has an outline for you to draw your existing and revised pasture plan).

The following chapters outline the items you should consider when sketching out your new pasture plan.

Sample of a Pasture Plan



3

FENCING SYSTEMS

Fencing systems will vary according to your land base. Develop a system that is best for you.

To revise your fencing system, start with a map or aerial photo of your land as it is today (use page 42 to sketch your new fencing system).

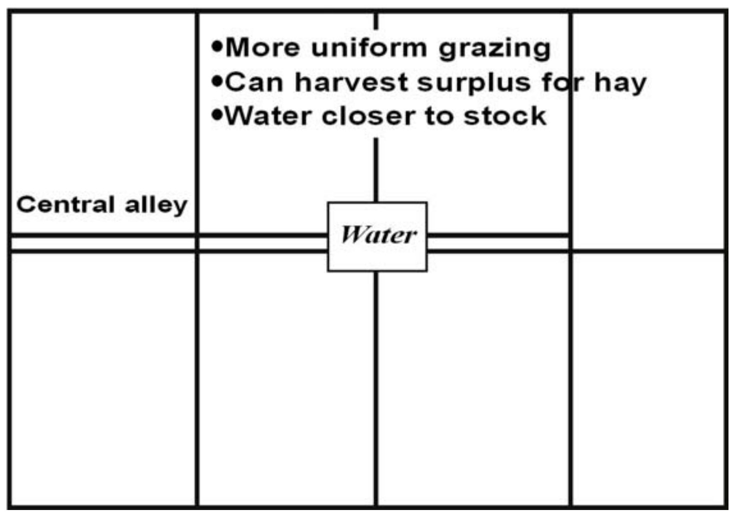
Assess your pasture land and label the:

- Seeded perennial pastures;
- Native forage areas;
- Annual forages;
- Areas that can be used for cut hay/pasture;
- Forage areas that can be used for stockpiling;
- Fragile lands that are susceptible to wind and water erosion;
- Ditches, water courses or riparian areas that can leach off nutrients and;
- Other natural landscape features.

Pastures that have a combination of native and seeded grass will be the least productive. The livestock tend to overgraze their favourite species, (often the seeded forage) and leave the others. To maximize productivity, the paddocks should have the same quality of forage.

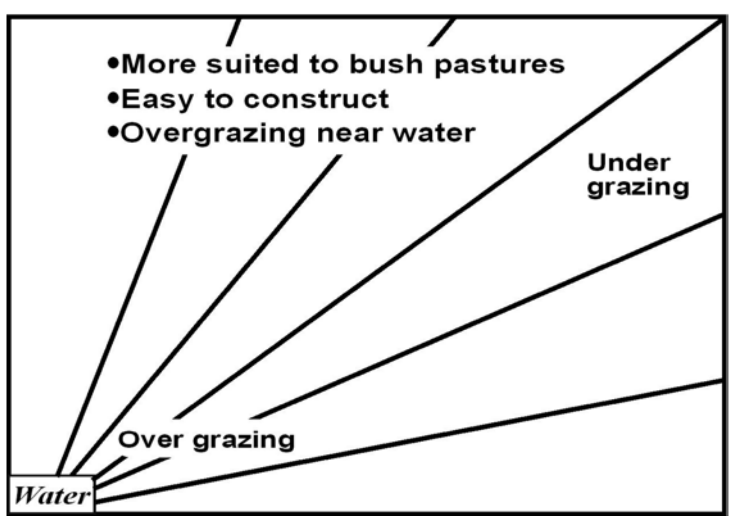
Square paddocks are usually preferred as they promote:

- More even grazing;
- Easier harvesting of surplus forage for hay and;
- Better manure distribution.



The use of diagonal fencing offers some advantages:

- Less expensive than square and;
- Easier to manage with a central handling system. It requires a good soil base as the long narrow paddocks result in over-grazing near the water sites and gates.

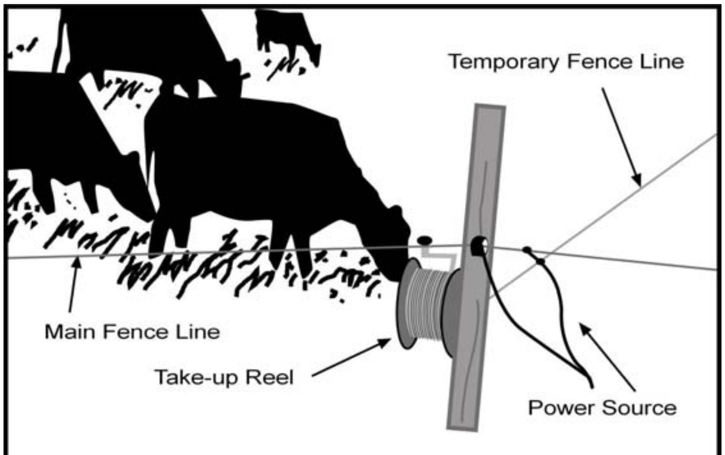


Temporary fencing can be used to reduce the size of large paddocks.

- Temporary fencing should be used to further subdivide the paddocks and increase stock density. A temporary electric net fence is an effective tool for managing your sheep flock and protecting them from predators.

Temporary Electric Fence with Take-up Reel

- The use of poly-wire or airplane wire on a "take-up" reel is a quick way to adjust your pasture size. There should be at least eight permanent paddocks in a grazing cell.

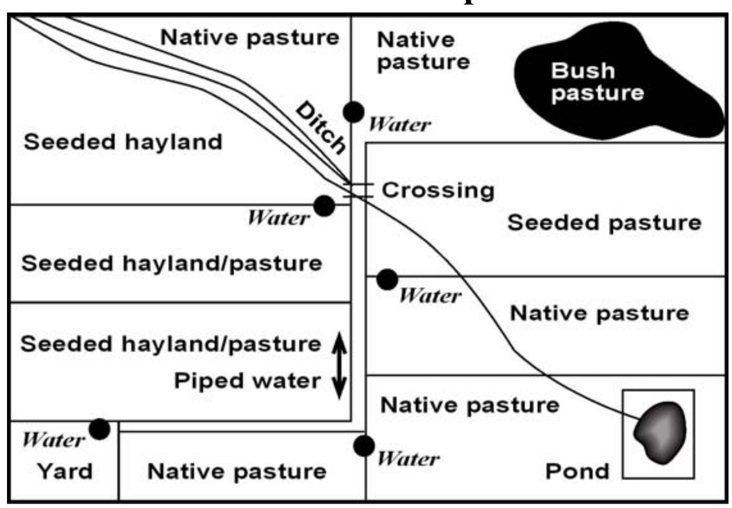


Take-up reel is used to subdivide the pasture and increase stock density. Reduces feed waste and allows for plant recovery.

The paddocks should have:

- Adequate stock density. The objective is to force the stock to graze all plants evenly and unselectively by crowding them in the paddock for a short period. The paddock can then be rested for an extended period to develop large, healthy roots and renewed lush top growth for the next grazing period.
- Alleyways that are well placed. They should be at least 20 feet wide to provide quick and easy access to the paddocks and watering sites. Wide alleyways minimize animal stress and allow for vehicle access;
- Alleyways that are located in high, dry areas so they are suited to all-weather travel;
- Water access. If the water is within 700 to 800 feet, the animals will drink on an individual basis. Further distances encourage the animals to travel as a herd. The use of portable water systems, buried water lines and solar or wind powered pumps makes clean, fresh water accessible on most pastures.

Paddock Example



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WATERING SYSTEMS

Livestock water consumption is subject to several factors:

- Size and type of animal – sheep require 30 to 50% less water than cattle;
- Physiological state of the animal (gestation, maintenance, growing, lactating);
- Type of diet – lush forages reduce water needs, dry or mature forages increase water consumption;
- Temperature – if the temperature is above 81°F or 27°C, water consumption will double and;
- Water quality – high salt levels increase water consumption.

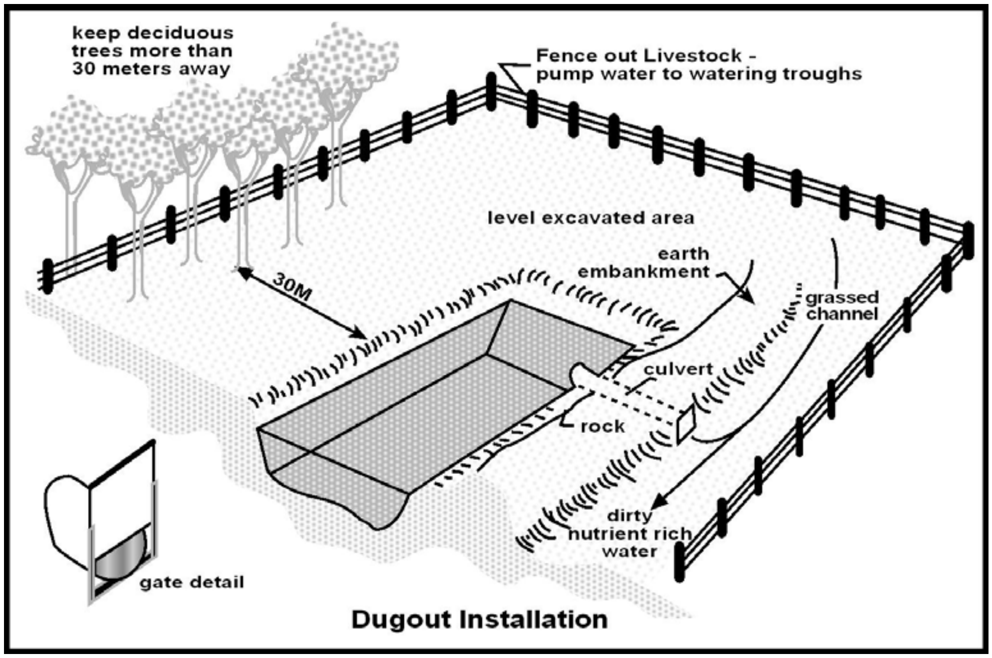
Guidelines for Stock Water Requirements
(Stockman's Guide to Range Livestock Watering)

Livestock	Winter		Summer	
	gal/day	litres/day	gal/day	litres/day
Milking cows	17	77	21	95
Cow/calf pairs	11	50	15	68
Dry cows	8	36	12	55
Calves	5	23	8	36
Growing cattle (400-800 lbs)	5-8	23-36	8-12	36-55
Finishing cattle (600-1200 lbs)	12	55	19	86
Bulls	8	36	12	55
Horses	8	36	12	55
Sheep	0.8	3.6	3	3

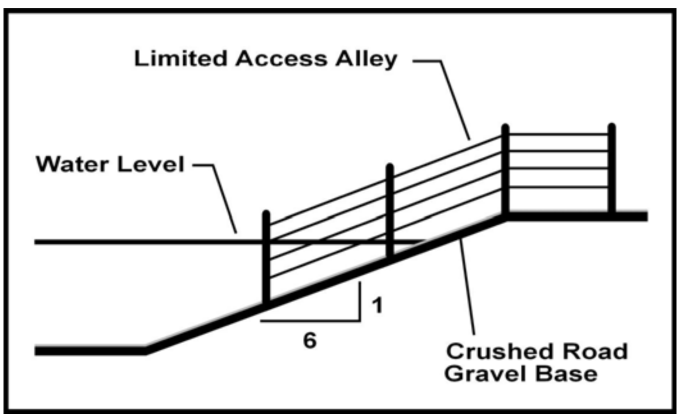
1) Water Source Options

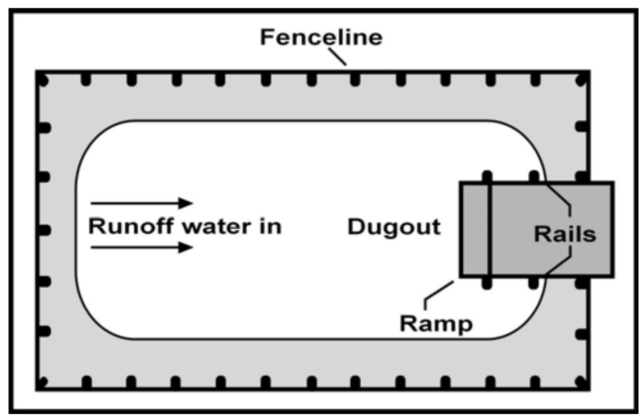
Whatever water source you choose, it must be reliable.

Grazed Forage
Fresh pasture is primarily water, therefore cattle on lush pastures may only consume 5 gallons per day and even less on rainy days. Spring forage growth may be only 5-10% dry matter; and mature forage may be 30% dry matter.



Dugouts
- Used where ground water is of poor quality or inconsistent;
- Recharge from surface water such as snow or field drainage;
- Requires restricted animal access to maintain water quality; →
- May require aquatic weed (algae) control to reduce toxic compounds.





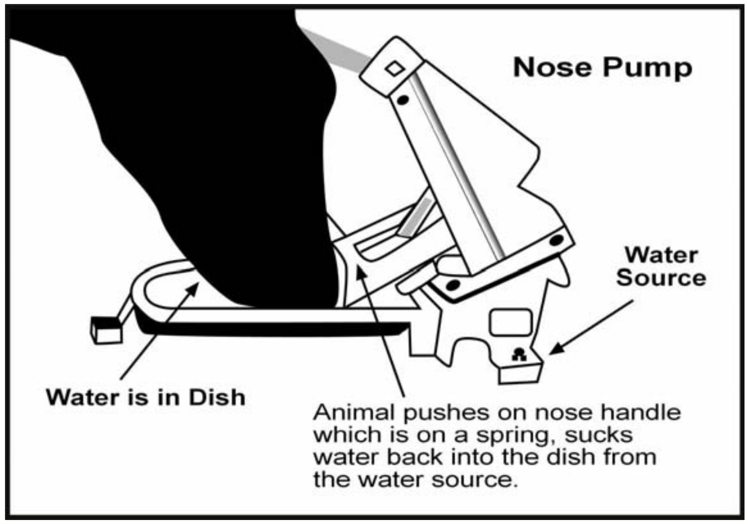
Streams or Ditches
- Direct watering from streams or ditches will result in poor water quality, the destruction of river banks, the aquatic life and the ecosystem. To minimize the negative impact, pump the water into storage tanks or troughs or limit access to the water using the method outlined above.

