The Grass-kept Horse

Canadian Pony Club Education

Information compiled by

Lezah Williamson

Edited by

David Dedrick
The Grass-kept Horse  

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Horse Keeping Systems

There is no one right way to keep a horse. Deciding how your horse is to be kept will be determined by a number of factors.

It is easy (and common) to put human needs and preferences before those of the horse.

Remember that equines:

are flight animals
are nomadic and instinctively need to be in almost constant motion
are gregarious, social herd animals and most have an inherent aversion to confinement and isolation
have a digestive system that works best when the animal is constantly grazing
are easily injured due, in part, to thin skin, vulnerable tendons and ligaments, and a susceptible respiratory system
are curious
are highly sensitive
have blind spots that can lead to the horse being easily startled
have one of the best photographic memories (significantly better than that of humans) and so do best in an environment that looks the same on a day-to-day basis
are statistically the most dangerous animal to humans, based on hospital admissions and death records

Consequently, when keeping equines, it is important to keep the above in mind when we consider how to most safely and appropriately care for the horse, while remaining safe ourselves.

Horse-keeping systems include:

1. The Stabled Horse

Today, five general reasons for housing horses in stables are:

1. human convenience
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2. provides a less severe environment than what may be experienced outdoors

3. tradition

4. economics

5. behaviour management

*(please refer to the document CPC Stall and Stable for more information on this topic)*

2. *The Combined System*

   in the Combined System, the horse is typically in the barn at night and out on pasture during the day

   the reverse is sometimes true in summer

   the Combined System offers the advantages available to both the stabled horse and the grass-kept horse

   in a study done assessing equine living systems, horses were kept in humane conditions that ranged from a slightly smaller stall, to a larger stall, to a large stall with paddock and field access

   assessed were:

   - microclimate
   - aerial contamination
   - box stall dimensions
   - access to paddock/pasture

   blood was taken from each group, and it was demonstrated through the diverse values of serum indicators that living conditions significantly influenced the physiological condition of the horse

   those horses living in the large stall with paddock and field access showed significantly more positive indicators when compared to the other two sample groups

   the combined system is especially useful with horses for whom daily exercise is not available

   this system does not keep a horse work-fit; you still need to ride and work the horse, but it helps the horse to maintain a higher baseline of fitness

3. *The Grass Kept Horse*

   the grass-kept horse lives outside all the time
Advantages to keeping a horse at grass include:

It is the most natural system

- horses are designed to be constantly moving
- horses are designed to be constantly eating
- typically horses at grass are kept in a herd situation, which is considered to be better for horses socially and emotionally (with some exceptions)

It keeps equines fitter

- horses self-exercise
- there is less risk of injury to wind and limb as horses stay toned
- soft tissues stay more toned and work-ready
- it requires less work for the owner to get the horse fit for work

Horses are healthier

- horses living indoors have been found to have higher antibody titers compared to grass-kept horses, indicating that stabled horses are fighting more infectious agents caused by poor air quality, higher housing density and poor stable hygiene
- comparatively, grass-kept horses have better lung health
  - stabled horses with pre-existing lung conditions are often advised to find outdoor housing to improve respiratory health
- movement is the most important contributor to long term joint health as complete, weight-bearing forward strides bathe the joint cartilage in synovial fluid; it is difficult for a stabled horse to achieve this type of movement when regularly stabled, even if exercised an hour each day in the ring
- Fewer digestive disturbances occur due to horses eating grass (high moisture and high fibre) and eating little and often
  - grass has a 60-80% moisture rate which aids in maintaining the healthy digestive tract
  - incidences of colic and ulcers are statistically lower in grass-kept horses

Horses are happier
horses exhibit more moderate behaviour both under saddle and in hand, as excess energy can be burned off through self-exercise

Fewer stable vices develop

grass-kept horses experience more stimulation, less boredom and therefore there are fewer (60-90%) stable vices noted in the population

this results in a long term savings in materials (e.g., fences and boards that may be chewed), feeding (in the case of horses that stall walk, etc.) and joint and foot wear and tear (in the case of weavers, etc.)

Less attention is required

- time saving
- labour saving
- money saving

Pasture can be a rich source of nutrients

if turned out on adequate, good quality pasture, grass-kept horses will require less supplemental feeding of hay and/or grain and therefore cost less to keep
Disadvantages to Keeping a Horse at Grass

it is less convenient

the field may be far away and take more time to get there

the horse may be hard to catch

there may be a lot of mud to walk through; a change of clothing may be required when dealing with a horse kept in a pasture

the horse's appearance may not be as presentable or show-ready

horses may be wet or dirty

it will take more effort to turn a horse out for a show and be more difficult to maintain that level of cleanliness

it is harder to regulate, monitor or control how much a horse eats or drinks

if turned out with other horses, the more dominant horses may eat more of the supplemental feed

it is hard to provide an individual feeding program for those horses that need it

there is a real danger of horses overeating and developing laminitis, especially in spring

if the horse becomes ill or lame, treatment may be more difficult and could require moving the horse to a stable/paddock situation

in the case of emergency treatment or examination, do you have the utilities available (electricity, hot water, etc.) that a veterinarian might require to diagnose and treat your horse?

if a horse needs movement restrictions in order to achieve repair of soft tissue (tendons, ligaments) or bone, a pasture situation will not suffice

if a horse has an open wound that needs extensive care, a pasture situation will be less hygienic and therefore less satisfactory for healing than a stable

during fly season, field turn out and sheds are not suitable isolation areas for the treatment of certain diseases that can be transferred by flies, such as the microorganism Strep. Equi that causes strangles

if turned out with others, there may be increased risk of bullying
injury
shoe pulling
becoming herd-bound

owner is limited with types of clip that can be used

clipped horses should not be turned out in cold weather unless blanketed and offered shelter

trace clip is recommended; most others remove too much hair for horse to live outside comfortably

blanketing in winter will be necessary

in areas of high rainfall, may need to have numerous blankets to rotate through

finding appropriate field space can be difficult; if you don't own your own, this can be problematic

when field boarding or renting a field, you are still subject to monthly payments

if you have to rent a field, is there someone on site who can keep an eye on the horses?

do you have to share with other horses that are not your own; if so, how do you deal with issues such as their herd health, including inoculation and worming health, or extra costs arising from incidences such as blanket ripping, etc.?

do you have everything you need on site, like shelter, and if not, who is responsible for paying?

how permanent is the situation; will the field be available only on a short-term basis while awaiting development, etc.?

fields require a lot of care and regular maintenance; how much money and time are you willing to invest into a property that is not your own?

the development of some ailments is often more common in horses kept at grass

*thrush*: a fungal infection of the foot often associated with wet and muddy conditions

*scratches*: a bacterial infection of the legs associated with wet and muddy conditions

*rain scald*: a bacterial infection of the skin on the back caused by saturation by rain

*sweet itch*: an allergic reaction to environmental conditions
Laminitis: inflammation of the sensitive laminae of the foot that can be caused by overeating.

Sunburn: can be an issue in the summer for horses with a lot of white skin.

Photosensitivity or blue nose disease: can arise in certain situations where alsike clovers are consumed in areas with high levels of sun typically by horses who lack some pigment; can affect the liver.

Insect bites and stings:

Exposure to diseases such as rabies (from exposure to infected bats, raccoons, skunks, etc.) and West Nile Virus (from infected mosquitoes).

Exposure to or ingestion of toxic plants:

If pastures are overgrazed, erosion and water pollution can occur from contaminated runoff.

Contaminated runoff originating from your property can result in legal issues.

Overused and poorly managed pastures can be an eyesore and cause issues with neighbour.

Caring for a Horse at Grass

Horses at grass have six basic needs:

1. Water
2. Daily inspection and regular care
3. A secure, adequately sized space
4. Shelter
5. Companionship
6. Food

Water:

Adequate, clean water supply is necessary as an essential of life.

Water should be available at all times and in all seasons.

