CHAPTER 11 ~ ANIMAL HEALTH ON PASTURE

INTRODUCTION

Animal health is an essential component of a profitable grazing system. Animals in good health produce to their full potential and minimize veterinarian and medication costs. Good grazing management can promote animal health by providing high quality, cost effective feed, access to clean air, exercise, better footing, and will allow animals to behave more naturally. However, a good health management program is critical and should be developed in cooperation with your veterinarian.

This chapter covers the topics of parasites, vaccination, mineral supplementation, poisoning and poisonous plants.

PARASITES

Economic losses from parasites can be significant. The affects of parasites on livestock include poor animal weight gain, reduced feed conversion, weight loss, and increased susceptibility to disease and death. The first effect of parasitism is appetite suppression resulting in altered grazing behavior. Even very low levels of larval challenge will result in reduced food intake. The second effect is the generation of an immune response by the livestock to the incoming larvae. The generation of an immune response requires energy and protein and both of these needs are met at a cost to production; body weight gain, wool growth or milk production. These effects produce production losses before clinical symptoms like scouring are visible. (Meat and Wool New Zealand Ltd. 2006).

Two main groups of parasites affect pasture animals: internal (such as roundworms, flukes and tapeworms) and external (including fleas, ticks, lice and mange). Controlling the parasite load on animals can be done through management, based on an understanding of the parasite life cycle and using the appropriate prescribed treatments.

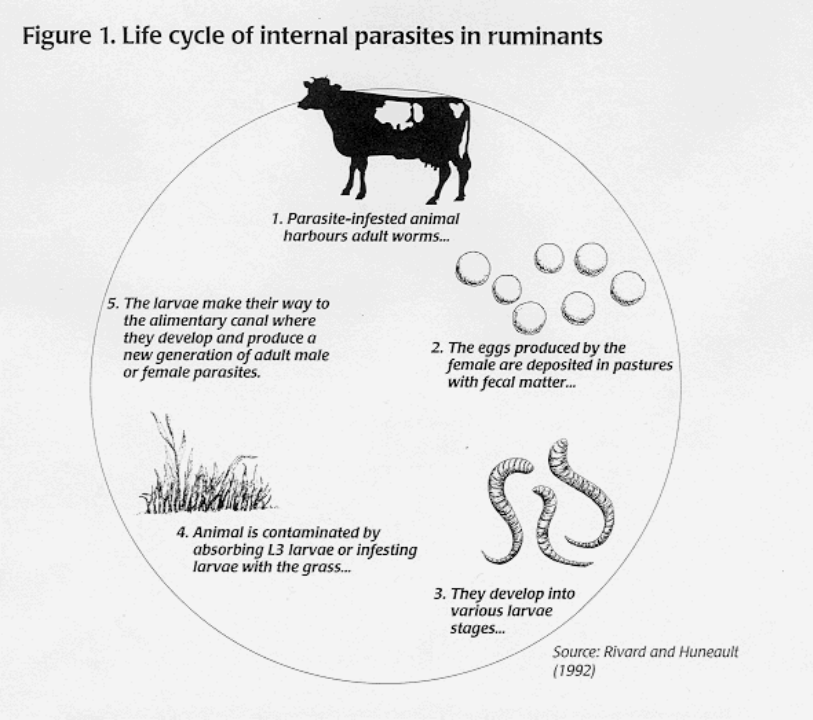
Internal Parasites

Internal parasites are becoming an increasing issue for many livestock farmers. Limited access to appropriate anthelmintic (wormer) drugs and development of worm resistance to anthelmintics are significant issues around the world. As anthelmintic resistance in parasitic worms increases, the issue of parasite control is becoming more challenging for livestock producers. Internal parasite control depends on the producers understanding of the parasite life cycle, the animal class or age, grazing management, and appropriate use of anthelmintic drugs.

The common round worms of sheep and cattle have three stages in their life cycle: adult, larvae and egg. The adult stage is the worm that lives in the intestinal tract of the animal. The worms mate and the females produce eggs that are released into the environment in the animal's manure. The egg hatches into an immature worm or larvae. Most worm species have four larval stages. The first three stages of development take place in the manure and the fourth stage occurs inside the animal.

The third larval stage is often referred to as L3 and is the infective stage. Heavy dews and rain release the L3 from the manure onto the pasture. As the pasture is warmed by sunlight and in the presence of moisture (dew/rain), the L3 migrate up the grass blades where they are most likely to be eaten by livestock. When the L3 are eaten by an animal they undergo another moult to become an immature worm or the L4 larva. The L4 larvae moults once more and matures into the adult worm.