Groundwater – Wells or Springs
- Is the preferred water source because it provides the cleanest water;
- The recharge rate should be determined at the onset. A slow recharge rate means you must water less livestock or you must provide an alternate water supply.

Snow
- Animals will consume less water if they eat snow covered feed;
- Cattle that consume hay on winter pasture must learn to eat snow to meet their water needs;
- Wet snow is a better water source than dry snow or snow with ice;
- Research has shown that cattle can be successfully watered with snow in a Canadian climate.

2) Moving the Water
During the winter cattle travel to the water source approximately once per day. In the summer, however, they travel between 5 and 7 times per day. The further the distance they have to travel, the longer they will remain at the water source. Ideally, the total herd should be able to drink in less than one hour, even at the highest demand.

Cattle like to remain as a herd, but if they can maintain eye contact with each other, they will travel alone. Individual watering reduces the pressure on both the water source and the land. A central watering paddock can be used for adjoining paddocks. The watering area should be small enough to discourage animals from lounging nearby. This system works for 2 to 4 paddocks, however, any more will result in trampling of the forage at the site.



3) Pumps

Electric and Gas Pumps

- Automated electric pumps are generally the most reliable;
- A ¾ HP pump will maintain pressure in a 1.5 inch water line;
- Gas pumps are used to fill storage tanks in remote locations. They either have an automatic cut-off switch, or are left to run out of gas;
- Nose pumps on pasture usually require one pump for 25 to 30 cow/calf pairs depending on the distance to the water. The pumps can lift water approximately 20 feet.

Solar Pumps

- Are a good choice for remote locations;
- They must be checked every 3 days and have a stand-by generator or a gas pump for extended cloudy weather;
- It is best to use a large trough/container and run the pump less frequently;
- The deep-cycle battery must be stored in an insulated container to protect it from cold weather;
- Voltage meters and battery testers are essential.

4) Water Lines

- A water line is often the most economic system for moving water;
- Water delivery is limited by the size of the pipe and the number of inserts within. The optimal pipe size is 1.5 inches in diameter to minimize friction.
- 75 psi quality pipe withstands some freezing, but it is best to blow out the water lines in fall;
- All pipeline should be buried at least 8 inches deep. This provides some frost protection and extends water delivery until late fall. Pipeline plows for burying your water lines are available for rent in some Manitoba communities.

Pipe Sizing Guide (litres/minute)

Pipe width	*Pipe length (meters)*		
cm/inches	30 m	166 m	500 m
1.3/.5	18	9	5
2.5/1.0	58	36	22
3.2/1.5	103	85	40

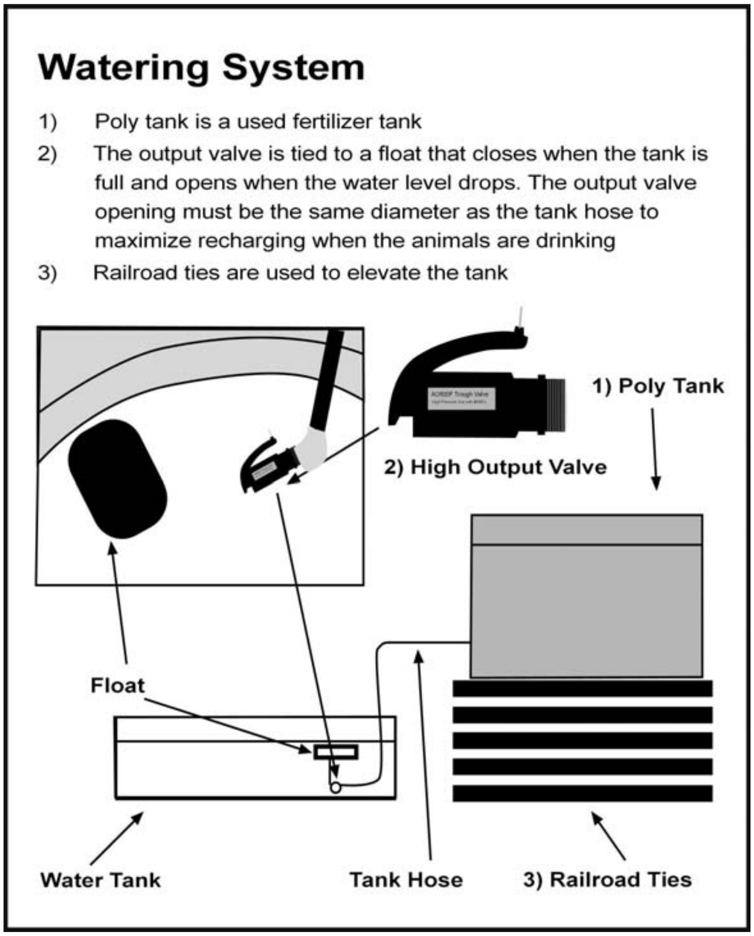
5) Trough Space

- Allow 5 – 10% of the herd to drink at one time. Each animal will drink 5 – 10 gallons per event;
- "Rule of Thumb" – allow 1.5 inches of space between animals around the trough. A herd of 100 requires 12.5 feet of tank rim space. This will allow 8 animals to drink at the same time for 4 minutes and the herd will be watered in 60 minutes.

6) Tank and Trough Options

Troughs

- Commercial galvanized troughs can be abused by stock. They must be comprised of strong steel;
- Fibreglass units are strong and difficult for stock to abuse. These units are readily available in 1,000 gallon plus capacities.



Poly Tank Watering System

(left) Diagram of a poly tank watering system.

Grain Bins

- Galvanized steel rings from grain bins are often used for large watering sites. Concrete is used to form a water seal base. One can also use a plastic or fiberglass liner with a solid base of sand (smooth surface for liner) with a geo-textile liner below to hold the sand in place.
- A rail is required to prevent the animals from jumping into the tank and making holes in the liner.

19 foot grain bin = 4,000 gal

Machinery Tires

- Large machinery tires can also be used as water troughs. They are almost indestructible;
- Cut back the upper bead 5 to 6 inches using a reciprocating saw;
- Use a concrete pad and seal with an epoxy sealant.

7) Remote Locations

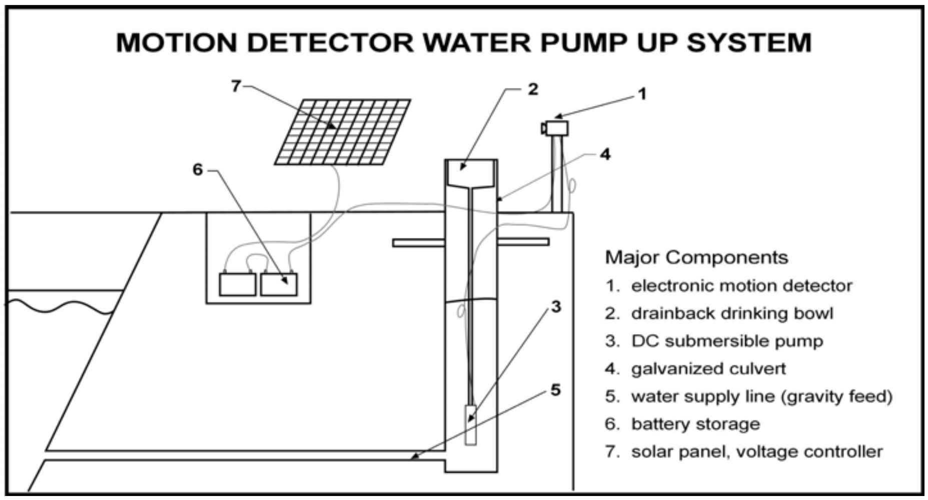
- Water can be trucked out to the herd in large tanks. High output valves will supply the water at a high discharge rate.

Remote Winter Watering

Technical advances in the use of natural energy sources such as geothermal heat and solar and wind power allow producers to water cattle at remote locations. Examples of remote winter water systems are:

1) Motion Detector Water Pump up System

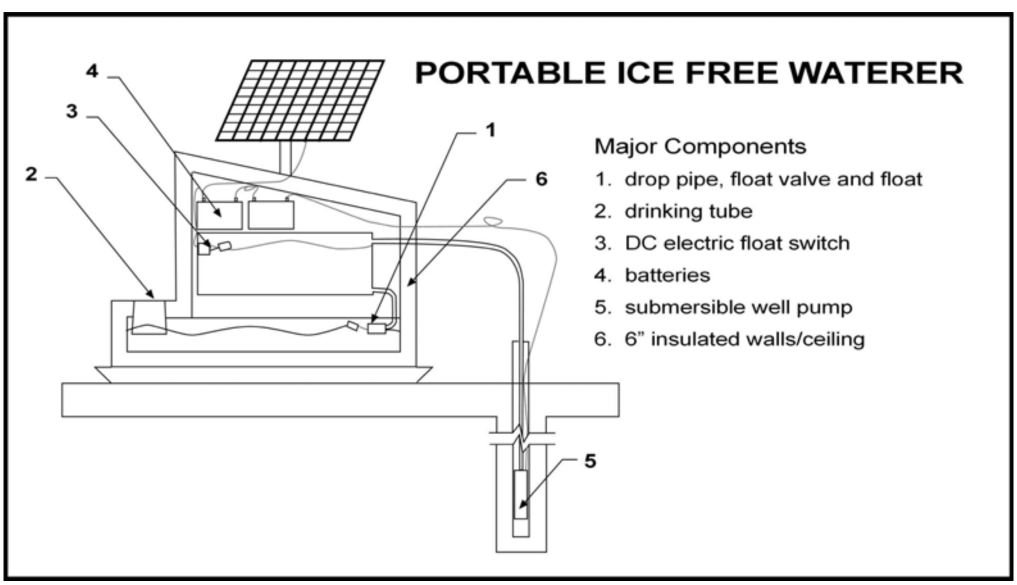
When an animal walks up to the drinking bowl, an electronic motion detector turns on a pump that fills the bowl with water. When the animal leaves the detection area, the pump shuts off and the water drains back down through the pump so no water is left exposed to the cold. A filter prevents hay and debris from going back down into the pump with the water. The pump is powered by a solar DC battery.



- Water must be within 15 feet of the surface. If it must be pumped from further away, it will require two pumps and more than one DC power supply.
- Filter must be cleaned frequently;
- DC batteries must be protected from the bitter cold. A discarded household chest freezer is an excellent battery storage compartment.

2) Portable Ice-Free Waterer (Using a well insulated building)

A small highly insulated, portable building encloses a poly tank that holds hundreds of gallons of water, several degrees above freezing. The cattle drink from a water trough which only has a small area situated outside of the building. The building temperature is moderated by the latent heat of the hundreds of gallons of water stored within the building.



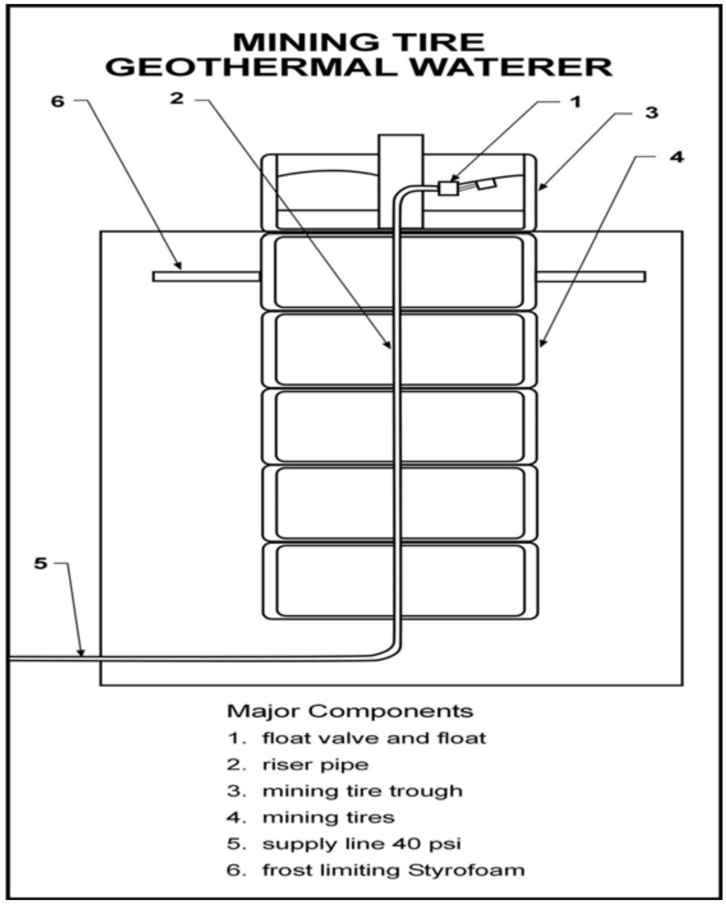
- The building must be well insulated. It should have enough cattle drinking so that at least 300 gallons of water are consumed and replaced daily. If all water is consumed and exchanged with new water, It will cool and the system with begin to freeze;
- Some ice may need to be cleared from the drinking tubes on the coldest days;
- Batteries and/or gas powered generators do not freeze when housed in the building.