Water can be obtained from private well, public water, river, pond, or lake.
natural water sources may seem convenient but may not be a reliable source of water in the summer, and may get iced over in winter

ensure water is not stagnant nor from a sandy source

with water obtained from municipal water sources, the suppliers are responsible for water quality

for all other water sources, the land owner is responsible for water quality

water is tested for presence and absence of total coliforms and fecal coliforms

water for livestock should have a total bacteria count of less than 200 bacteria per 100 ml. of water

fecal coliforms should measure zero for both human and animal consumption

total dissolved solids (TDS) - 6500 ppm constitutes mineral contaminants considered safe for horses

toxic contaminants include pesticides, herbicides, heavy metals, nitrites and nitrates, industrial pollutants and micro-organisms

horses are very sensitive to algae and toxins produced by cyanobacteria (blue-green algae) which can be found in pond water

any potential source of contamination such as manure piles or septic tanks should be at least 15.2 m (50') from a drilled well and 30.5 m (100') from a dug well or pond

Your water system is potentially the single most important aspect of your property

water is used for animals, for irrigation of fields, for cleaning, in washrooms, for the watering of arenas, etc.

if there is no access to water, or it is only seasonal, this will result in

more labour for you

more expense if you have to drill a well

lower re-sale of the property if there is no ready access to water

a poor water plan can result in

higher costs

hauling water in on a temporary basis is costly
drilling a well is very expensive; price is based on how many metres of drilling needs to be done, and then there are added costs associated with pump purchase

increased labour

shipping in water, dragging hoses and hauling buckets all are very labour intensive

increased time required to do chores

inconvenience

plants failing to thrive

less forage for the horses to eat

animal illness and/or death

water is vital to life (second only to oxygen)

limited water will result in a failure to thrive, dehydration and can make the horse susceptible to the development of ailments such as impaction colic

lack of water will result in death, typically within three days

The size and scope of your water system depends on

the number of horses on the property

ancillary services offered on site like wash racks, indoor washrooms, field irrigation and hot water in the barn

Basic plumbing consists of two sets of pipes

water supply pipes from well/public water

waste water to drains

hot water will require a separate pipe

Your water system is most vulnerable at winter due to freezing potential

install drain valves on pipes

make sure pipes slope down to drain valves so water can drain out

when digging trenches for pipes, deeper trenches will help to prevent freezing
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make them 1.2-1.8 m (4-6’) deep

pipes should be installed below soil frost line

avoid running water lines in outside walls

pipes in insulated walls may still freeze

install pipes in inner walls where they will be warm, can be seen and fixed easily

you may need to

use electrical heat tape on exposed pipes

Install *frost free water hydrants* (freeze proof water spigots that extend one metre [three feet] above the ground) in as many places as you can for convenience when planning for water for pastures

**Daily Inspection and Regular Care**

The horse must be seen frequently

it should be caught and handled daily

twice a day is ideal

this way you will not overlook any injuries

some horses, if not caught regularly, will become harder to catch

groom the horse, paying special attention to the feet

never use a body brush on a grass-kept horse

assess its weight on a regular basis

adjust feed to need

*Laminitis Management:*

Laminitis can be caused by over-eating of lush pasture, therefore horse owners must monitor horses for the development potential of this ailment

when introducing horses to a new pasture, do so gradually

if using the combined system, make sure horses are fed before being turned out on pasture

use a muzzle if necessary
schedule regular appointments with the 
vet
farrier
how you care for your horse and pasture can affect the horse's worm load
have regular fecal counts done on your horses
use a de-worming program
keep horses off of pasture after harrowing
have other livestock graze the pasture
keep new horses quarantined until you can ascertain how many eggs they shed regularly

Cleaning of the field must be undertaken daily
this will ensure more even grazing
it will reduce the fly population
it will reduce the chance for the horse to pick up internal parasites
it will improve aesthetics

Winter Care for Horses in Cold Climates
Canada is a large country and has varied weather from region to region during the winter, but for the most part, cold weather and snow are to be expected for a significant portion of the winter months.

Minimum care standards for food, water, shelter, space, cleanliness, exercise and hoof care become even more important during inclement weather.

Food
grass typically goes dormant in the winter and may be inaccessible due to snow cover
supplemental feeding will be necessary in winter
you must make up for what your horse can no longer access in the field
there is a direct correlation between your horse's food and water consumption
if the horse is drinking less, it will also eat less, resulting in a lowered ability to tolerate cold
a study of stalled horses showed they have been found to drink more in the three hours after feeding, so feed little and often

the change to your horse's diet in winter can have a negative impact on its health

hay and grain contains less than 15% moisture (compared to grass at 60-80% moisture)

the higher dry matter content of winter forage coupled with horses drinking less in cold weather can result in impaction colic

supplement with 29.5-59 ml (1-2 oz.) of salt daily to stimulate thirst

when feeding salt, give loose salt as opposed to a salt lick, which horses might not want to use in freezing temperatures

if hay is weathered/yellow/brown, you may need to supplement with vitamin A

provide extra energy as forage

hay is a better supplemental food than is grain

microbial fermentation of forage in the hindgut generates heat better than does extra grain

do not overfeed; this can make horse more susceptible to spring laminitis

a study of stalled horses showed they have been found to drink more in the three hours after feeding, so feed little and often

Water

ice in the water will deter horses from drinking adequate amounts

there is an increase in incidences of colic between December and March because horses do not drink enough in the cold weather (Swinker, 2012)

water should ideally be between 7 to 18 degrees Celsius (45 to 65 degrees F) to maximize drinking

water consumption increases by 40% when water temperature is above zero

snow and ice are not an adequate source of nutrition

feed salt to increase thirst

to prevent water freezing:

use a floating ball or block of wood to help prevent water from freezing in water tubs
insulate water buckets

wrap flexible sheets of insulation around buckets and seal with duct tape to prevent horses nibbling

purchase heated water buckets

add warm water to water buckets

install waterers with heating kits

purchase stock tank heaters plugged into GFCI protected outlet to avoid shock

the plug type stock heaters are safer than the floating type

have a plan for loss of electricity due to winter storms

have a plan for a back-up water source if on well water, as wells run off of pumps that are powered by electricity

purchasing a generator may be necessary if your area encounters frequent power outages

Shelter

provide free choice protection from adverse winter weather conditions

extreme cold: horses can tolerate -40 degrees but need access to shelter

wind: one study showed that horses accessed shelter 62% of the time when snow and wind speed is over 17 km/h or 11 mph

precipitation: especially on the West Coast, unrelenting rain can cause health problems

dimensions

sheds should be 22 square metres (240 sq. ft.) for two horses (4 m by 6.5 m) and add 5.6 square metres (60 sq. ft.) for each additional horse

Space

if extremely snowy and icy

remove horses from icy paddocks

remove deep snow from paddocks and high traffic areas

improve traction in paddocks, driveways or high traffic area with the application of sand
sand and salt should not be used together in a paddock where a horse might lick the sand

when piling snow removed from paddocks, high traffic areas and driveways, avoid putting it in low areas, over drainage grates, near septic tanks, well heads or any other source of drinking water as manure in the snow can be a potential source of contamination

if extremely rainy

install gutters on buildings and direct rainwater away from footing and into drains or ditches

ensure paddocks and other high traffic areas have a good grade for drainage and solid footing such as crusher dust

Cleanliness

if a horse is grass-kept, do not use the body brush as it will strip essential waterproofing oils from the hair and scurf on the skin

Exercise

confinement without exercise in the winter can lead to:

bad behaviour

a rise in stable vices

the development of heaves (recurrent airway obstruction)

the development of ulcers

the development of degenerative joint disease

continue to exercise horses in cold weather

once the temperature drops into the neighbourhood of -40 degrees, there is a danger of damage to the respiratory system

use caution when working horses in winter conditions

deep snow can cause tendon and ligament injuries

ice can cause horses to slip and fall; bruises, cuts, sprains and strained, or fractured pelvises (and other bones) can result

do not over-ride horses that are out of shape
cool out can become a challenge in cold, damp weather

**Hoof Care**

pick feet daily

feet grow more slowly in the winter

continue to maintain a regular farrier schedule; do not neglect your horse's feet

ice and snow can pack and ball in the horse's feet, which can lead to slipping and soft tissue

leave the horse barefoot for better traction

if shod, use snow pads and studs

**Health**

freeze/thaw cycles can cause

foot abscesses

thrush

scratches/pastern dermatitis

rain rot caused by dermatophilis congolens

lice and mites can be heavily implicated in the winter; inspect your horse and his blankets regularly

**Horse Care**

horses have two **natural defenses against cold**:

1. *long hair*

   this is the first line of defence against cold

   reduces loss of body heat

   insulation value is lost if the horse is wet

2. *subcutaneous fat*

   if the horse loses too much weight, his ability to retain heat will be compromised

*lower critical temperature* is the temperature below which a horse needs additional energy to maintain body warmth
5 degrees Celsius (41 degrees F) with summer coat

-8 degrees Celsius (18 degrees F) with winter coat

variables that will affect this are if the horse is:

- wet, the horse will be able to withstand low temperatures less well
- fat, the horse should be able to withstand low temperatures better; regularly body score your horse over winter to ensure it does not lose weight
- smaller, because they will have a greater surface area to body weight, so they will be able to withstand low temperatures less well; low temperatures can also result in a growth slump in young horses

temperatures

energy needed for maintenance increases 1% for every degree below -8 degrees Celsius (18 degrees F)

for every 10 degree drop in temperature, increase your horse's feed accordingly

it takes two weeks for a horse to acclimatize to a new temperature

horses are most comfortable between -8 to 15 degrees Celsius (18-59 degrees F) but can tolerate up to -40 degrees

blanket horses when

- there is no shelter
- it is wet out: 2.5 mm (0.1 inch) of rain can cause cold stress by matting hair which reduces insulation
- horse is clipped: clipped horses should not be turned out in the cold unless they are blanketed and have shelter
- horse is very young or very old
- horse is not acclimatized to cold weather
- horse has a body score of 3 or less