The female worm mates inside the host animal and produces eggs in about 21 days. The eggs pass out in the manure and the life cycle begins again (Figure 1). Female worms produce large numbers of eggs over their lifetime and the population of eggs and larvae on pasture can build rapidly if not managed properly.



http://eap.mcgill.ca/general/home_frames.htm

Table 11.1 lists some of the common internal parasites and their life cycles.

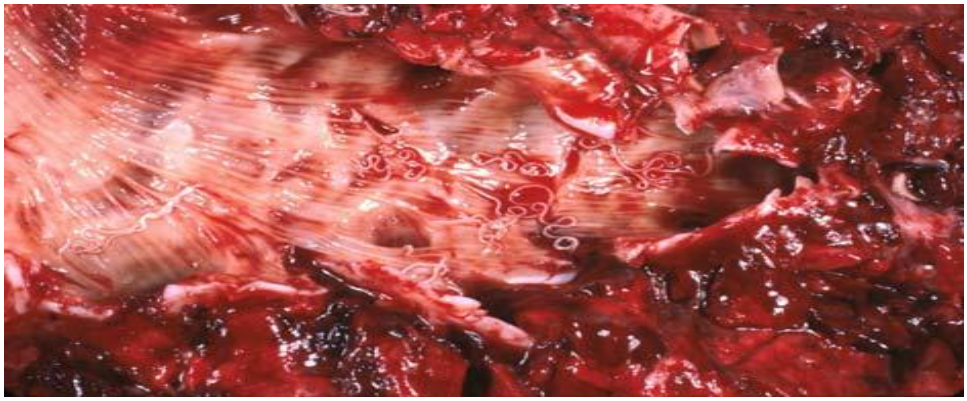
Table 11.1 Common Intestinal Parasites

Adapted from Duval 1997

	Common Name	Scientific Name	Life Cycle*	Symptoms
Stomach and Intestinal Worms	Barberpole worms	*Haemonchus contortus; Haemonchus placei*	IS: 4-6 days PP: 3 weeks	Anemia, soft swelling under jaw and abdomen, weakness, no weight gain.
	Brown stomach worms	*Ostertagia ostertagi*	IS: 4-6 days PP: 3 weeks	Same as Barberpole Worms/Haemonchus, lack of appetite, diarrhea.
	Small stomach worms	*Trichostrongylus axei*	IS: 3-4 days PP: 2-3 weeks	Same as as Barberpole Worms/Haemonchus, diarrhea and weight loss.
	Small intestinal worms	*Cooperia punctata; Cooperia oncophora*	IS: 5-6 days PP: 1520 days	Same as Barberpole Worms/Haemonchus.
	Hookworms	*Bunostomum phlebotomum*	IS: ? PP: 30-56 days	Edema, anemia, weight loss, diarrhea.
	Nodular worms	*Oesophagostomum radiatum*	IS: 6-7 days P P: 4145 days	Dark green diarrhea, edema.
Lungworms	Lungworms	*Dictyocaulus viviparus*	IS: 6-7 days PP: 3-4 weeks	Sticky nasal discharge, difficulty breathing, cough.
*Life Cycle Legend: IS = Infectious Stage: minimum number of days for parasite to reach infectious larvae stage (L3) after hatching of eggs. PP = Prepatent stage: period up to appearance of first eggs in manure after host is infected.				

Roundworms are one the most common parasites in grazing animals. There are three basic types of roundworm that infect grazing animals: lungworm (Figure 11.2), intestinal worms and stomach worms. Roundworms have the direct life cycle described previously.

Figure 11.2 Lungworm



From: (http://cal.vet.upenn.edu/merial/Introduction/intro_top.htm)

The liverfluke (11.3) has a more complex life cycle. Liverflukes live in the hosts' bile ducts, producing eggs that subsequently leave the host in its feces. If the eggs are dropped in a wet area, they hatch and release the larvae called miracidia. The miracidium finds a snail (*Lymnaea truncatula*) that acts as an intermediate host. The miracidia bores into the snail and uses the snail to multiply and develop into tadpole-like creatures; this takes two to three months. If the miracidium fails to find a snail within 24 hours, it runs out of energy and dies. Once developed, the tadpoles leave the snail and swim to a plant, climb out of the water and encyst onto the plant. When a mammal eats the plant and cyst, the larva will emerge from the cyst and infect the new host. It burrows through the intestinal wall and then through the liver to the bile ducts where it will mature to the adult stage. Egg production occurs about eight to ten weeks after initial infection.