3) Mining Tire Geothermal Waterer

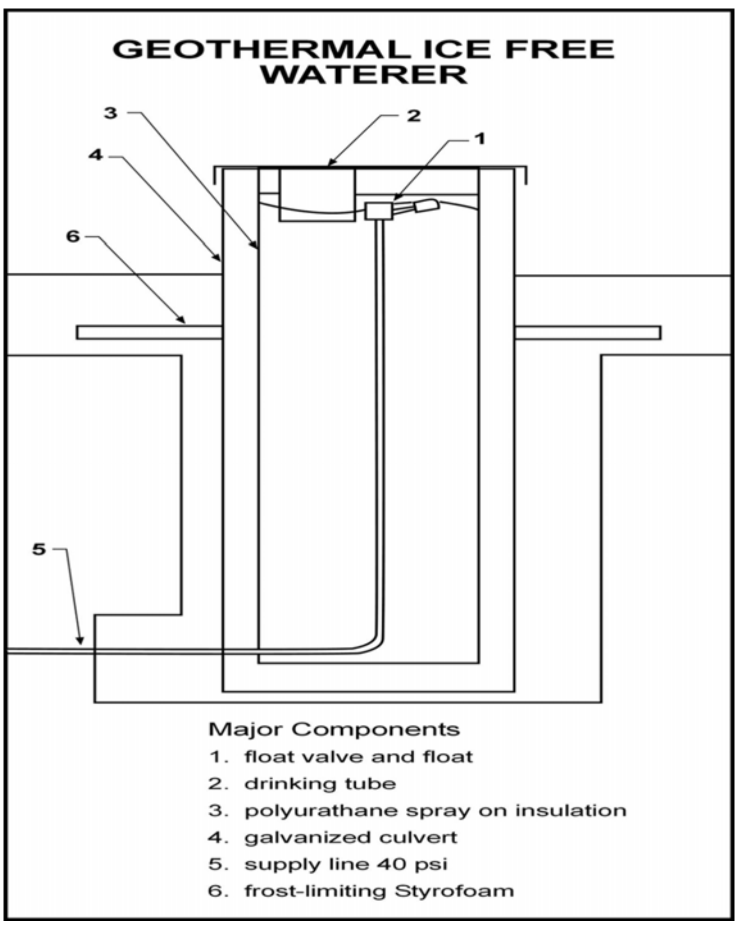
Cattle drink from a water trough made from a used industrial mining tire. The bottom side of the drinking water trough is kept relatively warm with geothermal heat rising from below the frost line.

Water is provided through a buried supply line from an existing water source. The tire pit below ground level allows for geothermal heat to rise which keeps the supply line from freezing and keeps the drinking trough warm. This works best with very thick rubber tire faces.

- Mining tire will generally have a layer of ice each morning which must be cleared. Once cleared the cattle keep it free the remainder of the day;
- There must be enough cattle drinking from the trough to completely replace all the water every day, or the water will get colder and eventually freeze solid. Not suitable for small herds;
- Well suited for deep burial pipelines that travel great distances underground.



4) Geothermal Ice Free Waterer

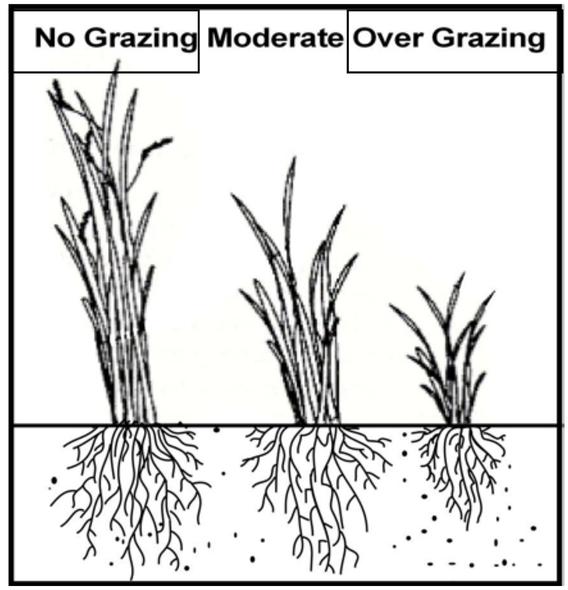


Cattle drink water out of the top of an insulated galvanized tube which contains about 500 gallons (2,300 litres) of water. The water is kept warm from geothermal heat and the latent heat contained within the water itself.

- Cattle drink directly out of a drinking tube located at the top of the four foot diameter insulated galvanized culvert. The culvert is 10 feet tall with eight feet below ground level. The latent warmth of the water keeps the small diameter drinking tube free of ice even in cold weather. The water supply pipe enters the bottom of the culvert below the frost line, and comes up the middle of the culvert to be controlled with a float valve under an insulated lid. Water height is set by a float valve which needs to be within three to five inches of the top of the culvert so that cattle can reach the water;
- In exceptionally cold weather, the drinking tube may develop an ice plug in the drinking hole which must be cleared. This may occur a few days each winter;
- Works well with minimal management and with long-run underground water supply pipe lines;
- No electricity required, may be adapted to DC powered deep well pumps and drilled well situations.

5

ANIMAL CONTROL



Controlling your stocking rate provides time for the crop to rest, recover and establish a strong root system. The rate of rest varies according to the season but it is important to ensure the roots are replenished prior to the next grazing.

* *Early season – fast growth requires at least 20 days rest*
* *Late season or drought – slow growth requires 30 days rest*

Re-growth is also dependent on the species.

- Orchard grass re-grows faster than smooth brome.
- Bunch grasses with basal growing points re-grow quicker than sod forming or joint stemmed species.

What is Overgrazing?

Overgrazing is when livestock are allowed to graze the pasture down to the plant base on a continual basis. When the plants are grazed to the base or near to it, the plant does not have enough leaf surface to collect sunlight and undergo photosynthesis. As a result, the first stage of growth uses energy from the root reserves. This prevents the roots from getting established and the plant becomes weak. Plants should be left at least 4 inches high so they can recover and establish a healthy root system.

60 animals for 3 days provides a rest period for plants. Stock density = 20 animals per pasture

One animal on pasture for 50 days can overgraze individual plants. Stock density = 1 per acre

Stocking Rates

Determine the stocking rate of a pasture system by using:

- Your previous experience with your pastures;
- Your hay yields and the resulting usage or surplus and;
- Provincial guidelines.

Calculation of Stocking Rate

The stocking rate is the number of livestock in a given area in a set period of time. Failure to balance the livestock demand to the forage supply will result in over-grazing and a resulting declining in pasture productivity.

Grazing management has three important variables:

- The number of animals in the pasture;
- The length of time in the pasture and;
- The size of the pasture.

These variables are measured by using the Animal Days per Acre (ADA) formula.

Use the following method to calculate the stocking rate for pasture use. In this example a 20 acre paddock is producing 3000 pounds of forage per acre and grazing 600-pound steers.

Step 1. Determine average forage production per acre

This is best calculated as pounds of forage per acre (lbs. DM / acre)
Estimating forage production can be difficult – the two most important factors are plant height and plant density.

lbs. of forage production per acre = 3000 lbs. DM / acre

Step 2. Determine forage utilization rate – lbs. DM useable forage per acre

The grazing animal should not harvest every pound of forage produced – some must be left behind to ensure vigorous re-growth. The typical utilization rates for Manitoba conditions are 50% giving rise to the 'take half, leave half ' statement that wise grass farmers live by. Plan for enough margin in your utilization rate to buffer the risk of drought and wildlife feeding.

<u>50%</u> (utilization rate) x <u>3000</u> (lb. of forage per acre) = <u>1500 lbs.</u> (useable forage per acre)

Note: The utilization rate for native pasture should be 50%. The tame pasture utilization rate is 50-75% depending on your fertility package. Remember that a management decision to increase the utilization rate has consequences such as reduced stand life and lower forage production in the future.

Step 3. Determine the livestock forage requirements - Animal Day (AD)

Cattle will consume 1.5 - 3% of their body weight per day on a dry matter basis. The amount of forage an animal will consume in a day is an Animal Day.

Cow/calf pair is approximately 2.5%. The calf is included with the cow until the calf is approximately 600 lbs. A 1500 lb. cow will consume 45 lbs./day. Use 3.0% for grassers and use the average weight during grazing season. For example if the steer starts at 600 lbs. and will end at 870 lbs., use 735 lbs. as the average summer weight. e.g. (870 – 600 / 2) = 135 870 -135 = 745 lbs.

<u>1500 (lbs.)</u> (cow weight) x <u>3.0 (% dry matter intake)</u> = <u>45 lbs/cow/day (Animal Day)</u>

Step 4. Determine Animal Days per Acre (ADA)

Once you know the useable forage per acre and the livestock requirements you can calculate the stocking rate for a particular paddock. Animal days per acre (ADA) is the forage utilization rate divided by the livestock forage requirement (AD).

1500 lbs. (useable forage DM per acre) / 45 lbs./cow/day (AD) = 33 (ADA)

Step 5. Use the ADA to calculate your stocking rate

Remember that the stocking rate is dependent upon the three variables, number of animals per pasture, the length of time in the pasture and the size of the pasture.

20 (acres) x 33 (ADA) / 50 cows (herd size) = 13 (grazing days)

20 (acres) x 33 (ADA) / 10 (grazing days) = 66 cows (herd size)

Calculating the Number of Paddocks Required

Paddocks are required to control the grazing animal and provide adequate time to rest the grazed forage. Generally, the more paddocks the better. Estimate the potential number of paddocks in a grazing system by using this formula.

Days Rest / Grazing Days + number of animal groups = number of paddocks

30 day rest period / 5 days grazing per period + 1 animal group = 7 paddocks required

Once the number of paddocks have been determined, the grazing days can be adjusted to allow for a longer or shorter rest period. In the above example, 5 days is only the average grazing days per paddock – the actual will vary according to the regrowth rate.

days rest required / number of paddocks resting = grazing days

Fast growth period	Slow growth period
18 days rest = 3 grazing days/paddock	36 days rest = 6 days grazing days/paddock

*Fast Growth = Fast Moves * Slow Growth = Slow Moves*

Stock Density

Stock density is the number of animals per acre for a grazing period. Increasing stock density requires a shorter grazing period but provides more even grazing and can be used to clean up problem weeds or brush. To determine stock density, divide the total amount of DM forage produced over the season by the seasonal requirements of the animal (cow/calf pair or grasser) being grazed.

20 (acres) x (3000lbs./ac x 50% utilization) / 45 lbs./cow/day = 667 animal days.
667 / 120 days grazing season = 5.5 animals for the summer

STOCKING RATE WORKSHEET

Step 1. Determine average DM forage production per acre – lbs. of forage per acre

pounds of forage production / acre = ________ lbs./acre

Step 2. Determine forage utilization rate – lbs. useable forage per acre

50% (utilization rate) x _________(lbs. of forage / acre) = _______lbs. (useable forage / acre)

Step 3. Determine the livestock forage requirements - Animal Day (AD)

__________(lbs.) (cow weight) x ___(%) (Dry matter intake) = ________lbs/cow/day Animal Day (AD)

Step 4. Determine Animal Days per Acre (ADA)

________lbs. (useable forage per acre) / ________lbs./cow/day (AD) = _____ (ADA)

Step 5. Use the ADA to calculate your stocking rate

_____(acres) x ________(ADA) / _______cows (herd size) = _______(grazing days)

OR: _____(acres) x _______(ADA) / ______(grazing days) = ______cows (herd size)

PADDOCK CALCULATION WORKSHEET

days rest / grazing days + number of animal groups = number of paddocks required

________days rest / ________grazing per period + number of animal groups = ___paddocks required

days rest required / number of paddocks resting = Grazing Days

Fast growth period

18 days rest / 6 paddocks = 3 days grazing/paddock

Slow growth period

36 days rest / 6 paddocks = 6 days grazing /paddock

6

FENCING DESIGN AND EQUIPMENT

Fencing is a tool for controlling livestock. The fencing system should be flexible so it can accommodate changes in forage quantity and quality, animal density, renovation activities and harvesting of surplus hay.

Options for Fencing Systems:

- Barb wire – traditional, costly, low maintenance;
- High tensile electric – lower cost, versatile, easier to erect but higher maintenance than barb wire and;
- Heavy duty poly-wire or airplane cable with a take-up reel; allows for easy subdivision of paddocks.

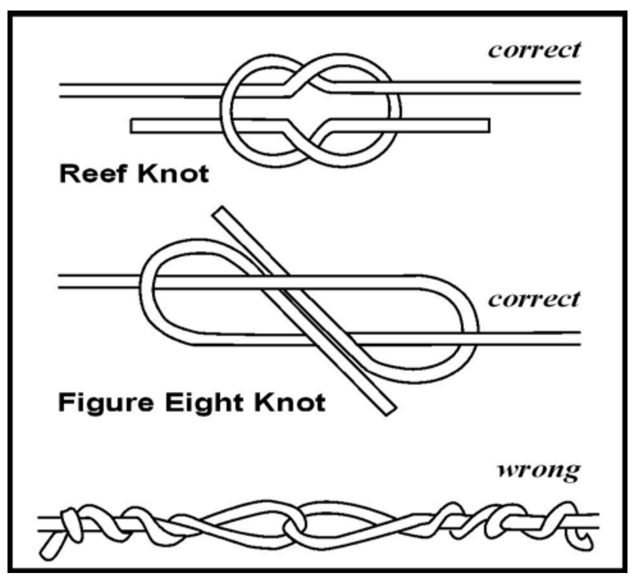
Many fencing systems utilize a combination of permanent high tensile fencing with temporary fencing. The use of poly-wire/airplane cable, step-in posts and a take-up reel, makes the sub-division of a paddock a quick process. Some grazing managers electrify only the perimeter fence and use temporary fencing within.

High Tensile Electric Fencing Systems

- High tensile galvanized steel wire 12.5 gauge has a strength of 1,800 lbs;
- Has a high degree of elasticity – will stretch and return to original length;
- Very effective conductor of electricity;
- Safe for animals;
- Provides reasonable livestock restraint and predator protection and;
- Is easy to handle once techniques are mastered.