A Secure, Adequately-Sized Space

Size of Pasture
for a 498 kg (1,100 lb.) horse, a pasture must be capable of producing at least 498 kg (1,100 lbs.) of forage each month

proper grazing management can reduce this amount by 10-20%

**minimum land requirements are two horses per hectare** but this is dependent on:

- size of horse
- type/breed of horse
- horse's physiological state
  - age and health of horse
- number of horses that are on the land currently and were on the land recently
- current fat score of horse/pony
- amount of hours each day that the horses spend on grass versus in paddocks or stable
- time of year/season
  - supplementation will be necessary at certain times of year
- species growing in the pasture
  - unimproved native rangeland pastures will require more land than improved pastures
  - having a mix of grasses and legumes will improve the soil, increase the nutritive count, and extend the growing season
- plant's stage of maturity
- quality of pasture
- type of soil
  - land with clay soil can be particularly hard to manage in less than ideal climatic conditions
  - mineral content of soil in the area
  - presence of lime, phosphate, potash and nitrogen in balanced quantities
- how well the pasture is cared for and was cared for in the recent past
- typical climate and climatic abnormalities
  - length of growing season
amount of rainfall
availability of irrigation
amount of heat in the summer
frequency of drought
typical date of first frost
winter temperatures

Calculating Stock Rates

\[
total \text{ number of animals} = (\text{total acreage}) \times (\text{yield per acre}) \times (0.04) \times (\text{average animal weight}) \times (\text{days of grazing})
\]

Shape of Pasture

psychologically, a rectangular or square pasture is more calming than an irregularly shaped pasture
rounded corners can also have a more calming influence
this is due to the possibility of horses being trapped/bullied in corners

Fencing

there are many types of fencing, and each has advantages and disadvantages
fencing must be
  able to contain the pony
  high enough to discourage jumping
  strong enough to prevent the horse from leaning on it and breaking it
  highly visible to the horse
fences and gates must be checked daily and immediately after storms

Other Land Concerns

debris that may be blown or thrown into field needs to be removed
in areas where there are rabbits, fox, gophers or other wild animals that will burrow, the field should be checked frequently for holes.

footing may need to be reinforced with gravel or crusher rock around gates and other high traffic areas to prevent the formation of mud for ease and convenience of handlers for safety and ease of movement of horses and humans in these areas to prevent the development of mud related ailments such as thrush and mud fever.

**Shelter**

Horses require shelter for two main reasons:

1. horses require shelter from wind and insects
2. horses require shelter from rain, especially heavy or unrelenting rain

supplemental hay feeding in a shelter will help to reduce waste in high rain areas

Shelters can take many forms:

shelter can be in the form of artificial housing

shelter can be trees (this is a less desirable option, but adequate for shelter from sun in summer; inadequate for the winter)

shelter can be a solid wall behind which a horse can escape from the wind (the least desirable)

**Qualities of a shelter:**

must be large enough to accommodate the field population

make sure the shelter is big enough to accommodate your horse(s)

err on the side of caution regarding size - *bigger is always better*

minimum standards for two horses are 4 m X 6.5 m

every horse’s personal space is different

needs to be sturdy
it must be strongly constructed to withstand all types of weather
consider snow load requirements for roofs in winter
doorway should be large to prevent horse being injured or feeling trapped by others
shelter should be situated on a high, well drained area
consider the flooring in an open-sided shed
usually slopes to the outside slightly
usually consists of native materials found on the building site
a shelter is ideally built with the rear wall toward the prevailing wind
consider which direction major storms arrive from and from which direction the coldest winds come from (may not be the same direction)
do not have the open side of the shelter facing the north/prevailing wind
one study noted that when the wind rises above 17 km/h, horses will spend 63% of their time in a shelter
shelter should be bright and inviting
Other points to note about shelters:
permission may be required from the municipality to erect permanent structures, and in some areas, temporary structures
groundwater pollution around shelters will be minimal because horses typically spend little time in the shelter

Companionship
Horses are herd animals so socially and emotionally will benefit from companionship
Another horse in the pasture will serve a purpose in the summer to help keep flies of his field-mate, as you will observe when they stand-by-side, nose-to-tail in order to swish flies from their friend's face
Periodically a companion can be another species - goats are common horse companions

Feeding
Keeping a horse at grass allows for the realization of Rule of Feeding #1: *Feed Little and Often.*
the horse's digestive system is designed for the horse to be:

constantly eating
constantly moving

physiologically, the environment provided to the grass-kept horse is ideal for its digestive anatomy

horses kept at grass have been found to have fewer tooth-related problems due to the higher silicate content in grass as opposed to that found in grains

horses will eat up to 4% of their body weight in grass daily

supplemental feeding may be necessary at certain times of the year

restricted grazing may have to be practiced at times of rapid grass growth

Understand Equine Grazing Behaviour

horses are selective grazers

they will over-graze preferred areas, called 'lawns'

they will ignore other areas, called 'roughs'
horses base their choices on:

*palatability* (what tastes good)

*what is available*

poorly managed fields are referred to as *'horse sick'*

horse sick fields offer limited choices of good quality nutrition

horses are amongst the most wasteful grazing animals

horses prefer young, immature plants

they will graze an area down to bare ground

bare ground gives rise to weed development and creates problems with plant re-growth

horses also cause bare patches in the field to develop in areas where they congregate and where they roll horses will avoid some plants

as avoided plants grow to maturity, their nutrient availability decreases

*spot grazing:* horses will not graze in areas where they defecate so plants around manure will become longer and less palatable

horses trample forage
horses do their best grazing from dawn to dusk, so the grass-kept horse may be consuming less in the shorter winter days partly due to this reason (this only applies to regions where grass is still available in winter)

**How to determine how much pasture your horse is eating**

varies according to season, species and quality of grass, length of grazing time and grazing management

horses will eat, trample, or damage 0.5 kg (1 pound) of forage per pound of body weight per month

a pasture must be capable of producing at least 498 kg (1100 lbs) of forage each month in order to support a 498 kg horse

good grazing management can mean that the amount of forage produced per horse can be reduced by 10-20%

grass and legume pastures produce more forage over a grazing season than do native rangeland species

growth is most abundant in spring and summer

**Grass**

Grass is the primary (and in some cases, only) forage available to a horse on pasture.

A well maintained pasture should supply adequate nutrition for the average horse during the growing season; *from late fall through winter into early spring, supplemental feeding will be necessary*.

Consider average forage production, in pounds per acre

the field should be able to provide the same number of kg of forage as the horse weighs, e.g., 454 kg of forage needs to be produced monthly to support a 454 kg horse

Forages:

*grasses*: technically graminoids are monocotyledonous usually herbaceous plants with narrow leaves from the base

grass has a 60-80% moisture content

grass contains carbohydrates, proteins, vitamins and minerals

pasture grass is a rich source of carotene and vitamin D, two nutrients a stabled horse may be deficient in
nutritional levels vary from season to season

grass will have high nitrate stores during times of drought and immediately after a freeze

grass goes dormant in winter causing growth and nutritive values to drop

grass has a higher nutritive value when it is younger and shorter, and will lose nutritive value the taller it grows

\textit{legumes}: perennial plants with nitrogen producing nodules in their root system

this results in the plants having a higher protein content

they also have higher levels of calcium

requires less fertilization

these plants also discourage unwanted weeds and pests

\textit{A good pasture should have a mix of grasses and legumes}

\textbf{Grass grows in three phases}

\textit{vegetative}: development of the leaves

the most nutritious phase, but also the most fragile and easily damaged

\textit{elongation}: stems grow taller while the number of leaves stays the same

elongation is the best phase for grazing

\textit{reproductive}: when the seed heads or flower develops

the longer the stem, the less nutritive value the plant has due to a higher lignin content

\textbf{When to graze a field}

grazing should start when the grass has grown to 10-15 cm

grazing should cease when the grass is at 3-5 cm

grazing below 3 cm can weaken perennial grasses

\textbf{Pasture maintenance}
A well managed pasture will be a more productive pasture

    this will be especially evident when conditions are less than ideal, like during times of drought

The two most important practices in a grazing management plan are

    proper timing of grazing

    a restoration schedule

There are many challenges to pasture management

    environmental conditions

    fluctuations in horse population

    balancing equine grazing behaviours

        overgrazing

        compaction of ground

        tearing of the ground by hooves

    all of these activities form a surface where only the hardiest plants survive

    lack of awareness on the part of owners

    lack of effort on the part of owners

    lack of equipment to provide the intensive management required, especially for smaller acreages

Assessing a Pasture

    1. determine the population of plants

        estimate total population

        determine desirable plant population

        be aware of intermediate plant population - species horses will not usually eat
locate (and later remove) undesirable plant population - low forage value, those that may be toxic

2. plant density
   high plant density provides a protective barrier against erosion from rain and hoofs

3. plant diversity
   establish the number of species available
   pastures with a higher diversity are healthier, more resilient and more nutritious