Figure 11.3 Adult liverfluke

From:
http://cal.vet.upenn.edu/projects/dxendopar/parasitepages/trematodes/Fhepatica.htm

Internal Parasite Control

Producers must be aware of the kind of parasites and the level of infestation before deciding what parasite control strategy to use. Collecting and submitting fecal samples for analysis will provide the producer with accurate information of the parasite burden on their farm. This information coupled with monitoring of production measures such as the livestock's body condition and the rate of gain can tell a producer what effects parasites are having on the livestock. It should be remembered that fecal samples are an indication of what was happening on the pasture when the livestock ate the parasite eggs. This could be 21 to 28 days earlier, as this is how long it takes for the larva to mature and the host to start shedding eggs. The weather and other pasture factors can have a dramatic impact on the current parasite conditions.

Weather has a significant impact on larva numbers on pasture. Warm moist weather in the spring and early summer promote and speed up the life cycle of the worms. Hot dry weather in later summer kills off eggs and larva. Cooler fall weather results in fewer eggs and larva. Therefore there is a buildup of parasites through the spring and early summer with levels typically falling off as the season turns colder and fall changes to winter.

Producers should discuss their parasite control programs and strategies with their veterinarians. The limited number of anthelmintic drugs and the increasing problem of anthelmintic resistance is making parasite control a more complex and important issue.

Internal parasite control strategies may include: 1) pasture and stock management plans to reduce the livestock's exposure to worms at key times in the parasite production cycle 2) maintaining animals on a high plane of nutrition to minimize stress and prevent disease 3) strategic worming procedures and 4) breeding livestock for worm resistance or resilience.

1. Pasture and Livestock Management

Pasture and livestock management can have a significant impact on parasite levels. Young livestock are more susceptible to worms than mature animals. Sheep and cattle (but not goats) develop a level of immunity to worms. Sheep develop this immunity at eight to nine months and cattle at around 18 months. It is therefore important that younger animals be watched closely for signs of parasite infection. By the time signs like scouring appear there can already have been significant losses of production (scouring can be caused by things other than parasites, it is important to make sure that you are treating the right problem).

Young stock can be grazed before older animals to avoid parasites in a rotational grazing system. Clean pasture like hay aftermath and newly seeded pasture or annual pasture crops can be reserved for susceptible animals like lambs. These practices allow areas with the lowest worm burden to be grazed by the animals most at risk.

The highest numbers of worm larva are found in the first 2 cm of the pasture height. Therefore animals grazing pasture with longer grass or not grazing too close will be consuming fewer worm larvae than when the pasture is shorter. This has to be balanced with the animals grazing habits and the growth pattern of the grass. Intensive grazing can expose animals to higher levels of larva than lightly grazing the same pasture. Overgrazing is detrimental to the pasture and can be detrimental to the animals.

It is possible that species like cattle that are less susceptible than sheep could be grazed before sheep to clean up some of the parasites before the sheep. Goats could not be used to clean pasture for sheep because they are both susceptible to the same parasites.

Liver fluke infestations can be reduced by limiting livestock access to wet areas in pastures. Alternatively, the wet areas can be drained to reduce potential habitat for the snails that act as intermediate hosts for the liver flukes interrupting the liver fluke life cycle and significantly reducing the risk of infecting the livestock.

Keeping pastures as dry as possible also helps to prevent and reduce all parasite problems. Watering areas should be well drained and kept dry if possible. By keeping high traffic areas where livestock accumulate dry, the buildup of parasites and other problems such as foot rot is discouraged.

2. Animal Nutrition, Stress and Disease Prevention

Animals that are suffering from poor nutrition or that are stressed by either their production cycle (lambing, calving, etc) or disease are more susceptible to parasites. It is vital to maintain a good level of nutrition, including appropriate access to minerals. Animals that are healthy maintain a healthy immune system and are able to respond effectively to all challenges including parasites. In an overgrazed pasture, the animals have less to eat and are placed under nutritional stress weakening their ability to defend themselves against pathogens.

Females that are in late pregnancy and early lactation have a temporary drop in immunity and can release more worm eggs onto pasture. This results in the peri-partum rise in egg production that occurs later in the animal's lactation period leading to a significant increase in parasite burden. Any other stressor that impedes the animal's ability to initiate an adequate immune response can result in increased parasite activity and egg shedding by the effected animal. This increased egg shedding can result in parasite build up in that animal and other livestock.