Handling Techniques

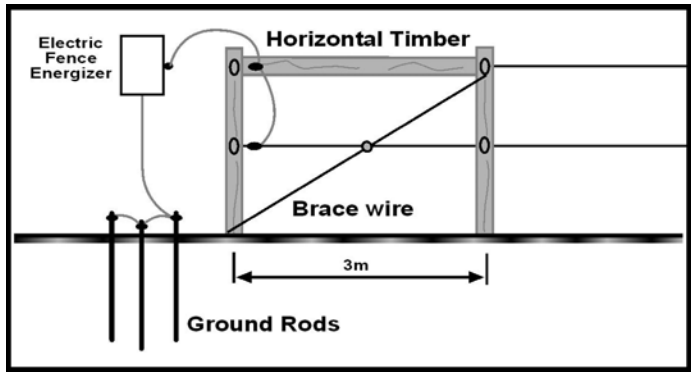
- Wire is easily broken if kinked or bent;
- Wire may be spliced using the reef or figure eight knot and;
- Joins can be made without the aid of tools.



An electric fence teaches the animals to avoid the fence.
Posts are spaced further apart than for barb wire fences and the line posts are used to hold the fence/wire up.

Brace Assemblies

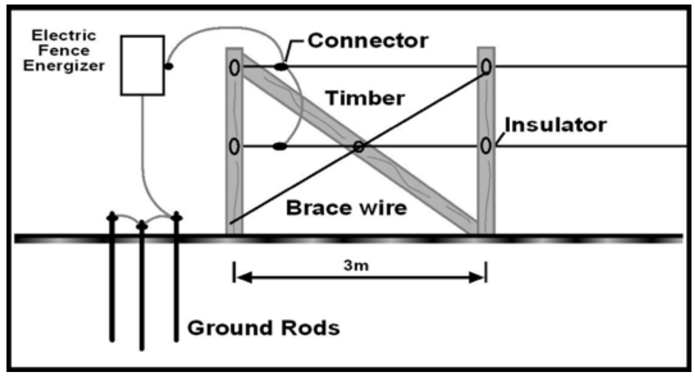
Brace assemblies are the key to a strong fence and must be properly installed.



Horizontal end brace

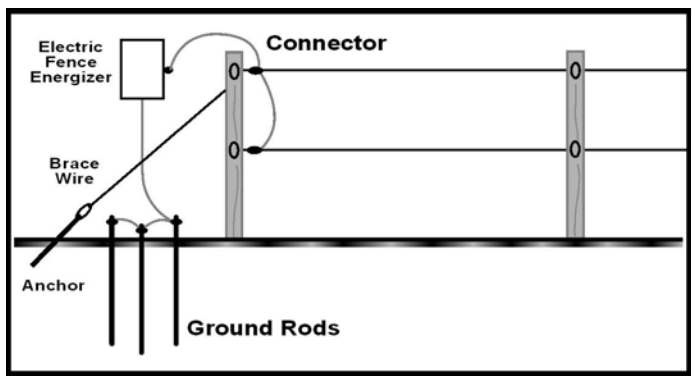
- Top horizontal brace should be 2.5 times the height of the fence.

Diagonal end brace



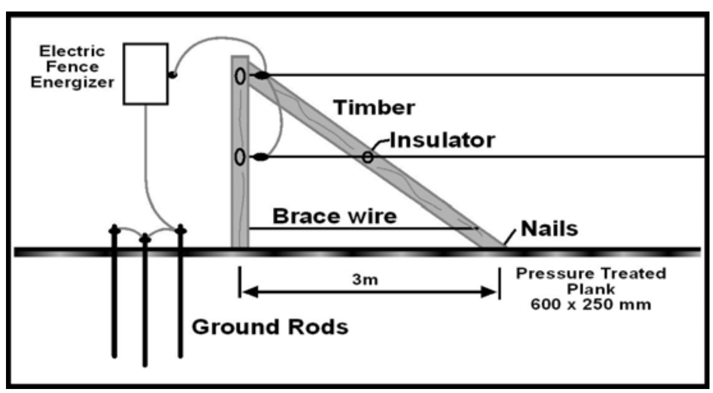
- To prevent an electrical short, ensure the diagonal wire does not come into contact with the ground or electrical wires.

Single post end brace with dead-man anchor



- Thickness of the post and the depth of the soil will determine the strength of this unit;
- Dead-man attachment can be a screw-anchor or an anchor wire attached to a rock buried in the soil.

Angle end brace



- Very simple system;
- The end of the angle brace must be floating on pressure treated wood or a stone plate;
- A horizontal brace wire runs from the bottom of the post to the angle member to provide strength.

Line Posts

- High tensile electric fence posts are used to hold up the wire;
- The distance between the line posts varies with the terrain;
- Increasing the number of posts improves fence visibility;

Line Posts continued:

For cattle fencing:

- On high tensile electric wire use 50 - 60 ft. spacing on the perimeter and subdivision fences;
- 60 - 80 ft. spacing for single wire subdivisions and;
- 30 ft. spacing for alleyways or where there will be minimal animal pressure.

For sheep fencing:

- 40-50 ft. spacing on fences with 3 wires can be used;
- 20 ft. spacing is preferred to keep the wire taut and prevent loose wire from catching the wool.

Electric Fences

- One joule per mile of electrified fence wire ensures adequate control. One joule for every three miles works, however, high grass, brush or trees can short out the system;
- If you have 5 - 6 miles of fence, it is better to split the system with multiple energizers;
- Never have two units hooked to the same fence - it will destroy both units.

Electric Fence Energizers

Two types of energizers are used: deep-cycle battery operated and 120-volt energizers.

How an energizer works

- Provides a pulse of electrical energy of several thousand volts and a few milliamps of current for a fraction of a second;
- Pulse is repeated approximately once per second;
- Output energy (in joules) indicates the potential of the energizer. It is a combination of volts, amps, pulse duration and frequency;
- Low impedance energizers (120 volt) will maintain an effective voltage on a high capacitance fence (many wires).

Deep-cycle battery:

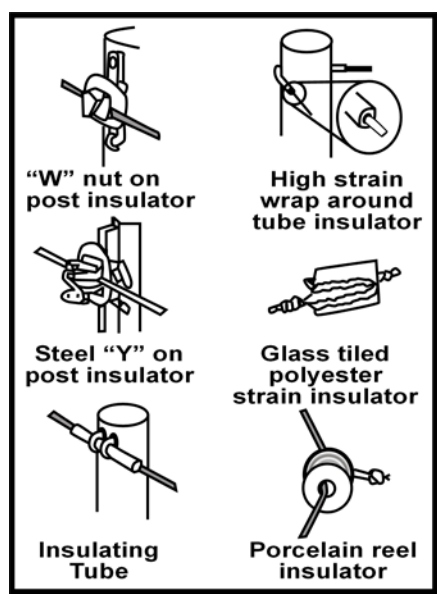
- Used as portable units;
- Used in remote locations;
- Solar panels can be use to recharge the batteries;
- Has a medium to high impedance that produces a lower voltage unit and current.

120-Volt Energizers

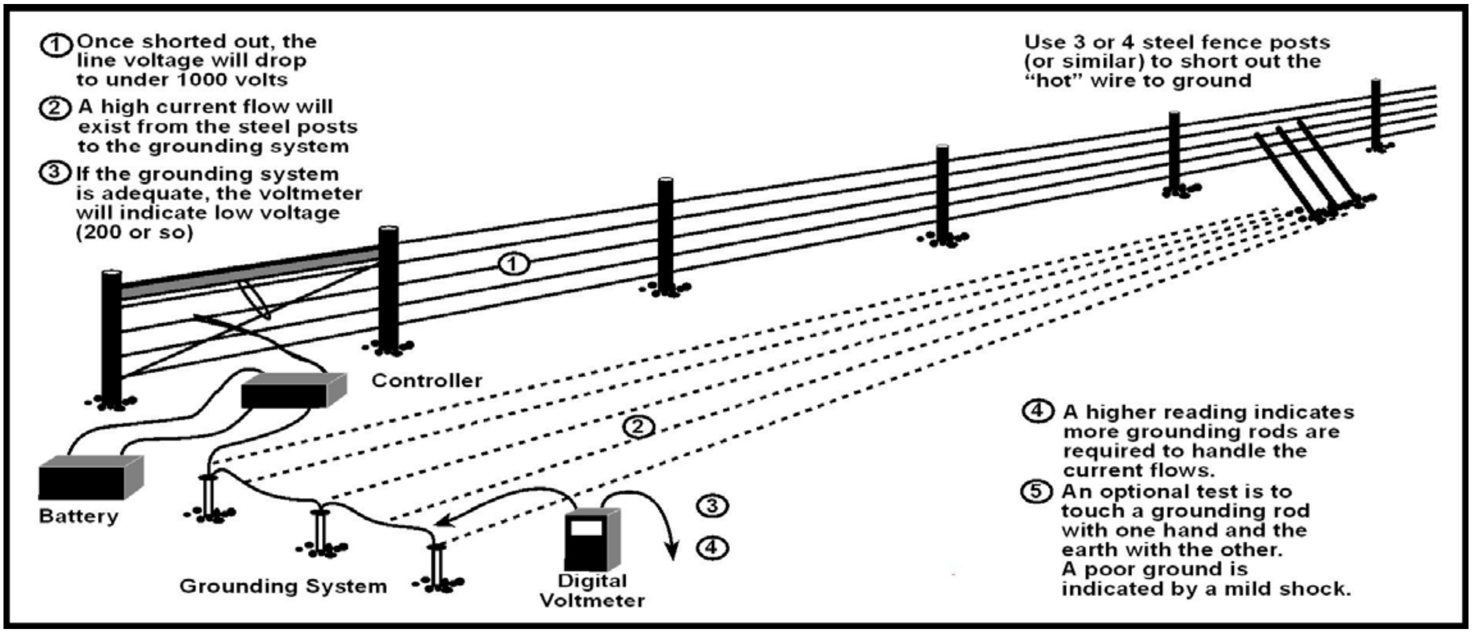
- Greater voltage as compared to battery;
- Lower maintenance and higher capacity.

Insulators

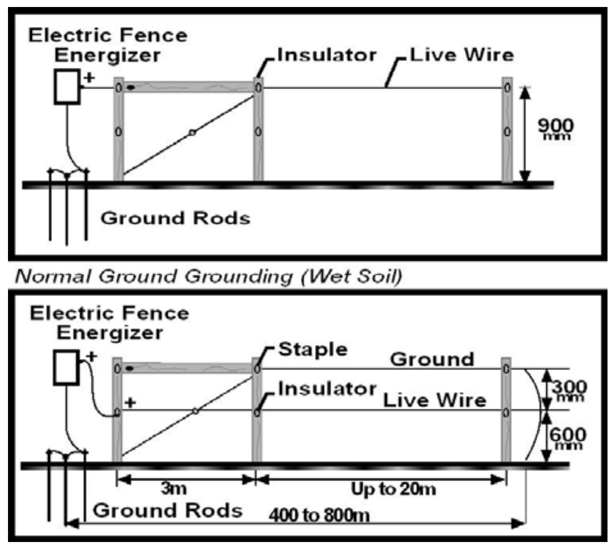
- Prevent leakage of electric current;
- They must be of good quality; porcelain is not recommend as it cracks, plastic is better since it has a high density and can resist ultra violet rays and extreme cold;
- Wrap around high density insulators are effective but dirt and insects can cause leakage.



Electrical Fence System



Grounding



A major reason for the failure of electric fencing is poor grounding.

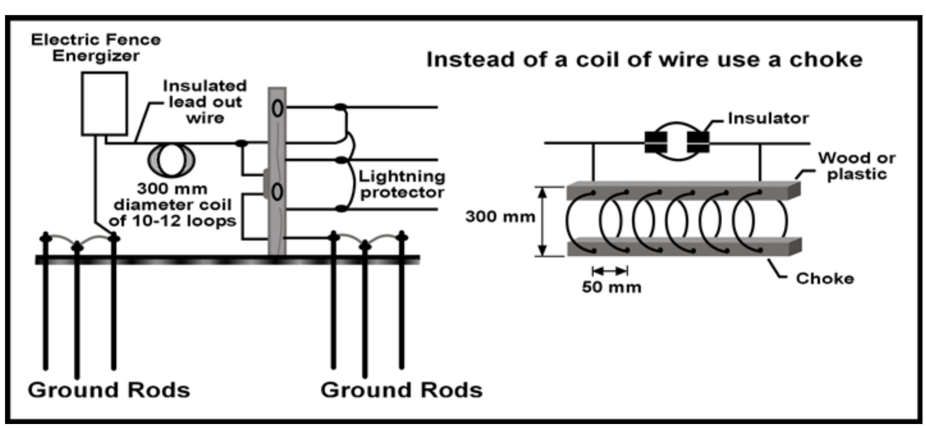
The system should have:

- At least three ground rods that are 6-9 feet long and spaced 9 feet apart;
- The general rule is three feet of ground rod per joule of energizer;
- Galvanized rods - steel rods corrode;
- Separate rods – never share with hydro poles or well casing (a galvanized culvert can be very effective as a grounding source) and;
- Galvanized or stainless steel metal clamps to connect the wire to the ground.

Frequently check the effectiveness of the grounding system by using a digital voltmeter. If the reading is higher than 500 volts, additional ground rods are required.

Lightning Diverter

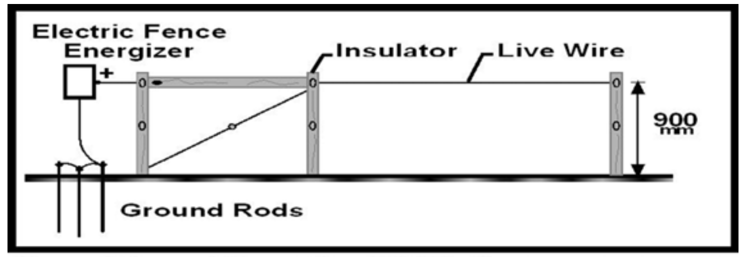
- A diverter is used to protect the energizer from lightning strikes and power surges.
- A choke kit (home made) acts as a resistance to deflect the electrical surge through the diverter to the ground.