4. plant vigour
   more vigorous plants will recover faster if stressed

5. legumes in stand
   legumes have nitrogen producing nodules in their root systems, which will result in healthier, more nutritious pastures
   legumes often grow more vigorously at a time when grasses are growing less well due to the heat of the summer; this extends the grazing season

6. soil erosion
   will be obvious visually if present, usually caused by overgrazing

7. woody canopy
   the percent shaded at noon can promote uneven grazing, parasites, soil compaction and manure accumulation
   if shaded less heavily, can protect grasses and soil from the sun in times of drought

8. intensity of use
   overgrazed pastures are unhealthy and stressed, and will take longer to recover
   under-grazed pastures will have a higher lignin count, and be less nutritious

9. uniformity of use
   avoid overgrazing
   avoid uneven grazing
10. plant residue

under-grazing results in dead or dying plant material

overgrazing results in excessive carbon to recycle

If less than 25% of your pasture is desirable plants, opt for pasture renovation

**Steps Toward Pasture Renovation**

1. assess soil and pH levels

   soil samples should be taken 10 cm (4") deep

   soil and pH levels will vary from farm to farm

   the ideal pH for soil is between 5-6.5

   acidic is below 7 and will restrict and stunt growth

   lime increases soil pH to make nutrients more available to plants

   soil tests determine nutrient deficiencies

2. determine nutrients required based on soil tests
the three main nutrients required for plant growth:

- **nitrogen**: a critical nutrient for forage quality and growth
  - too much nitrogen can cause animal health and water quality problems
  - 75 kg of nitrogen per hectare is needed to see a yield response
  - 300 kg per hectare (50lbs of nitrogen per acre) is advised in the spring
  - the majority of nitrogen should be applied in spring and fall
  - ideally, application of nitrogen should be 1/2 in spring, 1/4 in late June, and 1/4 in early September
  - an indicator of the need for nitrogen is the appearance of greener grass around manure and urine areas
  - if plants are lacking nitrogen, they won't be able to respond to potassium and phosphorous

- **phosphorous**: improves forage quality and root development

- **potassium**: improves the plant's ability to survive periods of stress

use information from soil analysis to create a fertilization plan

3. apply fertiliser or lime depending upon results of soil tests

  - fertilizer should be applied April-May to encourage initial spring growth
  - fertilizer applied in the late summer/ fall will extend the growing season and strengthen the roots
  - applications of fertilizer throughout the growing season is more beneficial than a single annual application

  if practicing rotational grazing, fertilization should take place immediately upon horses being removed from the pasture

  horses should not be on the pasture when fertilizer is applied, and one should refer to the manufacturer’s directions regarding when it is safe to return horses to the pasture

  some fertilizers will promote the growth of dominant grasses resulting in a loss in biodiversity

 commercial fertilizers typically combine combinations of nitrogen phosphorous and potassium (Na/P/K)
grasses benefit from nitrogen
if a pasture has over 40% legumes, it will likely not need nitrogen
legumes respond better to phosphorous, potash and lime
lime can be applied any time of the year
over-fertilizing is costly and contributes to groundwater pollution

4. establishment and maintenance
re-seeded pastures should have horses kept off of them for close to a year
ideally keep horses off the pasture until forage plants are well established (1-3 years)
control weeds physically or chemically
control grazing by using rotation and strip grazing
harrow to remove dead grass
roll to consolidate soil, encourage tillering and level rough areas
remove manure daily
good fertilization in winter fall or spring will allow the grazing to begin 1-2 weeks earlier in the spring

Other Options for Pasture Maintenance

Plowing and Seeding
Plowing up a pasture and re-seeding can be very time-consuming, labour intensive and expensive
plowing and seeding improves stand density and/or introduces new species into the existing pasture
the best time of year is spring or fall
fall is preferred
spring generates higher weed competition
spring reseeding may not take if there is a drought in the summer
Proper soil preparation is key to the success of the establishment of the pasture. Fertilizer will stimulate existing plants and seeds in the ground. Lime should be added at least 6 months before seeding. Introducing a legume will improve the pasture by making it more nutritious over the summer. Legumes can be added by inter-seeding.

The two factors that will affect seeding success are:

1. Seed to soil contact
2. Seeding depth

*Planting too deep is the #1 cause for seeding failure*

The ideal depth is 6.35 mm (1/4”)

*Seed to soil contact is the #2 cause for seeding failure*

The seeds need to be in contact with and covered by soil.

If there is already vegetation in the pasture and you will not be plowing, horses should be allowed to graze it as low as possible before reseeding to avoid competition.

Prepare an adequate seedbed.

Reseeding with desirable forages will hinder the re-establishment of weeds and promote the growth of grasses and legumes.

Match desired seeds to your climate and soil type.

Select high quality seed.

Seed a legume to provide forage during the hotter summer months.

Use proven seeding methods.

Re-seed pasture with be using direct drilling, if possible.

If only small areas need to be refurbished, those areas can be over-seeded.

Frost seeding is when seeds are broadcast on frozen ground.
as the ground freezes and thaws it opens and absorbs seed into the soil, making it ready for the following spring
this is a cheaper alternative to other means of seeding
the ideal candidate for frost seeding is a pasture that has ‘run out’
if you can see soil the size of a loonie or larger, these spots can be frost seeded

Horses will need to be kept off of the pasture until the new plants have 12.7-15.2 cm (5-6") of growth
this will also allow the roots to handle the pressure of grazing

Seeding Methods:

1. slot seeding
   existing turf is spared
   a slot seeder places seed in existing turf
   a roller presses soil around the seed and conserves moisture

2. minimal cultivation and partial reseeding
   light cultivation breaks up the soil
   seed is broadcast or drilled at reduced rates
   light cultivation mixes seed with soil
   roll to consolidate and conserve moisture

3. minimal cultivation and total reseeding
   old sward is destroyed
   there is minimal/no cultivation
   seed is broadcast or directly drilled
   roll to consolidate soil and conserve moisture
   frost seeding is a variation of this, undertaken by broadcasting seed when the ground is frozen, followed by the seed being absorbed during thaw

4. ploughing and reseeding
old sward may or may not be destroyed
plough
cultivate
seed is drilled or broadcast
light cultivation covers the seed
roll to consolidate soil and conserve moisture

Recommended Grasses for Horse Pastures

*Kentucky Bluegrass*
- sod forming grass
- winter hardy
- tolerant of grazing
- low yield
- poor heat and drought tolerance

*Timothy*
- high in fibre
- approximately 3% crude protein (will vary)

*Smooth Bromegrass*
- very high in fibre (19%)
- approximately 5.5% crude protein (will vary)

*Orchardgrass*
- moderate fibre content
- approximately 3% crude protein (will vary)

*Perennial Rye grass*
- rye grass is commonly used in grass mixes but is a dominant grass that can take over
is also high in sugars and low in fibre plant
approximately 4% crude protein (will vary)
specialty crops like fall rye are used for grazing in the summer

Red clover (Trifolium pratense)
a legume
approximately 4% crude protein (will vary)

Tall fescue
a reasonable amount of fibre
approximately 4.7% protein (will vary)

note that there are over 300 varieties of fescue, and some can become infected with an endophyte

White Dutch clover or Common White clover (Trifolium repens)
clover is also commonly found in grass seed mixes
is very high in sugars and low in fibre which can lead to colic and laminitis

Ideally a pasture should have at least one species of grass and one of legume
grasses and legumes are complementary
grasses and legumes have different stages of maturity resulting in a longer season
the mixing of grasses and legumes provides a better level of nutrition

a balance of 40-60% grasses and 40-60% legumes is considered ideal

weeds should not be more than 10% of the species present

the ability of legumes to fix nitrogen in the soil means the land needs less fertilizer

plants chosen should be adapted to the grazing management strategy to be used

include perennial pasture species and legumes that are suited to your climate and region
Forage species to avoid for horses

alsike clover: can cause photo-sensitization and liver damage; some horses are more susceptible

rye grasses can be problematic for horses that are laminitic

Weed control

weeds compete with desirable forages

they take up space, nutrients, light and water from desirable forages

some weeds are toxic and harmful

prevention is most effective

avoid overgrazing and bare patches

the most environmentally friendly weed control strategy is to provide natural competition from healthy, vigorous pasture forage

weeds can be a sign that a pasture has reached old age and needs ploughing and re-seeding

buy certified weed-seed free hay

mow pastures regularly before weeds go to seed, or remove perennial weeds by hand or machine

if weeds are a continual problem, herbicide application may be advisable

plan herbicide programs wisely

identify the type of weeds in the pasture to maximize efficiency of herbicide

follow directions exactly

annual weeds only live for a year but are prolific seed producers, so try to cut and remove parent plant before it can seed:

lamb's quarter

ragweed

buttercup
do not use herbicides in late summer on annual weeds

winter annual weeds germinate in late summer:

chickweed

mustard

late summer is the best time for application on perennial weeds as they are moving food reserves to their root systems:

Canada thistle

dockweed

Himalayan blackberry:

Himalayan blackberries are a non-native highly invasive species

they can encroach on a field at the rate of 4 m (12 feet) a year

horses have been known to become entangled in blackberry vines

the vines have large thorns that can injure horses
Toxic and Harmful Plants

Identify harmful plants

control them by pulling or applying herbicide

Note that typically, horses will not touch toxic plants unless there is nothing else to eat

ensure horses have adequate good quality forage

avoid overgrazing

Examine hay for unwanted plants

Unwanted plants include:

Arrowgrass (Triglochin maritima)

grows in marshy areas of central and western North America

toxic if found dried in hay or if growing with inadequate moisture

symptoms include cyanosis, hyperoxygenation, convulsions and death
Choke cherry (Pruunus spp.)

  wilted leaves are the most toxic
  symptoms include heavy breathing, agitation, death

Death camas (Zgadenus spp.)

  death of 2-6% of body weight can prove fatal

Early yellow locoweed (Octytropis macounii)

  found in central Canada
  produces swainsonine; accumulates selenium
  causes irreversible neurological damage

Low Larkspur (Delphinium bicolour) and Tall Larkspur (Delphinium glaucum)

  found in western North America
  consumption by horses is uncommon but if done, death can result
  new, immature growth is most toxic

Monkshood (Aconitum spp.) aka Wolf’s Bane

  causes immediate death due to cardiac failure

Red maple (Acer rubrum)

  a potent killer of horses due to the toxin gallic acid
  horses often die within 18-24 hours after ingestion
  ingestion of maple causes lysis of red blood cells followed by development of hemolytic anemia

Ergot alkaloid (ergopeptine) toxicity

  a fungi that can affect fescue and other hays and grains consumed by horses
  this can lead to losses of foals at birth and at gestation

Alsike clover (Trifolium hybridum): causes photosensitization and liver damage to susceptible horses

Endophyte infected tall fescue: endophytes are a fungus that lives in a plant that can harm pregnant mares and their foetuses
Black walnut and butternut: native to southern Ontario, this tree might be converted into bedding which can cause laminitis.

Bracken fern aka Eastern bracken: toxicity is related to the enzyme thiaminase, which splits the essential B vitamin thiamin into pyrimidine and thiazole, inactivating them. In the presence of thiaminase, thiamin levels in the blood drop significantly. Rhizomes and young fronds in the rapid-growth phase are the most toxic.

Bristly foxtail has sharp, bristly, forward pointing barbs that can become embedded.

Poison hemlock and Western water hemlock (Cicuta douglasii): death may occur in 15 min.

Field Horsetail or scouring rush (Equisetum spp.): found in poorly drained locations; symptoms are slow to develop and involve loss of appetite, jaundice, weakness, staggering and paralysis; if mixed in hay at moderate levels, intoxication can occur in 1-4 weeks.

Tall, creeping, meadow and celery leafed buttercup: often found in wet areas; can cause mouth blisters, digestive tract irritation and contact blisters. Note that poison is inactive when dried in hay.

Lupine (Lupinus spp.): can cause nervousness and aimless running, respiratory issues, convulsions, frothing at the mouth.

St. John's Wort: causes photosensitiveness, inflammation of unpigmented areas, issues with the tongue and mouth.
Nightshade (eastern black and Black Hairy Climbing): abdominal pain, dilated pupils, loss of appetite and diarrhea, uncoordination, unconscious and death

Jimsonweed: can cause dilation of the pupils, impaired vision, fast weak pulse, uncoordination, aggressive behaviour, trembling

Showy milkweed (Asclepias spp.): can cause persistent colic

cockle (purple cockle and cow cockle): can cause restlessness, teeth grinding, drooling, colic, diarrhea, rapid breathing, weak pulse, coma and death

tansy ragwort: can cause nervousness, chills, pale mucous membranes, dull coat, rapid pulse, high temperature, staggering, weakness and death

spurge (cypress leafy): contact with sap can cause inflammation; ingestion can cause diarrhea, vomiting, swollen face, abdominal pain, muscle tremors, sweating

white snakeroot: can cause depression, inactivity, arched body, hind feet placed close together, excessive salivation, nasal discharge, rapid breathing

cocklebur: symptoms appear within a few hours and can cause weakness, twisting of neck muscles, depression, laboured breathing, weak pulse, death

sneezeweed (helenium automnale): symptoms are slow to develop and can include weakness and weight loss, rapid pulse, laboured breathing, loss of muscular control, convulsions

Yew (English yew, Canada yew, Japanese yew, and hybrids): extremely toxic and the most common form of animal poisoning. Contains alkyloids (most toxic are taxine A and B) that depress the action of the heart. Horses are most commonly exposed to yew inadvertently through landscaping in a garden or on a property border. Death occurs within 2-3 hours of ingestion.

Oleander: similar in toxicity to yew; causes arrhythmia and cardiac arrest. One ounce can kill a 1100 lb. horse.

Practices for Ensuring Good Growth

Avoid over-grazing

pastures should be grazed evenly and not overgrazed

avoid overgrazing by supplying supplemental feed
weeds will arise in bare patches

*Rest pastures*

re-growth takes 2-6 weeks depending on time of year

- horses can cause soil compaction
- horses trample and shear off plants
- horses remove plants at ground level
- horses overgraze an area repeatedly

this damages re-growth and reduces the concentration of high quality forage in a pasture

*Stockpiling aka fall saved pastures or deferred grazing*

the practice of saving pastures for grazing in the fall and winter after forage growth has stopped due to cold weather

- reduces feed costs
- manure spreading is reduced
- some overhead costs are lower such as for buildings and bedding

reduces feed costs
- manure spreading is reduced
- overhead costs associated with buildings and beddings are reduced

applying 50 kg/ha of nitrogen fertilizer at the start of stockpiling can significantly increase forage yields

*Exercise paddocks*

small grassy areas for limited grazing and turn out

- use sod forming grasses such as creeping red fescue or smooth brome grass
- limit turnout
- remove manure regularly
- mow regularly
- rest when necessary
cut excessively long grass

rotate the position of feeders and waterers so that those areas do not become bare

cross graze with sheep and cattle is grazing becomes uneven

Animal Concentration Areas (ACA) aka dry lots, paddocks, sacrifice lots, heavy use areas

this allows for removal of horses from the pasture at high stress times such as drought, or during times when damage is more likely, such as during heavy rains

allows an area for horses to be housed if there are too many in the pasture

allows an area for horses to be housed if they need to limit grazing due to rich grass or being overweight

provides an area where horses can be fed hay prior to being turned out on grass to prevent overeating

provides a common area with improved/reinforced footing where horses can come in off of the pasture to access water, saving footing in the field by preventing high traffic areas

ACAs should be built with animal comfort in mind

100 square meters per horse is advisable
good, level hardwearing footing that will not become muddy or dusty
on high ground and slightly sloped for drainage
should have a 6-7.6 m (20-25') buffer zone of lawn, trees etc. to act as a buffer for contaminated run off
at least 30.5 m (100 feet) from wetlands
must provide shelter, water, and an area to eat

harrowing
dragging the pasture to spread manure
this will break up the manure to reduce the parasites
will also minimize areas when horses do not graze
will help to fertilize the field
harrowing must be done in dry, hot weather and is best done when the grass is short
removes dead grass
levels uneven ground
helps remove weeds
kills parasite in manure
aerates the ground so that drainage is better and fertilizers are more effective
horses need to stay off pastures for six weeks after harrowing

rolling
rolling helps to even out, firm and strengthen land
should only be undertaken when the ground has dried out
most effective when used one week after harrowing

topping aka mowing
mowing promotes tillering which generates dense, leafy grass
mowing is recommended in some areas to keep weeds down and make grass more appealing
in areas where grass is sparse and easily uprooted, mowing is not recommended
fields should be topped at least once a year to encourage the grass to form a thick turf
cuts excessively long grass
remember to remove dead weeds as they typically are more toxic when dried

Other

rotate the position of feeders and waterers so that those areas do not become bare, or situate these in a paddock outside of the field

Grazing systems:

Continuous grazing

Continuous grazing involves the horse being on the pasture 24 hours a day
this requires the least amount of human intervention but is the hardest on the land
there is 70% forage waste with continuous grazing
you will end up with uneven grazing and areas fouled by manure (unless it is picked up regularly)

requires a large area of land and a low stocking rate

Rotational grazing

Rotational grazing involves breaking up larger pastures into smaller ones
horses will graze on one section while the other section(s) rest

Rotational grazing discourages selective grazing
practice rotational grazing to keep forage in the vegetative growth state
once a section is grazed down, horses are moved to another section, allowing the recently grazed section to rest

Advantages:

increases amount and quality of forage
allows for more animals to be supported on a section of land
reduces or eliminates selective and spot grazing
minimizes rejection areas where horses don't graze
promotes growth of desirable species
helps control parasites
can discourage some diseases
may permit harvesting of hay and stockpiling in fall
provides better manure distribution and nutrient recycling

**long term rotation**

long term pasture rotation involves the horse being on a pasture for a longer period of time, then being moved to another pasture so the original pasture can rest