Overgrazing creates two problems that can compound each other. In an overgrazed pasture, the animals have less to eat and are placed under nutritional stress weakening their ability to defend themselves. At the same time, they are being forced to consume more larvae because the grass is short. It is therefore important not to overgraze, both for the good of the pasture and the animal's health.

3. Strategic Worming Procedure

A basic principle when worming is to hold the livestock for 12 hours after worming on the old pasture or in the barn before moving them to a clean pasture Wherever possible, wormed animals should be moved to clean grazing pastures.

It is also vital to make sure the livestock are receiving the appropriate dose of wormer. You will need to know the average weight, the weight of the lightest animal and the heaviest animal for this. Weigh a representative number of animals (about 10%) to calculate the average weight. Knowing the weights of the animals that you are treating is essential to calculate the appropriate dose. In addition, the worming gun or syringe should be calibrated to ensure that it is delivering the dose that you intend to use. This can be done by setting the worming gun to the desired delivery rate, filling the worming gun and then squirting it into a measuring cylinder or cup. The amount in the cup should be equivalent to the required dose times the number of squirts that you

place in the container. For example, if you have the drench gun set to deliver 10 cc and you deposited 10 squirts there should be 100 cc in the container).

With the increasing cost of drugs and the problems associated with parasite resistance to anthelmintic drugs, producers are more and more concerned about how best to make the most of their parasite control programs.

Dr. J.P. Lautenslager, OMFRA developed the following basic deworming procedure in 1991.

To ensure that animals going on grass do not deposit large numbers of eggs in the manure and reinfect the pasture, it is important to reduce or eliminate over-wintering of parasites in sheep and to deworm at the right time in the spring. Once on pasture, sheep eat the available larvae that have survived the winter, therefore animals must be dewormed when they have eaten as many larvae as possible but before these larvae develop into adult worms shedding large numbers of eggs. Animals must always be moved to a clean grazing area 12 to 24 hours after deworming

To start the deworming procedure in the spring:

YEAR 1

1) Deworm all ewes in the flock after lambing and before going to grass.

2) Deworm all animals 3 to 4 weeks after going to grass – this is critical. This allows sheep time to ingest any gastrointestinal nematodes that have survived the winter and allows the inhibited larvae in the sheep to develop to the adult stage. Then animals are dewormed before the pasture is re-contaminated.

3) During the last two weeks of July, collect approximately 20 – 40 individually packaged fresh fecal samples (6 – 8 pellets each) from each group of sheep being pastured and have them analyzed by your veterinarian for intestinal parasites. If the group on pasture is made up of ewes and lambs, take fecal samples for each group. Your veterinarian can assist in determining the most accurate number of samples for the flock size and expected parasite load.

- If fecal samples indicate high worm counts, deworm all ages in the group and move to a pasture that has not been grazed by sheep that year or has had the longest rest period.
- If fecal samples indicate low worm counts, deworming is not necessary in these groups.

4) At winter stabling, deworm all ages with a product that is effective against dormant parasites. Some products are only effective against adult parasites. Different deworming products are effective for different stages of the parasite's lifecycle. Your veterinarian can advise you on the appropriate product to use in your farm situation.

YEAR 2

Follow steps above but skip Step 1

YEAR 3

Follow steps above but skip Steps 1 and 4

YEAR 4

Follow steps above but skip Steps 1, 2 and 4

The fecal analysis in Step 3 must be done every year. If the July fecal samples have a high parasite load for the mature ewes in any year, start the cycle over again at Year 1**.** It is important to note that this program is designed for the mature flock. Lambs and stock under 24 months of age will need to be more closely monitored for parasite buildup (Kennedy 2004).

When considering parasite control programs for cattle; remember that young cattle are more susceptible to production losses due to worms than older cattle. In addition, those raised under intensive grazing are more at risk than those grazed on extensive pastures. In most cases, mature cattle will probably not need to be wormed and it is more beneficial to worm the young cattle. The level of nutrition, general health status and stress level also play a role in the general health level of the cattle.

When bringing new livestock on to your farm, regardless of the species, it is a good idea to quarantine them from other livestock for a period of time. During this quarantine period all new livestock should be wormed. This will help to ensure that you do not introduce new parasites to your farm.