Fence Types

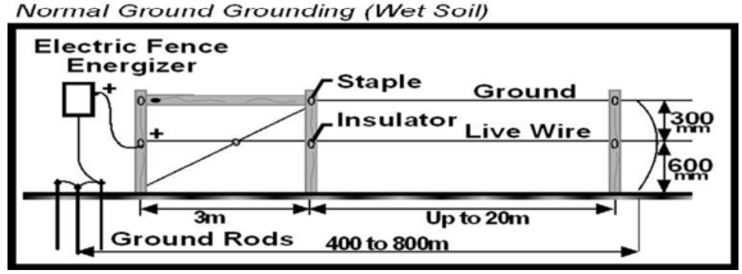
Single wire fence

- Most common form for subdividing;
- Set at “hip” height;
- Requires moist soil to provide enough shock;



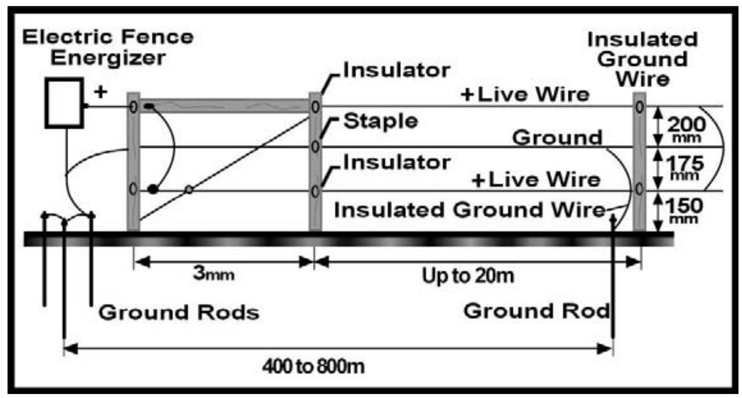
Normal Ground Grounding (Wet Soil)

- Double wire using a second wire if the soil is very dry.



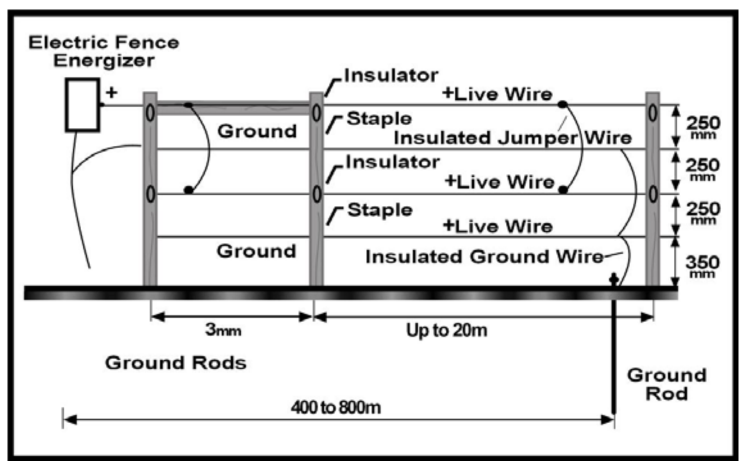
Three wire fence

- Used primarily for dairy and beef cattle;
- Two live wires with a middle ground wire;
- 60 feet post spacing;
- Used for alleyways.



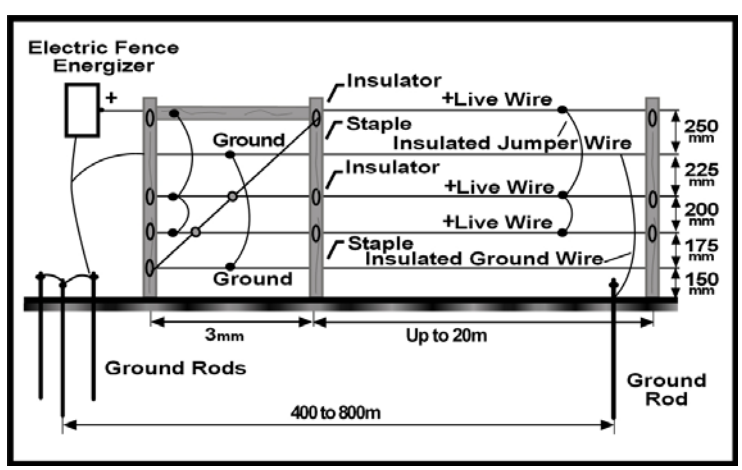
Four wire fence

- Used for cattle and horses;
- Requires jumper wires to connect the electrified wires together and the ground wires together.



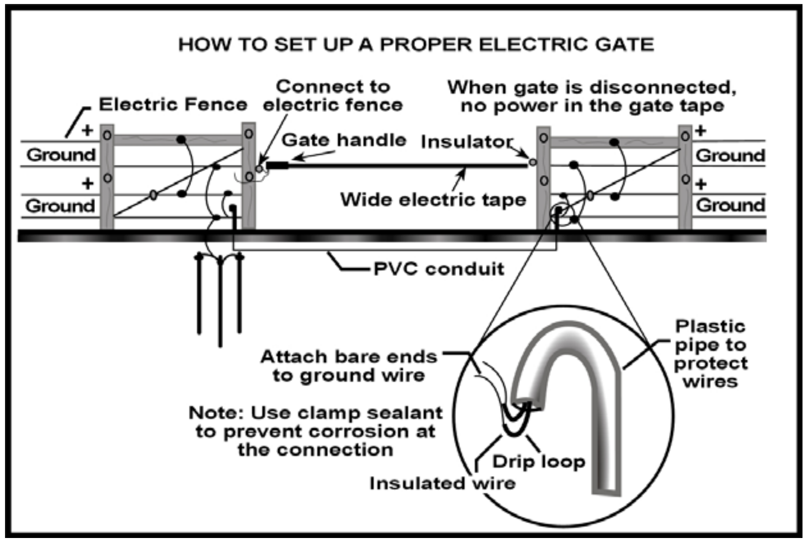
Five wire fence

- Primarily used for sheep and goats;
- Jumper wires are used to connect all positive and negative wires together. This ensures a good connection.



Power for Gated Areas

- Need to make sure power is always on both sides of the gate;
- Power is moved through a double insulated wire encased in a plastic pipe buried underground;
- Power can also be moved overhead by rails fastened to the gate posts**.**



Temporary Fencing Methods

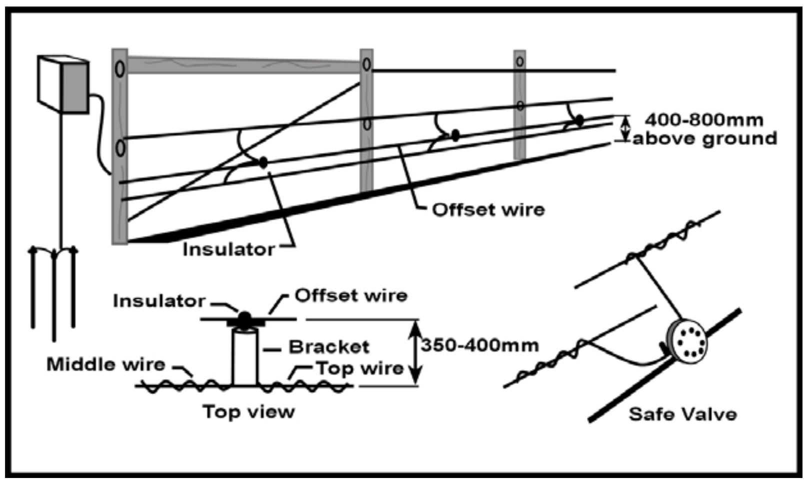
- Heavy duty poly-wire or airplane cable on a take-up reel with a geared drive rolls up as fast as you can walk;
- Step-in fiberglass or insulated posts are preferred for their ease of use;
- In frozen ground a battery operated drill is an effective way to make holes in the ground to set the posts;

Electric net fencing

- Used for temporary fencing for sheep or poultry;
- Easily erected or moved and;
- Effective for predator control.

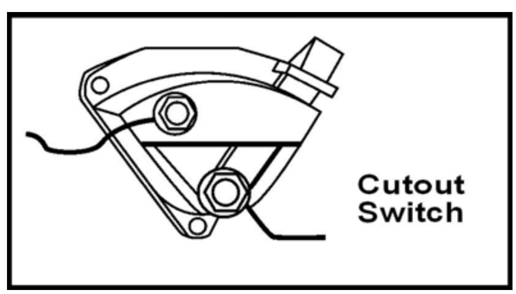
Offset electric fencing

- Electric wire offset inside older fencing can be used to teach animals to avoid the fence line. This can extend the life of the older fence;
- Fastening an electric wire directly in line with an existing barbwire fence is not recommended due to potential harm to animals and humans. If the barbs catch them they will be continuously shocked by the electrified wire.



Cut out switches

- Used to cut/transfer sections of fencing as required;
- Used to isolate/identify short circuits;
- Not required to go all the way to the energizer;
- When a particular section is not being used, power can be cut off and used effectively elsewhere.



Insulated gate handles

- The gate area has a hot wire running underground as well as along the gate tape. When the tape is attached, by way of the handle, the tape is hot and cattle can’t cross. When the tape is detached, the fence remains hot, however, the herd can pass through the gate area.

7

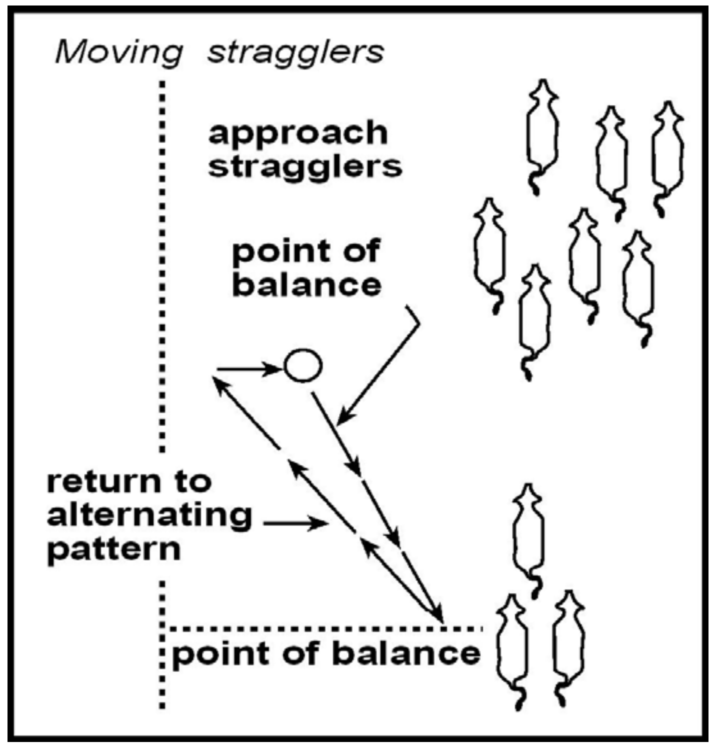
LIVESTOCK HANDLING FACILITIES

When designing your handling system ensure that it meets the following criteria:

- Labour efficient;
- Cost effective;
- Minimizes animal stress and maximizes animal psychology and is;
- Safe for all users.

Animal Psychology

- Handling facilities should be located in surroundings familiar to the animals;
- Grazing animals view life on a horizontal plane. They will try to jump any horizontal object such as rails, but will not attempt to cross vertical objects. Concrete mesh, which has a strong vertical element, has been used successfully as a perimeter fence for large corral areas;
- Sheep and cattle follow the leader so a tame lead animal is very helpful;
- Avoid the use of clubs, yelling or other physical abuse.

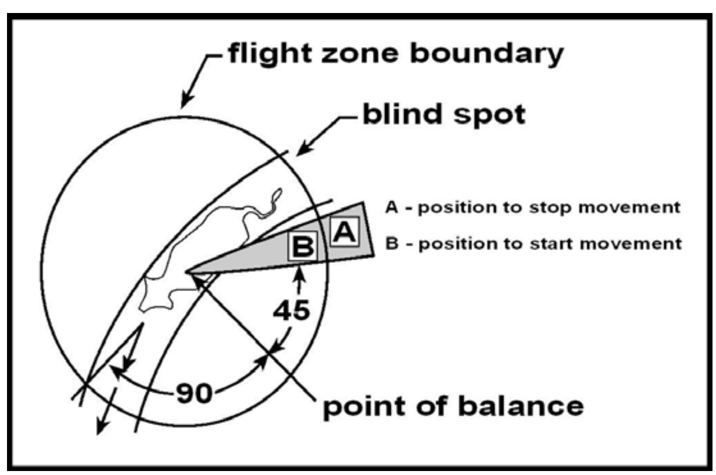


Moving Animals on Pasture

- Back and forward movements behind the point of balance will move the animals forward;
- The flight zone boundary changes with the area;
- Animals that are offered new pasture often move easily;
- Always try to entice them to come; bang a pail, have a special cattle call or cow bell.

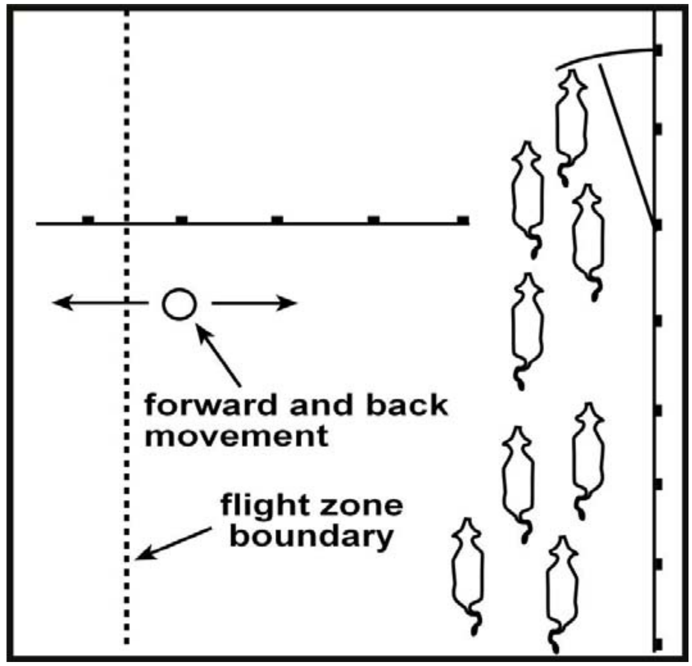
Animal Flight Zones

- Animals have excellent peripheral vision so you need to be at the mid-point to move them;
- As shown in the diagram, you control the animal movements by positioning yourself between points A and B (stop and go);
- If you place yourself behind the animals they will just turn around and look at you.