45% forage waste

**short term rotation**

short term pasture rotation involves the horse being on a pasture for a shorter period of time, then being moved to another pasture so the original pasture can rest

30% forage waste

**limit grazing**

involves turning horses out for a limited number of hours each day
some people prefer to turn horses out at night in summer as there are fewer bugs and less chance of the horse’s coat being sun bleached
if land is limited, one group of horses can be turned out during the day and a second group turned out during the night

**strip grazing**

if only one pasture is available, strip grazing can be utilized to preserve grass throughout the season
typically a temporary form of fencing such as electric tape will be used to section off a portion of the field for grazing while the remainder is allowed to rest, grow and be fertilized
depending on the size of the field, it can be cut into thirds or quarters, and have some areas growing while others are being eaten

if the field is smaller, sectioning it in half will allow one part to rest and grow while the horse is consuming the other part

cross grazing

cross grazing is when horses are grazed in one pasture, and another species is grazing in another pasture, and then the animals' pastures are switched

if using cross grazing, horses will graze near the manure of other animals

  can help to reduce the equine specific parasite load on the ground

  horses will not graze near to their own manure in part due to the risk of them being infected/re-infected with internal parasites, but since internal parasites are different between cattle, horses, sheep, etc., animals have no issues grazing near the manure of another species

  sheep can also help to level out uneven ground

Seasonal considerations

  spring

  soil testing - to assess fertilizer requirements

  harrow - to aerate, scatter any manure, and remove dead grass

  aerate

  re-seed bare patches

  fertilize to promote grass growth

  good fertilization in winter fall or spring will allow the grazing to begin 1-2 weeks earlier in the spring

  roll the pasture to level rough areas

  rest pasture to be used for hay

  take action against weeds to increase grass production

  only take machinery on the land if it is dry enough
**summer**

continue with weed control

control grazing

top or mow the pasture to remove longer grass stalks and taller weeds

*never top foxglove or ragwort as they become more palatable once cut, while retaining their toxicity*

remove any material on the ground from the topping

harrow and roll as necessary to spread manure

cut and bale hay if possible

summer resting date: the date in the summer, which will vary from year to year, that horses are removed from a pasture so that it can re-grow and be stockpiled for late fall/winter grazing

**during a drought**

plant growth slows

nitrate in the plant is not being turned into protein and will accumulate in the plant tissues

nitrate toxicity can be a concern for grazing horses

horses are more tolerant of nitrates than are cattle or sheep, but it is recommended that nitrate concentration levels not exceed 1% of the horse’s total diet

nitrates most commonly accumulate in oats and barley, but can also accumulate in hay and pasture if recently fertilized

**conserving pasture production during dry conditions**

how a pasture is managed during ideal conditions will directly affect how a pasture manages during drought conditions

maintain a residual height of 3-4 inches, give adequate rest and re-growth time

the root system is usually proportional to the top growth

healthy plants with a well established root system will respond more quickly and vigorously once rain returns

nitrogen and moisture need to be applied together to get the most benefit
healthy plants provide a more complete canopy to protect from erosion
plants with a larger leaf will have more photosynthesis, a larger root system and therefore will rebound more quickly
seven days of overgrazing can delay re-growth by two weeks
pasture can be extended by bringing other crops into rotation
plant an annual crop that will be available until mid summer
rest the root systems

**after a dry summer or drought**

soil fertility plays a major role in fall pasture growth, overwintering of plants and spring growth
after a dry summer, help the pasture that is struggling from poor growth conditions, over grazing or a combination of both
use 22.7-34 kg (50-75 lbs) of nitrogen per acre for a return of 9-13.6 kg (20-30 lbs) of dry matter per lb of nitrogen
fertilizing will produce fresh fall feed and better weed control
early fall nitrogen fertilization stimulates fall tillering in grasses
this results in stronger sod, fewer bare spots, and fewer sites for weed establishment
this helps grasses over winter better and grown faster in spring

**fall**

control grazing
fertilize
clear ditches
continue with weed control
check pipes, troughs and drains to ensure you have good drainage for when the rains come
remove acorns, sycamore seeds and red maple leaves that may fall in the pasture
if planting any new hedges, trees or other vegetation on fence line, ensure it is horse friendly
may need to keep horses off of pastures to preserve footing and vegetation during thaw.

ensure driveways, lanes and paths are cleared, and snow is removed to an area where it will drain well and not cause flooding.

after a frost

plant growth slows

nitrate toxicity can be a concern as nitrate in the plant is not being turned into protein and will accumulate in the plant tissues.

horses are more tolerant of nitrates than are cattle or sheep, but it is recommended that nitrate concentration levels not exceed 1% of the horse's total diet.
nitrates most commonly accumulate in oats and barley, but can also accumulate in hay and pasture if recently fertilized.

practice stockpiling pastures, the practice of saving hay or pasture fields for grazing in the fall or winter after grass growth has stopped for winter.

**Drainage:**

Good drainage is important for:

- reducing excess surface water
- allows adequate ventilation below the ground's surface so aeration occurs

This produces:

- improving grazing
- preserve footing in fields which will help to prevent mud
- preserving the structural integrity of buildings
- preserving footing around buildings
- thereby preserving horse health
maintaining ease in working with and around the horse, paddocks and pastures

Field drainage

having rolling fields rather than flat will allow for natural run off to occur

for low lying areas, artificial drainage may need to be installed in the field

Building Exterior

In high rain areas like BC's west coast, the installation of eaves troughs on the roof will be an integral part of the drainage system

Diverting water from the roof into an underground drainage system will help to preserve footing, prevent mud, and help to prevent frost formation around the foundation

use flexible pipe 12" under the ground, running into a French drain

French drains should be planned during the construction phase, but can be added later if necessary

to install a French drain, dig a trench 2-6 feet deep and 2 feet wide

the drain will employ gravity so the trench should be sloped away from buildings, etc

perforated pipe should be laid, then rocks on top to promote drainage, and finally the top 6-12" will be brought up to grade with top soil
If the soil in your area is clay, it may saturate more quickly and require extra drainage around the building

install drainage pipes perpendicular to the barn, running away from the barn, 18" under the ground surrounded by 3/4 " clean stone

pipes will connect to French drain about 30' on one side of the barn, leading to a water holding area

areas with a large amount of rain will need two drains, one on either side of the barn

To direct and slow run off around buildings, use

berms (low mounds of vegetated soil)

swales (shallow, gently sloped vegetated ditches)

dry wells (small pit lined with gravel) can direct and slow run off

In areas with high snow accumulation, create a snow removal plan

snow will need to be removed from driveways/lanes, paths and paddocks

avoid piling snow along the side of a building as this can create problems during thaw season

**Other Property Considerations**

Whereas it would be ideal if all available land was reserved for forage, the reality is that much of the land on a property will be devoted to other uses such as residences, animal housing, parking, storage buildings, utilities, etc.

**First impressions**

the property's main entrance should be well marked with the street address:

for clients and other visitors

for industry professionals

for deliveries

for emergency personnel and their vehicles
the main entrance driveway should be wide enough where it meets the road that large trucks can turn in with no danger of losing a wheel in the ditch

having substantial gates that can be secured will keep horses in and help to keep unwanted visitors out

the gate should be set far enough back off of the main road that large trucks and trailers can completely clear the road

if the main entrance has a buzzer or key code pad, it should be accessible directly from the car

the choice of road surface needs to be easily maintained and well drained

Other installations that can consume pasture space include:

riding rings

indoor

may be connected to stable, in which case a less dusty footing is desirable

separate from stable, consider direct line access between stable and arena for inclement weather

outdoor

type of footing chosen should be done so with the region's weather in mind
round pens

parking

a circular driveway is appreciated by some clients if tight space/backing trailers is an issue
secure long term storage area for trailer parking

needs good access

ideally not visible from the road

solid year round base

a separate area may be needed for parking and storage of equipment used for ring and pasture maintenance

outdoor wash stalls

outdoor wash stalls can be more pleasant in good weather than indoor wash racks, which are often damp and dingy

outdoor wash racks can be drained in such a way that the excess water can be used for watering grass

exercise and cool out machines

Dutch mills

hot walkers

outbuildings for

hay storage

pallets on the floor will allow bottom layer of the hay to breath and prevent spoiling

accessibility to barn

good lane access for trucks turning and unloading

bedding

ventilation will keep dust down

good lane access for trucks turning and unloading

adequate door size if trucks need to back in and unload

equipment storage
Other Issues Regarding Horse Properties

Fly control

one fly can produce 300 million offspring in 60 days
flies can transmit diseases such as the microorganisms responsible for strangles (strep. equi) over a 600 yard radius
the most effective way is to control adult fly populations
eliminate the habitat required by the larvae
do not allow leachate or runoff from manure pile to pool as this will provide an area for mosquitoes and flies to breed
eggs are laid on top of moist manure and hatch in 7 days so clean regularly
fly breeding season starts at 65 degrees F and ends with the first frost
harrow fields to help drive out any manure that is sitting
clean up decaying organic matter such as spilled grains, grass clippings, etc.
fly predators, non-stinging wasps and parasite, will help to keep fly population down
remove manure stockpiled over winter prior to fly breeding season

Rodents

Keep everything tidy, thereby reducing food sources and hiding places
Use rodent proof bags and containers for storing grains
Concrete floors deter rodents
Poison bait may not be safe around horses

Odors

Horses generally do not produce bothersome odors
Odors associated with horses generally stem from manure, manure piles and urine saturated areas
If manure decomposes without oxygen it will be anaerobic and produce offensive odors
Place manure piles/bins downwind of barns and houses
Aesthetics

Large manure piles can be unsightly

Plan their location for convenience but also so they are not visible from the road, residence or client areas.