4. Breeding for Parasite Resistance

There is ongoing research into parasite resistance in livestock. Some breeds are known to be more susceptible than others. For example, in New Zealand, Merino sheep are generally more susceptible to worms that Romney or composite breeds of sheep. In the future it may be possible to do genetic testing for worm resistance as it is currently possible to test for resistance to foot rot in sheep.

Economics of Parasite Control

Parasite infestation can affect the profitability of a livestock operation due to the resulting weight loss in animals on pasture. Strategic deworming, consisting of treatment prior to the pasture season and 4-6 weeks after turn-out has been suggested as a way to achieve better parasite control (Hamilton and Gisen 2008).

Hamilton and Gisen (2008) studied two groups of cattle yearlings on pasture, one treated with dewormer and an untreated control group. Cattle treated with dewormer had significantly higher seasonal body weight gain and average daily gain (ADG) than cattle in the control group. Treated cattle gained an average of 10.5 kg more than control cattle over the length of the trial.

The cost of deworming was covered by the significantly higher weight gain in the animals treated in comparison to the control animals.

Failure to effectively control internal parasites can ultimately result in loss of livestock through mortality. This is more likely to happen with sheep and goats than cattle. In the event that an animal dies due to parasites, it is imperative that you immediately deworm all other animals in the group from which the mortality originated. It is recommended you consult your veterinarian and reevaluate your worming program. Failure to do so will almost certainly lead to more deaths.

External Parasites

External parasites, such as ticks, mange, lice, and flies, can also significant cause health and production losses in grazing animals (Figure 11.4). They can also cause anemia and damage to the meat and hide as well as transmit diseases. The life cycles of external parasites are generally short and they multiply at high rates (Table 11.2).

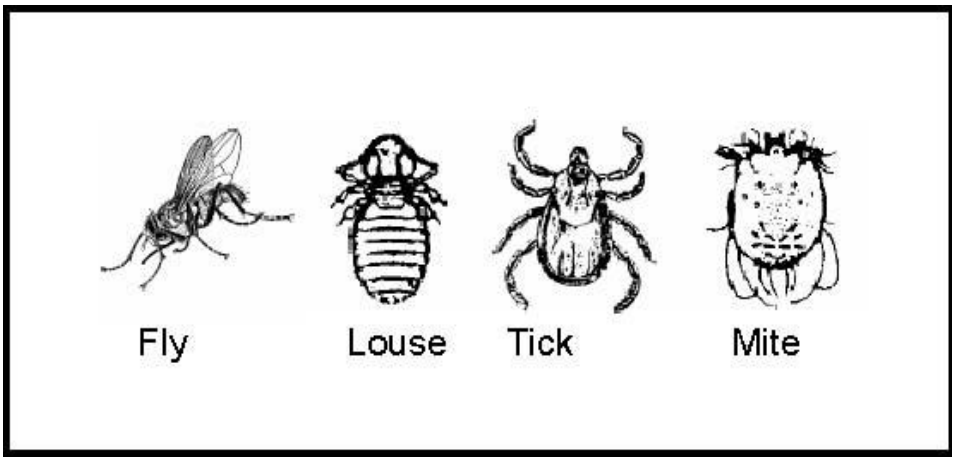


Figure 11.4 Baldwin and Foil 2002

Table 11.2 External Parasites (Adapted from Baldwin and Foil 2002 and Blowery 1999)

Parasite	Description	Symptoms
Lice	1/8" or less in size dark gray/brown wingless 3-4 week life cycle spread by body contact	irritation and rubbing of infested areas found first on shoulders and neck, back and base of tail sometimes found on the belly
Ticks	3 stages: larval, nymph, adult wingless size depends on species	weight loss anemia loss of condition attach to lower half of the body
Mange (parasitic mites)	1/40" or less in size cannot be seen with the naked eye 2-3 week life cycle spread by contact	itching irritation and thickening of the affected skin sores and licking of sores weight loss decreased milk production
Flies	two types: biting and non-biting	biting types cause irritation and sores non-biting types cause annoyance

External Parasite Control

External parasite control is largely dictated by the lifecycle of the parasite and can be difficult because of the feeding habits of the parasite. Many feed by biting and sucking blood for a short time, therefore the amount of control product that is consumed is small. Insecticides and some pour on and oral parasite control products are effective depending on the species of external parasite. The range of registered products is sometimes limited. Consult your veterinarian for appropriate control measures.