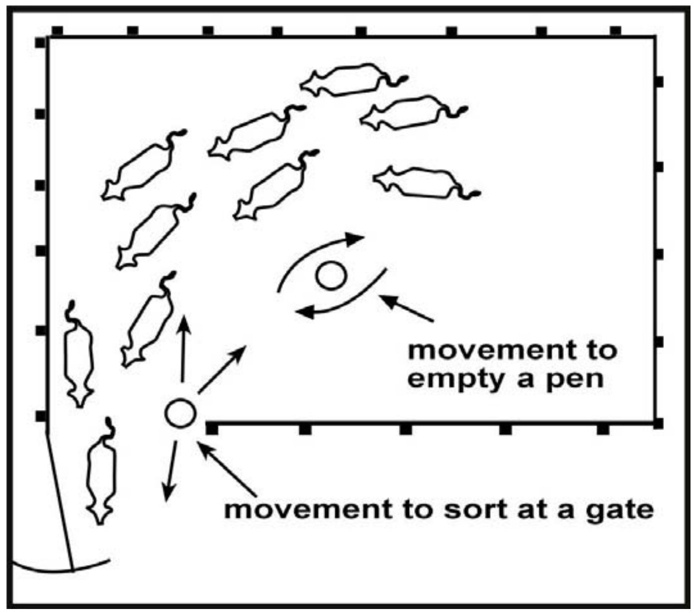
Moving in a corral

- Rapid movements in the flight zone will encourage the stock to move ahead. Flight zone boundaries will change.



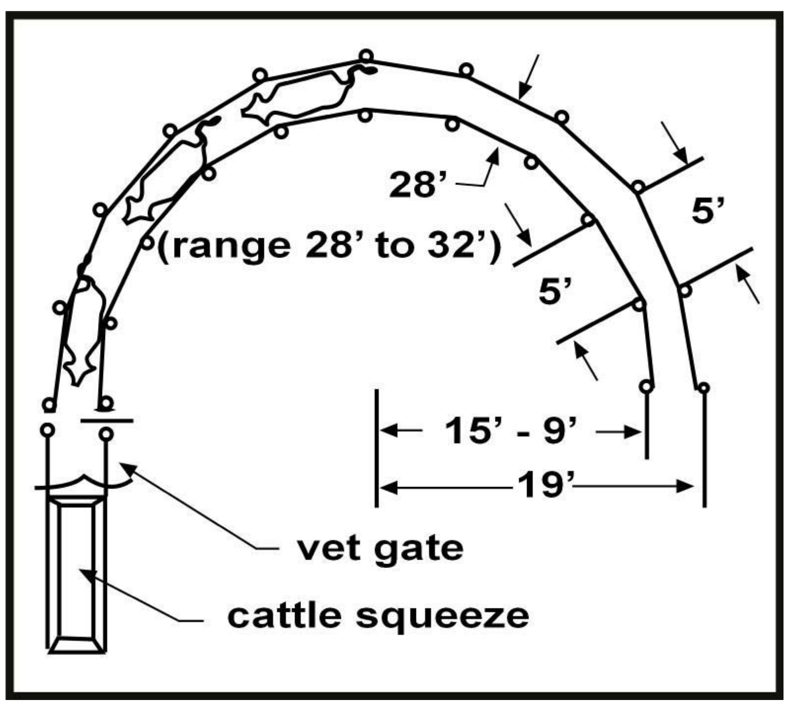
Emptying a corral

- Take the time to learn the flight zones



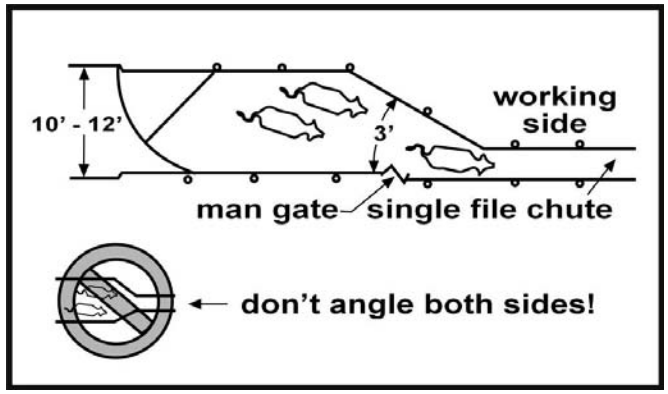
Chute Systems

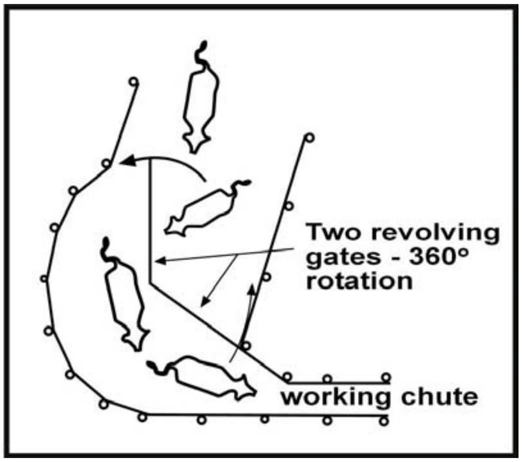
- Solid sides blocks vision. Walls made of strong, solid materials such as wood, steel, or welded pipes, block the animal's vision and keep them moving;
- Curved chutes keep cattle moving as they cannot see beyond the next animal;
- Self-locking head gates make for easier cattle handling – usually at a reasonable cost.

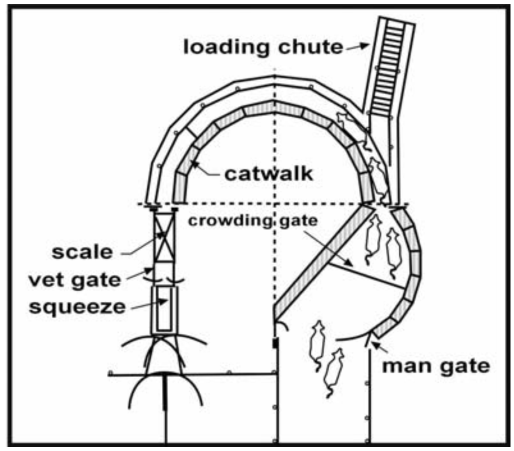


Crowding pens

- Require a strong gate to move the animals;
- Light weight gates are very dangerous with large animals;
- Funnel the areas, don't angle both sides;
- Include a man-gate for safe and easy access;
- Match the number of animals to the size of the pen; i.e. for holding and crowding have approximately 9 – 18 square feet per head and for confinement, approximately 140 – 180 square feet per head.



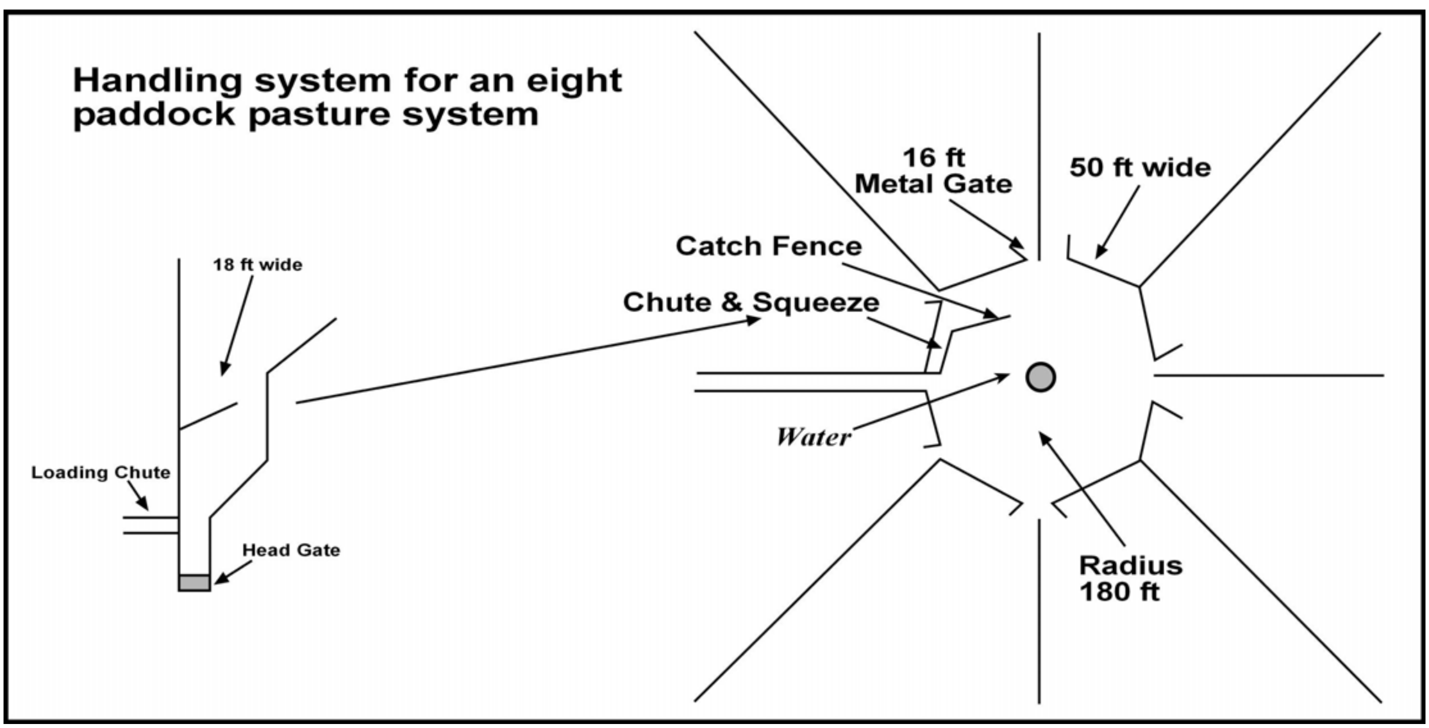




Example of a Corral for an Eight-Paddock System

This facility can accommodate 500 head and can be adjusted to suit smaller numbers.

- Access to all paddocks is gained through steel panel gates;
- The central water facility can be adjusted to herd size;
- A wing gate is included to catch cattle that require treatment;
- The size is based on 40 – 50 square feet per animal;
- Low cost concrete mesh is used for sides to prevent animal jumping;
- Holding area is made out of steel pipe for safety and reliability;
- The chute is constructed from steel pipes covered with recycled metal.



8

EXTENDED GRAZING

Extended grazing involves expanding the grazing season beyond the traditional summer grazing period to late fall or in some cases throughout the winter. Various methods are employed to ensure that both the livestock and pasture health is maintained or improved. The following points illustrate just how beneficial this system is.

- Reduces daily feeding costs by as much as 50%
  - Animal harvests its own feed so less machinery is required;
  - Manure is deposited on the land so there is less manure handling.

- Better use of the forage feed available on the farm
  - Stockpiled forage can be used;
  - Crop residues from cereal crops can be utilized;
  - Forage available on the headlands, low non-crop areas can be used.

- Environmental benefits
  - Less concentration of animals in one location (feedlot);
  - Manure is spread over areas where it might be difficult to spread mechanically;
  - Manure provides fertilizer for the forages;
  - Potential to increase plant diversity as seeds from feed hay can be re-seeded in the feeding area.

Options for Stockpiling Forage

- Stockpile perennial forage by saving the second growth from the pasture for use in the fall after the first killing frost or in spring before the spring growth;
- Choose forages that stand tall in snow such as tall fescue or Russian wild rye grasses. Soft grasses such as Orchard or Meadow Brome do not stay erect in snow, and alfalfa loses leaves and is lower in quality after frost;
- Harvest the first cut of the paddocks you choose to stockpile, or graze after mid-July, then graze again in November/December;
- Estimate dry matter yield by forage height – the following chart indicates average figures, however, it is best to measure your own pasture using a falling plate meter;
- You need to have an estimate of the forage available in order to plan for the volume you'll need for the fall and winter grazing.

Pasture Productivity Chart

Ruler height (inches)	Thin density (lbs./ac)	Average density (lbs./ac)	Thick density (lbs./ac)
4	1064	1338	1987
6	1502	1874	2821
8	1876	2321	3549
10	2187	2679	4170
12	2435	2948	4686
14	2620	3128	5096
16	2742	3219	5399

Seeded Annuals

- Can be used to bridge the summer grazing slump that usually occurs during hot weather;
- Can be used as stockpiled forage or for swath grazing in the non-growing portion of the year;
- Compare the cost of seeded annuals versus perennials prior to seeding.

A seeding chart for annual forages is on page 32.

Bale Grazing

- Reduces the labour and equipment costs that are associated with manure removal.
- Bales should be set out in rows across the selected field for winter grazing/feeding;
- The bales should be spaced at least 20 feet apart for easy access for animals; further spacing may be required to manage nutrient loading in the soil. Consult your local government office for manure/nutrient application regulations.
- Electric temporary fencing can be used to protect the bales not being used;
- Light bale feeders can be used to reduce wastage. They can then be rolled over the next row of bales;
- Twine should be removed when setting the bales out in fall;

Crop Residues

- Animals must receive supplements when they are fed crop residues.