Preventing water pollution

Manure pile runoff:

leachate is the brownish liquid that drains from the manure pile

leachate will contaminate groundwater and nearby water courses

when the manure pile is covered, this will reduce the leachate

a concrete pad is necessary if the manure pile is not covered

consider distance from open water courses (this includes ditches)

recommended 100'

field applied manure as fertilizer can also have run-off that pollutes water courses

Paddocks

rainy day paddocks are used for turnout
they have no grass
they are good for turnout when pastures are resting, weather is bad, or horses need to stay off grass due to high sugar levels, etc.
they should be on high ground and offer a buffer zone to absorb run-off

**Manure Management**

*It is recommended that managers of larger stables prepare a written manure management plan*

This shows that a proactive stance is being taken should the manager be questioned

About 10 886 kg (12 tons) of manure and bedding will be removed annually from one stall

a mature horse will produce about 14 kg (31 pounds) of manure and 3.8-9.5 L (1-2.5 gallons) of urine

the density of manure is 28.5 cubic kg/33 cm (63 lb/ft cubed) or 0.23 cubic metres (0.81 cubic feet)

this totals around 23 kg (51 pounds) of total raw waste per day

soiled bedding may account for another 3.6-6.8 kg (8-15 pounds) of waste

absorption properties of dry beddings (kg of water absorbed/1 lb of bedding)

<table>
<thead>
<tr>
<th>Bedding</th>
<th>Absorption</th>
</tr>
</thead>
<tbody>
<tr>
<td>wheat straw</td>
<td>1</td>
</tr>
<tr>
<td>hay</td>
<td>1.4</td>
</tr>
<tr>
<td>pine shavings</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Recommended distance between manure pile and other areas

<table>
<thead>
<tr>
<th>Location</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>property line</td>
<td>15-30 m (15-30')</td>
</tr>
<tr>
<td>residence</td>
<td>61-152 m (200-500')</td>
</tr>
<tr>
<td>well</td>
<td>15-61 m (100-200')</td>
</tr>
</tbody>
</table>
Manure management needs for a pastured horse are different than for those of stabled horses

field deposited manure can be used as fertilizer
manure needs to be picked up regularly
areas of high congregation need special attention
this will reduce parasite control, control fly breeding, reduce odors and make pasture
grasses be utilized more evenly

Fertilizer value for horse manure (on average) is 5.4 kg/907 kg (12 lb/ton) of N, 2.26 kg/907 kg (5 lb/ton) of P₂O₅ (phosphorous pentoxide), and 4 kg/907 kg (9 lb/ton) of K₂O (potash)

traditionally, nitrate-nitrogen is the component with the most pollution potential
most of horse's nitrogen is in its urine

Manure removal system

A complete manure removal system involves

collection
daily cleaning of stalls is necessary
good light is necessary
hand labour is most common in stall cleaning
straight line movement through wide doors from stall to manure pile is most efficient

storage area should be:
fly tight during summer months
keep manure as dry as possible to prevent flies breeding
protected by rainfall and surface runoff

if long term

requires more substantial structures than short term
arrange for manure removal from the farm every 7 days or operate a composting facility
plan for about 180 days of storage if in a cold climate
it is better to have too much storage space available than too little
entrance ramp should slope upward with a 10:1 slope
angle grooves on the ramps will be necessary to drain rainwater
a 12 m (40') wide load out ramp will be necessary if using commercial vehicles or 6 m (20') if using smaller tractors
needs to have a roof and wide doors
floor should be 10 cm (4") thick concrete over 15 cm (6") gravel
floor should be sloped to a drain
smaller stables may be able to use crusher dust instead of concrete
a large, unroofed storage area may need floor drains leading to corrosive resistant 8” pipes
needs to be large enough for machinery to work in
bucking walls (backstop) will help with unloading
if temporary
may be trailer, vehicle or dumpster
manure storage needs to be readily accessible to barn
add new manure over a small surface area to minimize flies

Site for Manure Storage

location must be accessible to all vehicles in all weather
high ground
good drainage
graded to prevent erosion from runoff
well above groundwater
strong base for storage facility and access road
away from building materials
corrosive chemicals in manure can cause damage
runoff should not be able to enter watercourses
situation:
not in paddocks and fields to prevent taking up of parasites
downwind from residences (including those of neighbours)
should be able to be screened from view for improved aesthetics
surface runoff or drainage from roofs should not come near pile

methods of disposal or utilization
land disposal:
direct disposal involves using a tractor and trailer or spreader to disperse a thin layer of manure over a field
can be done up to once a week in summer
this will decrease flies, improve nutrients and aesthetics, but is not advisable regarding internal parasites
it is recommended that manure be left in clumps, picked up, and disposed of in a manure pile out of the field
may be limited to pre-planting and post-harvest dates
do not spread on frozen ground or near a water course to prevent runoff
fertilizer value of manure at 20% moisture without bedding is 12/15/9 lb/ton (N-P2O5-K2O) but may vary widely so have it analyzed if in doubt
about 20% of organic N from horse manure is available to pasture grass the year of application, 50% the second year, 25% the third year
spreading keeps manure dry, decreasing flies
stockpiling for future handling
removal from site:

dumpsters should be sized so that manure disposal happens weekly

location must be accessible for pick up and accessible from the stable

a concrete pad would help to prevent leachate

composting:

composting occurs naturally if it decomposes in the presence of oxygen and is kept above 50% moisture content

composting reduces the volume of waste 40-70%

the carbon nitrogen ratio of stall waste is 20:1 to 30:1 which makes horse manure almost perfectly composed for composting

pathogens and fly eggs are killed by the high temperatures of composting

stall waste composites best in piles 1 m X 1 m (3’ X 3’) and must be turned over frequently as the temperature will be higher inside the pile than outside

frequent turning of compost will make it ready in 4 weeks

static piles will take up to 2 years to compost

manure sales are an option in some areas

Fencing

Fencing is a major capital investment that needs to be preplanned

Good fences make good neighbours

Purpose

as a matter of legal liability, in order to keep horses on the property

keeps dogs and other unwanted visitors off of the property

allows controlled grazing

allows segregation of horses due to age, health, purpose, etc.

enhances the appearance of a property

helps to keep property value higher
visible reminder to all of where the property lines are

**Types of fences**
	here is no 'best' fence

choose one that

fits your budget

is safe

suits your maintenance levels

the true test of a good fence is when an excited horse makes contact with it

as a flight animal, horses often will collide with fences in an attempt to escape what they fear

the speed and force with which a horse hits the fence will influence the potential for damage to the horse

horses will fight harder to free themselves if caught up in fencing more than other livestock

even relatively innocent horse behaviour such as pawing, scratching, chewing and playing can damage fences

more than one type of fence can be used on a property, and different types typically demarcate areas of different use

attractive and sturdy fences tend to cost more

less expensive but functional fencing can be used in more remote areas

in areas of high congregation, on property lines and in areas that need a higher aesthetic appeal, more expensive fencing can be used
different types of horses (stallions, foals, etc.) may have different fencing requirements than the average horse

- stallions may require a fence of 1.25-2 m (4-6.5 ft)

specialty fencing

- temporary fencing, such as electric fencing used for strip grazing, will need to be introduced to horses as it is less visible and will cause a greater reaction if touched

- sacrifice paddocks or all weather paddocks are areas where horses are housed when the fields are unable to have horses due to poor weather, etc. Paddock fences need to be very strong and board capped with metal to prevent chewing

- double fencing involves having two fences so there is a neutral zone between the field and road, two fields or a field and a riding ring. The neutral zone needs to be at least 3’ across; trees may be planted in this space. Double fencing helps to eliminate social/antisocial behaviour and helps to prevent the spread of disease. Double fencing may be used in conjunction with perimeter fencing to increase security.