When purchasing new livestock for your farm, exernal parasites should be considered since this can be a source of infection for other animals on your farm. Lice, ticks, and sheep keds can be easily brought on to your farm on newly purchased livestock. Quarantining and treating new additions to a herd or flock for external parasites is more economical and easier than trying to control an infection in an entire herd. New additions should be carefully inspected and quarantined in an area separate from their new herd or flock mates so that treatment and careful observation can occur.

Animals that are healthy and on a good nutritional plan are less likely to develop heavy external parasite loads, weaker animals are more likely to build up high levels of external parasites. Once a control measure is selected, it often has to be repeated, because most treatments are only effective against the adult form of the parasite. Eggs that are laid on the host animal will hatch over a few weeks depending on the species of external parasite. Re-infection from the environment can occur from parasites that have fallen from infected animals and survived in bedding or pasture grasses. Control products generally do not have an effective activity period long enough to cover the life cycle of most of these parasites. Depending on the species of parasite, treatment may have to be repeated in one to four weeks.

External parasites on sheep (like keds) can be very hard to control. Depending on the time of year it might be advisable to shear the sheep before treating them. Shearing removes large numbers of eggs and adult external parasites with the wool and makes the application of the parasite control product easier and more effective. It is important to remember that reinfection can occur from the lambs. Therefore, it is also easier to control a problem before lambing or after weaning.

Fly control can also be an important element in controlling a number of diseases including pink eye. The infectious agent causing pink eye, *Moraxella bovis,* can be spread by direct contact and by insect vectors like face flies (Werry 2003). Although not common in Canada, the reportable disease, *anaplasmosis* is also thought to be spread by flies. Even if there is no risk of the spread of a disease, flies can cause considerable discomfort to livestock. Efforts should be made to limit the fly populations on pasture. Ear tags, oilers and insecticide sprays can all help to reduce fly populations. As well, keeping areas around waterers and shade dry and free of manure will help to limit the fly population. (Kaufman et al. 2006, Kaufman et al. 2006).

VACCINATION

Consideration should be given to vaccinating animals for various diseases before they go on pasture. Young animals usually have passive immunity from their dams if they have received enough colostrum. This immunity declines as the animals mature and by three months of age the

immunity in both calves and lambs has declined to the point that vaccination should be considered. Previous history of clostridial disease is a clear indictor of the need to vaccinate. Vaccination of cows for Bovine Viral Diarrhea (BVD) should also be a consideration. The most appropriate time for BVD vaccination is prior to breeding. Therefore if breeding is going to occur on pasture, consideration should be given to when to vaccinate the breeding cows. Consult your veterinarian for advice on vaccination.

Clostridia vaccination

Clostridials are diseases that infect livestock and can cause significant losses. The disease is caused by the bacteria *Clostridia*, and can be fatal. The bacteria are capable of living for years in the soil because of their ability to form protective spores. *Clostridia* can also reside in the gut of an animal without causing problems and be shed in the manure infecting new animals. The bacteria can infect livestock with the following diseases: blackleg, malignant edema, enterotoxemias, black disease, red water disease and tetanus (lockjaw).

Routine use of combined clostridial vaccines is recommended. Clostridial vaccines are very effective and economical. Administration at intervals recommended by the manufacturer is required to provide adequate immunity. Current multiple vaccines are capable of immunizing against seven or eight separate clostridial diseases with the one product.

Once infected with a clostridial disease, the animal usually dies rapidly. Early detection and treatment with antibiotics or Clostridial toxoid is sometimes effective. Dead animals should be given a post mortem to determine the cause of death.

Clostridial vaccines should be administered subcutaneously (SQ) in the neck region. “Tent” the skin and use a needle no longer than 2.5 cm to administer the vaccine. The vaccine should never be administered intramuscularly since it can cause significant muscle damage. Reactions resulting from SQ injections in the neck region cause very little damage and can be removed easily at slaughter. (Floyd 1994).

Currently, there are no commercial clostridial vaccines licensed for use in goats in Canada. Goat producers have used vaccines approved for use in sheep. This is an extra- label use and must be done in consultation with your veterinarian.

MINERAL SUPPLEMENTATION

Mineral supplementation is an important part of livestock production. Feeding a mineral and vitamin supplement to livestock on pasture is an established practice. The cost of providing these required nutrients is low when compared to the losses resulting from mineral deficiencies, toxicities and imbalances. Deficiencies and toxicities can occur through inattention to feeding management or simple unavailability. These effects can be subclinical in nature, affecting gain and reproduction.