Residue Content Chart

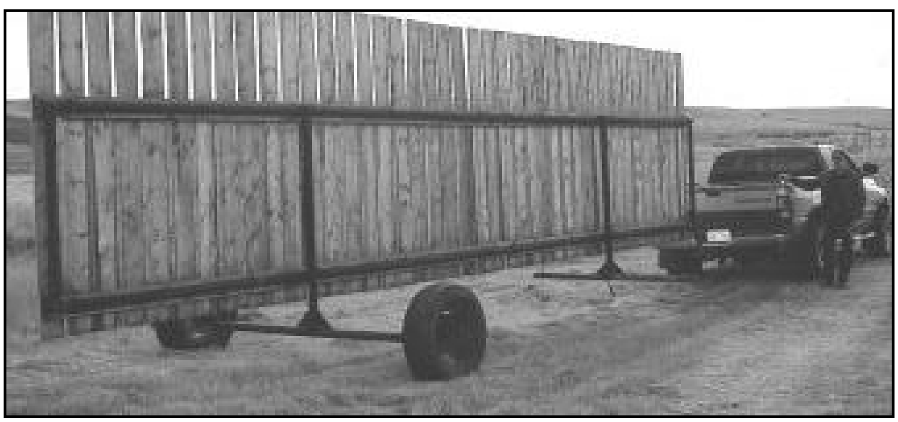
Feed	Dry Matter %	Protein %	Calcium %	Phos %	Mg %	ADF* %	TDN **%
Wheat Chaff	91	4.60	0.24	0.08	0.12	51.5	43.6
Wheat Chaff & Straw	86	4.00	0.25	0.12	0.12	51.5	39.7
Barley Chaff	89	6.50	0.52	0.13	0.17	42.8	53.0
Barley Chaff & Straw	89	5.00	0.45	0.11	0.15	49.6	45.6
Oat Chaff	87	7.20	0.71	0.14	0.23	42.6	53.1
Oat Chaff & Straw	84	5.10	0.39	0.1	0.15	50.1	45.1
Canola Chaff	89	5.90	1.45	0.12	0.33	56.0	38.5

*** ADF = Acid detergent fiber, an indication of potential digestibility of the forage**

**TDN = Total digestible nutrients, an indication of the potential energy value of the forage

Winter Feeding on Pasture

- Livestock can be wintered away from the yard-site in corrals for all or part of the winter season;
- The feeding and windbreak location should be moved on a regular basis so the nutrients from the manure and urine are spread over a large area;
- Manure can be concentrated over areas where soil fertility is poor;
- Livestock can be fed on virtually any parcel of land you choose, provided there is water or adequate snow available for the stock. Research has shown that cattle that utilize snow, perform as well as those on water;



- The amount of hay hauling can be reduced if the grazing is located close to where it was baled;
- Fall and winter grazing practices such as stockpiling perennial forage, swath grazing, and crop residue grazing, can be used on open parcels of land that do not have natural or other man-made shelters;
- Portable wind-breaks can be moved when snow accumulates thereby eliminating the need for snow removal.
- Moving the site on a regular basis reduces diseases on calving ground.

9

PASTURE ASSESSMENT

A healthy pasture is a productive pasture. Several factors must work together to create the ideal environment for plant growth. By assessing your pastures annually, you can measure the health of the pasture, set management goals, and identify improvements. The initial assessment becomes your benchmark by which you measure the impact of changes such as stocking rates, length of grazing, and length of rest period. *Pasture assessment examples and worksheets are in Chapter 10.*

Tame pasture and native pasture vary only in the diversity of the plants.

Tame Pasture Assessment

The planted species should be the dominant plant in the paddock. There should be very few invader species such as Kentucky bluegrass or Canada thistle. When these common invaders are present they limit productivity since they compete for available water and nutrients.

The density of the plant population is an indication of the health of the pasture. There should be adequate space so the plant leaves can spread out and undergo photosynthesis. The greater the leaf area of the plant, the greater the incidence of photosynthesis, and resulting plant growth. Too much space encourages invaders.

Managing mulch (vegetation residue) is the key to long-term pasture health and productivity. Mulch decreases soil erosion, reduces soil temperature and evaporation, improves water infiltration, and increases forage production. The use of mulch can buffer the impact of drought. A continuous layer of mulch, approximately 1/2 an inch (1-3 cm) is ideal. An absence of mulch is an indication of overgrazing.

Native Pasture Assessment

The desired native species should be present and dominant. Over the past 10,000 years, several prairie native grasses have adapted to our climate and are excellent producers. Big bluestem, western wheat grass, switch grass, grama grasses, green needlegrass and Indian grass all have exceptional yields, even in the face of drought.

Biodiversity is the key to native prairie resilience. A mixture of legumes and grasses are a sign of good pasture health. Legumes are known for their ability to utilize the nitrogen in the atmosphere to help the plant grow. When the plant dies, it leaves nitrogen in the soil for other plants to use.

As with tame pastures, the density of the plants and the available mulch are important factors for optimum production.

10

EXAMPLES & WORKSHEETS

The following pages provide an example of the costs associated with the establishment of a pasture. Worksheets are provided to help you determine your actual costs. To download an interactive worksheet where you can input your figures and have the calculations done for you go to: www.mbforagecouncil.mb.ca/grazingclubs

Sketch your existing and revised forage plan below (example on page 6).

Legend:

Two-wire permanent fence

Single wire permanent fence

Moveable, temporary fencing

Existing Pasture (Forage) Plan

Revised Pasture (Forage) Plan

Use this chart to select annual forages for your pasture plan.

Annual Forages for Extended Grazing							
Crop	**Optimum Seeding Date**	**Seeding Deadline**	**Seeding Rate (kg/ha)**	**Seeding Depth (cm)**	**Days to Emergence**	**Days to Maturity**	**When to Graze**
Oats	May 1-June20	Aug 15 for fall grazing	90-115	4-7	10	100-103	Pre-boot stage
Barley	May 1-31	June 20	90-120	4-5	8	84-90	Pre-boot stage
Wheat	May 1-31	June 20	100-135	3-8	10	99-105	Pre-boot stage
Winter Wheat - Spring Seeded	May 1-31	June 15	100-135	3-8	10	next season	15-20 cm
Winter Wheat - Fall Seeded	Aug 1-Sept 15	Sept 15	100-135	3-8	10	99-105	Fall grazing 15-20 cm, spring grazing pre-boot stage
Fall Rye - Spring Seeded	May 1-31	June 15	45-95	2.5-5	12	next season	15-20 cm
Fall Rye - Fall Seeded	Aug 1-Sept 15	Sept 15	45-95	2.5-5	10	88-104	Fall grazing 15-20 cm, spring grazing pre-boot stage
Corn	May 1-25	June 10	60,000-80,000	2.5-5	5-10	100-115	fall or winter
Siberian Millet	May 25-Jul 10	July 15	20-25	1-2.5	10	60-90	can be grazed but usually used for silage/hay
Proso Millet	May 15-July 10	July 15	25-35	1-2.5	10	85-90	can be grazed but usually used for silage/hay
Sorghum	May 15-June 1	June 5	6-8	2.5-3.5	10		can be grazed but usually used for fall/winter grazing
Sorghum Sudan Hybrids	May 26-June 16	July 5	20-30	1-2.5	10		Swath grazing - 60-70 cm cut early
Ryegrass (Italian)	Apr 10-June 1	June 5	20	less than 2.0	6-10	40-60	10-15 cm
Ryegrass (Westerwold)	Apr 10-June 1	June 5	20	less than 2.0	6-10	40-60	Graze 10-15 cm, Hay early flowering, 5-6 wks after seeding
Intercropping Winter Cereal & Fall Rye	Apr 10-June 1	June 5	50% of usual rate	3-8	10		Harvest 1st cut (cereal) at boot stage and graze fall rye in mid summer
Swath Grazed Crops	June 15-30	Early July	Usual rate				Swath prior to early dough stage, Graze in late August (non-growing portion of the season)

Forage Establishment Costs

The following example outlines the costs associated with a 320 acre pasture. Use the worksheets on the next two pages or download an excel spreadsheet at www.mbforagecouncil.mb.ca/grazingclubs to input your own information.

Forage Establishment Example for 320 Acres							
1: Forage Species		**lbs./ac**	**Total lbs.**	**Seeds per ft.**	**Cost/lb.**	**Cost/acre**	**Total**
alfalfa		1.0	320	5	$ 1.80	1.8	$ 576.00
trefoil		1	320	9	$ 1.75	1.75	$ 560.00
timothy		0	0	0	$ 1.25	0	$ -
meadow brome		5	106	9	$ 3.95	19.75	$ 6,320.00
tall fescue		3	960	16	$ 2.50	7.5	$ 2,400.00
creeing red fescue		0		0	$ 1.75	0	$ -
reed canary		0	0	0	$ 3.06	0	$ -
orchard		0	0	0	$ 2.75	0	$ -
Total		**10**	**3,200**	**38**	**$ 18.81**	**30.8**	**$ 9,856.00**
(25-35 seeds/sq. ft. is ideal - allow higher rates if poor seed bed conditions exist							
2. Cover Crop		**lbs/ac**	**Total lbs.**	**Seeds per ft.**	**Cost/lb.**	**Cost/acre**	**Total**
oats		40	12,800		$ 0.11		$ 1,408.00
annual rye grass		6	1,920		$ 1.00		$ 1,920.00
Custom Seeding						3.5	$ 1,120.00
Total							**$ 3,328.00**
3. Fertility		**Nitrogen**	**Phos.**	**Potassium**	**Sulfur**		**Total**
	lbs./ac	0	40	0	0		
	cost/lb.	$ 0.30	$ 0.30	$ -	$ -		$ 3,840.00
4. Weed Control						**Cost/acre**	**Total**
Herbicides						$ -	$ -
5. Other Establishment costs						**Cost/acre**	**Total**
						$ -	$ -
6. Total capital cost						**Cost/acre**	**Total**
Forage seeding						$ 30.80	$ 9,856.00
Cover crop						$ 10.40	$ 3,328.00
Fertility						$ 12.00	$ 3,840.00
Weed Control						$ -	$ -
Other establishment costs						$ -	$ -
Total						**$ 53.20**	**$ 17,024.00**
7. Annual Cost							**Total**
Establishment costs to be recovered in 6 years							
Annual principle							$ 2,837.00
Annual interest 8.0%							$ 113.00
Total annual cost							**$ 2,951.00**
annual cost/acre							**$ 9.22**

The following worksheets can be used to determine your annual forage costs or you can download this interactive worksheet at www.mbforagecouncil.mb.ca/grazingclubs

Worksheet # 1.

Forage Establishment Worksheet (# of Acres _______)

1: Forage Species		**lbs./ac**	**Total lbs.**	**Seeds per ft.**	**Cost/lb.**	**Cost/acre**	**Total**
alfalfa							
trefoil							
timothy							
meadow brome							
tall fescue							
creeing red fescue							
reed canary							
orchard							
Total							
(25-35 seeds/sq. ft. is ideal - allow higher rates if poor seed bed conditions exist							
2. Cover Crop		**lbs/ac**	**Total lbs.**	**Seeds per ft.**	**Cost/lb.**	**Cost/acre**	**Total**
oats							
annual rye grass							
Custom Seeding							
Total							
3. Fertility		**Nitrogen**	**Phos.**	**Potassium**	**Sulfur**		**Total**
	lbs./ac						
	cost/lb.						
4. Weed Control						**Cost/acre**	**Total**
Herbicides							
5. Other Establishment costs						**Cost/acre**	**Total**
6. Total capital cost						**Cost/acre**	**Total**
Forage seeding							
Cover crop							
Fertility							
Weed Control							
Other establishment costs							
Total							
7. Annual Cost							**Total**
Establishment costs to be recovered in ____ years							
Annual principle							
Annual interest____%							
Total annual cost							
annual cost/acre							

Worksheet # 2.

Forage Establishment Worksheet (# of Acres ________)							
1: Forage Species		**lbs./ac**	**Total lbs.**	**Seeds per ft.**	**Cost/lb.**	**Cost/acre**	**Total**
alfalfa							
trefoil							
timothy							
meadow brome							
tall fescue							
creeing red fescue							
reed canary							
orchard							
Total							
(25-35 seeds/sq. ft. is ideal - allow higher rates if poor seed bed conditions exist							
2. Cover Crop		**lbs/ac**	**Total lbs.**	**Seeds per ft.**	**Cost/lb.**	**Cost/acre**	**Total**
oats							
annual rye grass							
Custom Seeding							
Total							
3. Fertility		**Nitrogen**	**Phos.**	**Potassium**	**Sulfur**		**Total**
	lbs./ac						
	cost/lb.						
4. Weed Control						**Cost/acre**	**Total**
Herbicides							
5. Other Establishment costs						**Cost/acre**	**Total**
6. Total capital cost						**Cost/acre**	**Total**
Forage seeding							
Cover crop							
Fertility							
Weed Control							
Other establishment costs							
Total							
7. Annual Cost							**Total**
Establishment costs to be recovered in _____ years							
Annual principle							
Annual interest____%							
Total annual cost							
annual cost/acre							

Determining Pasture Condition

By: Dennis Cosgrove, Dan Undersander and Maurice Davis, University of Wisconsin

Good pasture condition is critical to a successful grazing system. Pasture quality may vary greatly from paddock to paddock, or year to year, due to differences in management, environment, fertility, grazing pressure or animal species. The intent of this chart is to provide graziers with a pasture evaluation method to help determine if their paddocks are in need of improvement. It is also a useful tool in evaluating the impact of management decisions on pastures.

Pasture condition scoring involves the visual evaluation of 10 categories that have an impact on pasture condition. The total score for an individual paddock is determined and that score is used to rank that paddock as very poor, poor, good or very good. The 10 categories and evaluations methods are listed below.