- combination fencing (i.e., wood and electric) can also be used to help provide a stronger barrier between horses in a field and areas of danger such as a road

- terrain can determine the type of fencing used; a Helsinki fence can be used on areas of steep terrain
Qualities of a good fence

highly visible

horses are far-sighted and scan the horizon looking for danger
wire fences are least visible so a top board is often added

secure enough to contain a horse even when run into, without damaging the horse or being damaged
having boards on the inside and posts on the outside will prevent horses popping boards

needs to have some give to minimize injury in the case of impact
high enough to discourage jumping

137-152 cm (54 to 60 inches) above ground level
having a fence at approximately wither height will help to prevent a horse flipping over the fence if the fence is hit at speed
larger horses, ones who are good jumpers, and stallions may require higher fences
solid enough to discourage a horse testing its strength
fences in areas where horses congregate need to be stronger than fences in areas where horses are not in as much in contact with fences, such as is large pastures
if there are temptations (other horses, corn, better grass, etc.) on the other side of the fence, the fence may be tested

shape of fenced area

rectangular areas are more relaxing for groups of horses
square areas require less fencing materials
avoid irregular shapes where horses can get trapped in corners and bullied

the fence post is the foundation of the fence
setting posts is the hardest and most time-consuming part of fence building
it is critical to the strength and longevity of the fence

Driven posts are more rigid than handset ones or those put in drilled holes
displaced soil around driven posts is highly compacted and resists movement
if soil is hard, dry or rocky, a small bore hole may be necessary to help set posts

wood is recommended for fence posts

pressure treated wood is best

pressure treated wood will last 4 times longer than non-treated wood

longevity of 10-25 years for pressure treated wood is typical

round wood posts are better than square posts

how deep to set posts for structural integrity and strength depends on soil

typical depth is 91 cm (36)

corner and gate posts need to be deeper, around 122 cm (48")

fence posts for high tensile wire, those set in wet areas, sandy areas and areas subject to frost heave may need to be set deeper or have a concrete skirt

horse-safe metal is the second choice in post material if used with chain link fences, welded fences and PVC fences

hollow posts require top caps to prevent ragged edges from cutting horse and accumulation of water within posts which can rust or crack during a freeze

distances between posts will typically be longer for board fences than for high tensile wire

have no openings that can trap a leg, hoof or head

no more than 7.6 cm (3") square

tension fences using high tensile wiring often have diagonal cross bracing of wire or wood on corner assemblies that allow for foot entrapment

open spaces between boards should be 30.5 cm (12") or less to discourage reaching through

with electric fences, space can be 45.7 cm (18")

bottom board should be no closer than 20 cm (8") from the ground to discourage horse from trying to eat grass on other side of fence

bottom board should be no higher than 30.5 cm (12")

this will prevent foals, minis and ponies from getting under the fence

if the board is too high the horse may get wedged under or, in some cases, may roll or slide under fence to the other side
higher clearances will also allow animals such as dogs and other nuisances to gain access to field

should have no sharp edges or projections

this includes fence posts, which should be set outside of the pasture so that horses will not injure themselves if running the fence line

tops of fence posts should be even and have a low profile so that horse cannot injure its head if running the fence line

nails and fasteners should be smooth and safe

fence should be inexpensive to install

should be easy to maintain

should be durable

should last 20 years

should look attractive

Fencing materials
**Canadian Pony Club Education - Stall and Stable**

*wood: post and rail*

**advantages**
- attractive
- safe
- secure
- good visibility

**disadvantages**
- expensive
- requires preservation treatment
- can be chewed
- requires a lot of maintenance including painting
- nails can become a hazard

*stone walls*

**advantages**
- durable
- good visibility
- materials required for construction may be inexpensive and plentiful in some areas

**disadvantages**
- expensive if materials are purchased
- time consuming to maintain
- requires skilled labour to install
### Vinyl, plastic or PVC fences

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attractive</td>
<td>Expensive</td>
</tr>
<tr>
<td>Good visibility</td>
<td>Can become weak and brittle over time or in the cold</td>
</tr>
<tr>
<td>Cannot be chewed</td>
<td></td>
</tr>
</tbody>
</table>

### Temporary electric tape or wire fences

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provides a psychological rather than a physical barrier if introduced properly</td>
<td>Low visibility unless polywire or polytape are used</td>
</tr>
<tr>
<td>Can be used in conjunction with other fences</td>
<td>Not suitable on its own unless polywire or polytape are used</td>
</tr>
<tr>
<td>Horses respect it</td>
<td>Horses must be introduced to it</td>
</tr>
<tr>
<td>Typically movable</td>
<td>Needs proper grounding and extensive maintenance if to be maintained in proper</td>
</tr>
<tr>
<td>Cheaper than traditional fencing</td>
<td></td>
</tr>
<tr>
<td>Can be solar powered</td>
<td></td>
</tr>
</tbody>
</table>
some municipalities have regulations regarding electric fencing

| combination fence | best; not recommended as the sole perimeter fence in congested |

**temporary tubular panels**

<table>
<thead>
<tr>
<th>advantages</th>
<th>disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>highly visible</td>
<td>not always sturdy</td>
</tr>
<tr>
<td>movable</td>
<td>expensive</td>
</tr>
</tbody>
</table>

**wire mesh**

<table>
<thead>
<tr>
<th>advantages</th>
<th>disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>secure</td>
<td>needs to be combined with boards</td>
</tr>
<tr>
<td>attractive</td>
<td>expensive</td>
</tr>
</tbody>
</table>
Metal piping

Advantages
- Secure
- Visible
- Durable
- Requires little maintenance

Disadvantages
- Very solid; no give
- Hard to dismantle in case of an accident or if fence line needs to be moved
- Expensive to install

Braided wire cable horse fence

Advantages
- Durable

Disadvantages
- High maintenance

Rubber

Advantages
- Has a lot of give to it

Disadvantages
- Can cause injuries if the horse gets hung up in it due to its flexibility
- Stretches and needs tightening

Chain link

Advantages
- Very secure

Disadvantages
- Expensive
- Can get stretched out
Buck and Rail Fences: triangular shaped fencing

**Advantages**
- popular in mountainous areas because it does not require post holes being dug
- no wire so is considered wildlife friendly

**Disadvantages**
- requires a lot of material

Zigzag or Snake Fence

**Advantages**
- typically made with materials on site
- no drilling or digging is necessary
- fairly easy to assemble

**Disadvantages**
- not overly sturdy or long-lasting
- difficult to make tall enough to discourage jumping
- often needs reinforcing
Fences that are unsuitable for horses

Fences that are unsuitable for horses typically will be ones that either poses a high risk to the horse due to the nature of the materials (usually wire) or that have a low level of visibility - or both.

Fence related injures account for a great percentage of injuries incurred by horses when turned out in a field.

Poor choices of fences for equines include:

- barbed wire suspension
- plain wire
- suspension (high tension)
- stock fencing (large square mesh)
- permanent high tensile electric fence
- barbed wire

Installation and layout

Planning includes many aspects

- selection of fence type
- location and type of gates
- aesthetics
chore efficiency
management practices
smaller paddocks are typically located closer to barn, larger fields further away
include service areas such as location of manure piles, lanes, etc.
safety
finances
create a layout drawn to scale, showing
fence lines
eliminate dead ends and corners to prevent dominant horses from trapping another horse in a corner
gate locations
where fences cross streams, meet large trees, or other obstacles
traffic routes for horses and handlers
routes for supplies and water
vehicle traffic routes including access for larger vehicles
relation to buildings and other permanent structures
all weather lanes should connect fields
lanes need to be wide enough (12-16' wide) for mowing equipment and other large vehicles
in areas that get high snowfall, leave room for snow storage or removal
consider gate access from lanes to fields: may need to be angled
topography will influence look, effectiveness and installation
paddock fencing should allow ease of movement for cleaning and working with horses
field fencing should accommodate for movement in and out for larger vehicles and machinery
Gates

need to be strong

must be safe

safety and strength must be the same as in a fence

gates should be as tall as the fence

must fasten securely

easy to operate with one hand

3.7 m to 4.8 m (12'-16') widths will allow for movement of vehicles through gates

1.2 m (4') is the minimum width for a horse and handler gate

human-only gates will help with efficiency and can be narrower

footing around gates may need to be reinforced with gravel or crusher rock

gates that swing both in and out of the pasture are useful

if a gate swings only one way, should swing into the field to prevent horses pressing against the gate and breaking latches

latches should be:

  sturdy

  safe

  capable of being operated with one hand

  a second latch is helpful to secure gates in open position

hinges should be:

  sturdy and strong enough to prevent sagging over time

Materials for Gates

metal tubes

  light and easy to work with

  durable
channel steel and aluminum stock gates
Canadian Pony Club Education - Stall and Stable

not recommended for horses due to sharp edges

less sturdy, can bend easily

avoid gates with diagonal cross braces due to risk of catching foot in corners

wood

common but can be heavy if not on sturdy hinges

often needs to be reinforced with a centre or diagonal brace

avoid gates that are cable supported

avoid using cattle guards

serious injuries may result

Location

typically pasture gates are situated away from corners to prevent horses being trapped by others in corners when horses congregate

if horses are herded rather than led, corner gates are more commonly used

gates that open to create fenced chutes across a lane between two pastures are efficient

gates should be planned so that there is a direct route flow from one gate to another for vehicles to access remote pastures

if accessed from a lane, gates may need to be angled to allow vehicle access to field

footing should be firm with good drainage and free of mud and standing water
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