Minerals are normally sold according to their calcium (Ca) and phosphorus (P) content. Most feed and mineral companies have a variety of mineral mixes. Analysis of the mineral content of pasture is a valuable tool for determining which mineral package will supplement the available minerals to best meet the animals' requirements.

Macro minerals are required in relatively large amounts in the diet. Requirements are expressed in grams or in terms of ration percentage. Some examples of macro minerals are: calcium (Ca), phosphorus (P), magnesium (Mg), potassium (K), sodium (Na), and chloride (Cl). Microminerals are required in relatively small amounts and are expressed in parts per million (ppm) or milligrams per kilogram (mg/kg) of the ration. Examples of micro minerals are selenium (Se), copper (Cu), zinc (Zn), iodine (I), manganese (Mn), and iron (Fe). (Murphy 2004).

An appropriate mineral mix can be fed free choice in a mineral feeder on pasture along with cobalt iodized salt. *Mineral mixes for cattle should not be made available for sheep because the copper level in cattle mineral is too high for sheep. If sheep consume too much cattle mineral it will be toxic for them.* Mineral feeders should be placed in a readily accessible place and protected from weather. The feeders should be well maintained and minerals always available and clean. (Rogers 2001).

The mineral content of a pasture is influenced by plant species, plant maturity, type of soil, and soil fertility. Legumes, for example, are usually greater in Ca content than grass forages, which in turn are generally higher in Ca content than cereals. Mature forages and crop residues (such as corn stover) generally contain low levels of P, while cereal grains and oilseed meals are moderate to high in P. Potassium content is lower in cereals than forages.

Lush spring pasture is often low in Mg and can result in ***grass tetany***. Grass tetany (a metabolic disease caused by a lower than average blood magnesium (Mg) level occurs most frequently following a cool period (temperatures between 45 and 60°F) when grass is growing rapidly. Though conditions for grass tetany most often occur in the spring they can occur in the fall. Waterlogged soils and/or high nitrogen fertilization reduces magnesium uptake by the plant. This is especially prevalent on soils high in potassium or aluminum. Drainage of these soils and or careful nitrogen use will encourage the uptake of Mg in the plant and therefore increase its availability to livestock. Typical signs of grass tetany begin with an uncoordinated gait and terminate with convulsions, coma, and death. Animals on pasture are often found dead without illness having been observed. Evidence of thrashing will usually be apparent around the animal if grass tetany is the cause of death.

The prevention of grass tetany depends largely on avoiding conditions that cause it. Graze less susceptible animals on high risk pastures. Steers, heifers, dry cows, and cows with calves over 4 months old are less likely to develop tetany. The use of dolomite or high Mg limestone on pastures and including legumes in pasture mixes will decrease the incidence of tetany in grazing livestock. In areas where tetany frequently occurs, feed cows supplemental magnesium. Supplementation increases blood magnesium levels and alleviates much of the grass tetany problem.

BLOAT

Bloat can be caused by the consumption of young, rapidly growing legumes in the pre-bloom stage. It is most often associated with white clover, ladino clover, and alfalfa plants. It is a severe form of indigestion marked by the collection of gas in the rumen that the animal cannot expel. The gas is primarily carbon dioxide and methane which are normal products of the digestion process. These gases are normally released by belching. When an animal becomes bloated, the

gasses are trapped in a froth formed from proteins in the feed.

Symptoms of bloat include the swelling or distention of the left side of the animal, and in severe cases open-mouthed breathing. The animal will show signs of restlessness, abdominal pain, feet stomping and kicking its belly, labored breathing, frequent urination and defecation, and sudden collapse. Treatment may require the services of a veterinarian, as gas needs to be freed from the rumen.

Bloat can be prevented by feeding animals hay or putting them on grass pasture before turning them out on to a legume pasture. Moving animals to a lush pasture should be done in the middle of the day when the animals as less likely to over eat. When seeding a pasture it is a good idea to limit the amount of legume (alfalfa or clover) in the pasture mix to no more than 50% by weight..

NITRATE POISONING

Nitrate poisoning occurs when animals graze pastures with high levels of nitrogen. A high level of nitrates in the drinking water will increase the total levels of nitrogen consumed. Symptoms of nitrate poisoning include brownish to grayish color to normally pink tissues of the nose, mouth or vulva, excessive salivation, rapid labored breathing, abortion, muscle tremors, a loss of conditioning, and weakness. Also, the animal's blood will have a chocolate coloured appearance. Plants take up nitrate and convert it to protein under normal conditions. During a drought, plant growth slows or stops, the protein synthesis stops and nitrates accumulate in the plant. Nitrogen accumulation in plants will also increase after the application of manure and fertilizers high in nitrogen.