Category	Evaluation Method
Plant Desirability	This will help determine if you have the types of plants you want in a paddock. A desirable species is one that provides high quality production for a significant part of the grazing season. Desirable species will typically consist of cool season grasses and legumes but may include other species such as warm season grasses, brassicas, chicory and others. Undesirable species, such as thistles, toxic and woody plants, are those that are not typically consumed by animals. Intermediate species are those that, while palatable, provide low tonnage or poor quality forage. Some examples are dandelions and wild plantains. Visually determine if the species present are mostly desirable, intermediate or undesirable and record the appropriate value on the scoresheet.
Plant Diversity	Plant diversity is the number of different kinds of plants which are well represented in the paddock. If only one kind of plant occurs, diversity is narrow; if more than 5 kinds are present, diversity is broad. Diversity is important in maintaining a productive pasture throughout the growing season. Determine the number of plant species present and record the appropriate value.
Plant Density	A high plant density is important for pasture production. Bare and open spots are unproductive and allow for weed encroachment and soil erosion. Visually estimate the total density of all desirable and intermediate species and assign a value based on percentage ground cover.
Plant Vigor	Desirable species should be healthy and growing at their potential. Some things to consider when rating for plant vigor are color, size of plants, rate of regrowth following harvest and productivity. Determine overall vigor of desirable and intermediate species and record.
Percent Legume	Legumes provide nitrogen for the pasture and improve the quality of thepasture mix. Legumes also provide tonnage during hot, dry periods in mid-summer. Visually estimate the percent of the total biomass which is represented by legumes.
Severity of Use	The proper amount and frequency of grazing are critical in maintaining productive pastures. Close and frequent grazing causes loss of vigor, reduces density of desired species, and promotes soil erosion. Light use allows excessive residue buildup, blocks sunlight and reduces forage quality. Assign a value based on usage for that paddock. Note: undergrazing may be as detrimental as overgrazing.
Uniformity of Use	Differences in species, plant maturity and stocking rates may cause uneven grazing to occur. Uniform grazing results in all plants being grazed to a similar height. Spotty grazing appears uneven, with some plants or parts of the paddock grazed heavily and others lightly. When rating this factor keep in mind that, while overgrazing may result in a uniform height, it is still detrimental to the stand.
Soil Erosion	Low plant densities on sloping soils can result in excessive soil erosion. Evaluate the severity of erosion (sheet, rill, gully and stream bank) in the paddock and record the appropriate value.
Woody Canopy	A woody canopy provides shade for animals but may result in uneven grazing and manure distribution, trampling and erosion. A woody canopy also intercepts sunlight and competes for water and nutrients. Estimate the percent of the paddock that is covered by a canopy and record the value.
Plant Residue	Decaying plant residue provides nutrients and organic matter to the soil. Too much residue (more than 2 inches) may result in poor nutrient cycling. Too little residue (less than 1/2 inch) may result in excessive water run off. Observe the amount of residue and record.

USING THE PASTURE CONDITION SCORE SHEET

To use the Pasture Condition Score sheet simply enter the selected value in the column next to the appropriate category. Add all ten values and compare to the table below to determine paddock condition.

Pasture Conditon Score	Condition
0-10	Very Poor
11-20	Poor
21-30	Good
31-40	Very Good

Keep in mind that a paddock may score well overall but still benefit from attention in one or two individual categories.

EXAMPLES

To the right are two examples to assist in using the Pasture Condition Score Sheet.

	EXAMPLE 1		EXAMPLE 2	
CATEGORY	Paddock 1 Heavy Grazing	Paddock 2 Moderate Grazing	Paddock 3 Before Frost Seeding	Paddock 3 After Frost Seeding
Plant Desirability: The species present are mostly: 0 1 2 3 4 Undesirable Intermediate Desirable	2	3	2	4
Plant Diversity: The diversity of plant species is: 0 1 2 3 4 Narrows <2 Medium 3-4 Broad >5	2	3	3	4
Plant Density: The percent ground cover for desirable and intermediate species is: 0 1 2 3 4 <55 65 75 85 >95	1	3	2	4
Plant Vigor: Desirable and intermediate species are: Desirable and Intermediate species are: 0 1 2 3 4 Weak Medium Strong	1	3	2	3
Legumes in Stand: The percentage of the total biomass which is legume: 0 1 2 3 4 <10 10-19 20-29 30-39 >40	2	3	1	3
Severity of Use: The degree and frequency of us is: 0 2 4 2 0 Light Moderate Heavy	0	4	4	4
Uniformity of Use: The uniformity of grazing is: 0 1 2 3 4 Spotty Intermediate Uniform	1	3	2	3
Soil Erosion: Sheet, rill, gully and stream bank erosion is: 0 1 2 3 4 Severe Moderate Slight	2	4	3	4
Woody Canopy: The paddock percentage covered by a woody canopy is 0 1 2 3 4 >40 31-40 21-30 11-30 <11	4	4	4	4
Plant Residue: Dead and decaying plant material is: 0 2 4 2 0 Deficient Appropriate Excessive	2	4	2	4
PASTURE CONDITION SCORE:	17	34	25	37

Example 1 compares a paddock which has been heavily grazed to one which has had a more moderate grazing schedule. A better managed grazing system has resulted in increased diversity, density and vigor and other improvements. The Pasture Condition score of 17 in Paddock 1 indicates poor condition while the better managed Paddock 2 has a Pasture Condition Score of 34 indicating very good condition.

Example 2 compares the condition of a paddock before and after frost seeding Red Clover. The frost seeding has resulted in a Pasture Condition Score increase from 25 to 37, or a change from good to very good condition.

The examples shown here are just two of many different ways the Pasture Condition Score Sheet may be used. Evaluating and scoring each of your paddocks throughout the growing season as well as over a period of years will provide a wealth of information to assist in managing pastures for maximum production and return.

Pasture Condition Score Sheet

	EXAMPLE 1		EXAMPLE 2	
CATEGORY	**Paddock 1 Heavy Grazing**	**Paddock 2 Moderate Grazing**	**Paddock 3 Before Frost Seeding**	**Paddock 3 After Frost Seeding**
Plant Desirability: The species present are mostly: 0 1 2 3 4 Undesirable Intermediate Desirable				
Plant Diversity: The diversity of plant species is: 0 1 2 3 4 Narrows <2 Medium 3-4 Broad >5				
Plant Density: The percent ground cover for desirable and intermediate species is: 0 1 2 3 4 <55 65 75 85 >95				
Plant Vigor: Desirable and intermediate species are: Desirable and Intermediate species are: 0 1 2 3 4 Weak Medium Strong				
Legumes in Stand: The percentage of the total biomass which is legume: 0 1 2 3 4 <10 10-19 20-29 30-39 >40				
Severity of Use: The degree and frequency of us is: 0 2 4 2 0 Light Moderate Heavy				
Uniformity of Use: The uniformity of grazing is: 0 1 2 3 4 Spotty Intermediate Uniform				
Soil Erosion: Sheet, rill, gully and stream bank erosion is: 0 1 2 3 4 Severe Moderate Slight				
Woody Canopy: The paddock percentage covered by a woody canopy is 0 1 2 3 4 >40 31-40 21-30 11-30 <11				
Plant Residue: Dead and decaying plant material is: 0 2 4 2 0 Deficient Appropriate Excessive				
PASTURE CONDITION SCORE:				

This chart can be used to examine the productivity of each individual pasture. Use it to determine which of your pastures need to be rejuvenated.

Pasture Record Sheet (Example)

Record the Grazing Days per paddock and use the Animal Days per Acre to compare paddock productivity

Paddock #	Acres per Paddock	Grazing Dates On	Grazing Dates Off	Grazing Days	Days Rest	Grazing Animals	Animal Units	Animal Grazing Days/Acre	Total per Acre	Total ADA per Pad.	Avg. ADA per Pad
1	26	5/10	5/15	5		50C, 10H	57.5	11	11		
	26	6/25	6/30	5	41	55C	55	11	11		
	26	8/10	8/20	10	41	55C, 20S	70	27	27		
	26	10/15	10/20	5	56	60C/H	60	12	12		
										60	15%
2	27	5/15	5/20	5		50C, 10H	57.5	11	11		
	27	6/15	6/20	5	26	55C, 20S	70	13	13		
	27	7/23	7/30	7	33	55C, 20S	70	18	18		
	27	9/10	9/20	10	42	60C/H	60	22	22		
										64	16%
3	31	5/20	5/25	5		50C, 10H	57.5	9	9		
	31	7/15	7/23	8	51	50C, 10H	57.5	15	15		
	31	8/20	8/28	8	28	55C	55	14	14		
	31	10/20	10/25	5	53	60C/H	60	10	10		
										48	12%
4	32	5/25	5/30	5		50C, 10H	57.5	9	9		
	32	6/20	6/25	5	21	55C, 20S	70	11	11		
	32	7/30	8/5	6	35	55C	55	10	10		
	32	10/5	10/15	10	61	60 C/H	60	19	19		
										49	12%
5	20	5/30	6/5	6		50C, 10H	57.5	17	17		
	20	6/30	7/8	8	25	55C, 20S	70	28	28		
	20	8/28	9/10	13	51	55C	55	36	36		
	20	10/25	10/30	5	45	60 C/H	60	15	15		
										96	24%
6	24	6/10	6/15	5		50C, 10H	57.5	12	12		
	24	7/8	7/15	7	23	50C, 10H	57.5	17	17		
	24	8/5	8/10	5	21	50C, 10H	55	11	11		
	24	9/20	10/5	15	41	60C/H	60	38	38		
										78	20%
										395	**100%**

ADA=Grazing days/acre; Average ADA=Total ADA divided by the ADA per paddock

Use average ADA per paddock to examine your pasture productivity and determine which ones need improvement.

Animal units: Mature cows/calves = 1.0. Yearlings = 0.75

Pasture Assessment Worksheet

Pasture Record Worksheet

Record the Grazing Days per paddock and use the Animal Days per Acre to compare paddock productivity

Paddock #	Acres per Paddock	Grazing Dates On	Grazing Dates Off	Grazing Days	Days Rest	Grazing Animals	Animal Units	Animal Grazing Days/Acre	Total per Acre	Total ADA per Pad.	Avg. ADA per Pad
1											
2											
3											
4											
5											
6											
										100%

ADA=Grazing days/acre; Average ADA=Total ADA divided by the ADA per paddock

Use average ADA per paddock to examine your pasture productivity and determine which ones need improvement.

Animal units: Mature cows/calves = 1.0. Yearlings = 0.75

Pasture Fencing Worksheet Example (material costs as of 2007)

Acres to be fenced	**320**					
Number of paddocks	**8**					
Fence description	**Perimeter**	**Cross Fence**	**Alleyway**	**Total**	**Total Cost**	**Your Cost**
Fencing (ft)	14,934	10,101	4,618	29,653		
Number of wires	3	1	3			
Number of rolls of wire	12	3	4	18	$1,281.45	
Post - spacing (ft)	30	60	60			
Posts	498	168	77	743	$2,134.85	
Brace assemblies	8	22	12	42	$336.00	
Wires electrified	2	1	3			
Insulators - line	996	168	231	1,395	$334.76	
Insulators - corner	8	22	12	42	$10.08	
Tighteners	12	11	18	41	$118.49	
Tape Gate units				8	$110.24	
Underground gate wire	(for 20 ft wide gates)				$64.95	
Materials						
Cut-out switches	$9.39	one per paddock			$75.12	
Energizer	$298.79		Number	1	$298.79	
Solar panels	$203.00	(11 watt)	Number		$0.00	
Digital Voltmeter	$60.58		Number	1	$60.58	
Lightening diverter	$8.89		Number	1	$8.89	
Temporary fencing-polywire	$48.90	(1659 ft/ roll)	Number		$0.00	
Take up reel	$61.94		Number		$0.00	
Step-in posts	$2.87	(per unit)	Number		$0.00	
Screw in anchors	$7.97	(37 inches)	Number		$0.00	
Total Material Costs					**$4,834.20**	
Labor for construction	(estimated at % of materials)			40%	$1,933.68	
Total Material Costs					**$6,767.89**	
Material Costs						
Wire - ft per roll	3,750	$69.89	(cost per roll)			
Post cost- line posts	$3.19					
cross fence	$1.79					
Braces (2per unit)	$8.00					
Insulators - line	$0.24					
Insulators - corners	$0.24					
In-line Tighteners	$2.89					
Tape Gate units	$13.78	for 20 ft wide gates				
Underground wire (165ft)	$66.98					
Financial Summary						
Operating Costs:						
Repairs and Maintenance	2.00%	of capital costs			$135.36	
Energy cost	$0.50	per mile			$2.81	
Labour cost	$16.00	per mile			$89.86	
Interest on operating	10%	on 1/2 operating costs			$142.66	
Fixed Costs						
Depreciation over	20	Years			$338.39	
Investment	10%				$16.92	
Total Annual Cost					**$726.00**	
Cost per acre					**$2.27**	

Pasture Plan (sketch out your new fencing plans)

Legend:

—— —— **Two-wire permanent fence**
- - - - - - - - - **Single wire permanent fence**
————— **Moveable, temporary fencing**

Pasture Fencing Worksheet

Acres to be fenced						
Number of paddocks						
Fence description	**Perimeter**	**Cross Fence**	**Alleyway**	**Total**	**Total Cost**	**Your Cost**
Fencing (ft)						
Number of wires						
Number of rolls of wire						
Post - spacing (ft)						
Posts						
Brace assemblies						
Wires electrified						
Insulators - line						
Insulators - corner						
Tighteners						
Tape Gate units						
Underground gate wire	(for 20 ft wide gates)					
Materials						
Cut-out switches		one per paddock				
Energizer			Number			
Solar panels		(11 watt)	Number			
Digital Voltmeter			Number			
Lightening diverter			Number			
Temporary fencing-polywire		(1659 ft/ roll)	Number			
Take up reel			Number			
Step-in posts		(per unit)	Number			
Screw in anchors		(37 inches)	Number			
Total Material Costs						
Labor for construction	(estimated at % of materials)			40%		
Total Material Costs						
Material Costs						
Wire - ft per roll	3,750		(cost per roll)			
Post cost- line posts						
cross fence						
Braces (2per unit)						
Insulators - line						
Insulators - corners						
In-line Tighteners						
Tape Gate units		for 20 ft wide gates				
Underground wire (165ft)						
Financial Summary						
Operating Costs:						
Repairs and Maintenance	%	of capital costs				
Energy cost		per mile				
Labour cost		per mile				
Interest on operating	%	on 1/2 operating costs				
Fixed Costs						
Depreciation over		Years				
Investment	%					
Total Annual Cost						
Cost per acre						

Pasture Planner

A guide for developing your Grazing System