Some pasture plants such as lamb's quarter, pigweed, and annual grains have a higher concentration of nitrogen than others. Pastures with high populations of lamb's quarter, pigweed, and annual grains should not be grazed for two weeks after a period of drought is broken by a significant rain as it takes about two weeks for the plants to fully utilize the readily available Nitrogen.

Providing a mixture of forages within the pastures can prevent nitrogen poisoning.

ERGOT IN PASTURE

This condition is caused by the growth of a mold in the seed head of grass and consumption of these grasses can produce alkaloid poisoning. The ergot mold primarily infects rye and some small grains, and occasionally bromegrass, fescue and bluegrass. Infections on the pasture can be severe enough to make the pasture hazardous to livestock. Livestock exhibit loss of condition, poor weight gains, reduced milk production, and abortions in horses have been reported in Ontario. (Wright and Kenney 2001).

Control of ergot in pasture can be achieved by using ergot free seed and clipping pastures to prevent seed head formation. Ditches and vacant land should be mowed if possible. Cool wet weather in the spring that delays pollination of the grasses and prolongs flowering also favors development of ergot. (Clarke 1999).

POISONOUS PLANTS

There are numerous plants that can cause poisoning in livestock. Some can cause death when small quantities are consumed while others have less dramatic effects. Not all species of livestock are affected the same way. For instance, Tansy Ragwort can be fatal to cattle, but sheep can be used as a control measure for the weed.

If you suspect poisoning as the cause of an animal death or if a death cannot be explained, a post mortem should be done. Digestive tract contents can be examined by plant experts to determine what the animal ate. This may provide answers to why the animal died.

Death from plant poisoning often occurs at times of pasture stress when the animals are searching for feed. Pastures should be kept free of weeds where ever possible. Table 11.3 is a list of weeds that are relevant to our pastures in the Atlantic region. Most of the plants listed will not result in death if eaten but can cause animal health and production issues.

Table 11.3 Weeds relevant to pastures in the Atlantic Region

Common Name	Scientific Name
Bittersweet	*Solanum dulcamara*
Alfalfa	*Medicago sativa*
Bindweed	*Convolvulus arvensis*
Black Eyed Susan	*Rudbeckia hirta*
Blue Flag Iris	*Iris versicolor*
Braken Fern	*Pteridium aquilinum*
Butter-and-Eggs or Toad flax	*Linnaria vulgaris*
Buttercups	*Ranunculus spp.*
Canada Rhododendron	*Rhododendron canadensis*
Clovers (Red, White, Yellow & Alsike)	*Trifolium spp.*
Comfrey	*Symphytum spp.*
Common Groundsel	*Senecio vulgaris*
Common Burdock	*Arctium minus*
Curled Dock	*Rumex crispus*
Daphne	*Daphne spp*. Found around Acadian communities
Elder Berry	*Sambucus spp.*
Fescue	*Festuca spp.*
Goldenrods	*Solidago spp.*
Joe-Pye-Weed	*Eupatorium purpureum*

Common Name	Scientific Name
Lambs Quarters	*Chenopodium album*
Lupines	*Lupinus spp.*
Mustards	*Brassica spp.*
Oaks	*Quercus spp.*
Red Maple	*Acer rubrum*
Reed Canary Grass	*Phalaris arundinacea*
Rhubarb	*Rheum spp.*
Serviceberry	*Amelanchier spp.*
Sheep Laurel	*Kalmia angustifolia*
Sorrel	*Rumex acetosella*
St. John's Wort	*Hypericum perforatum*
Stinging Nettle	*Urtica dioica*
Tansy Ragwort	*Senecio jacobaea*
Turnip and Rape Seed	*Brassica rapa*
Wild Cabbage	*Brassica oleracea*
Wild Cherries (Choke and Pin)	*Prunus spp.*
Winter Cress (yellow rocket)	*Barbarea vulgaris*
Yarrow	*Achillea millefolium*
Yews	*Taxus spp.*

The Canadian Poisonous Plants Information System found on line at http://www.cbif.gc.ca/pls/pp/poison contains a comprehensive listing of poisonous plants found in Canada

CONCLUSION

Animal health on pasture can be impacted by many things. Animals that are healthy, well fed, and stress free are less likely to exhibit health problems on pasture. Good pasture management includes good livestock management, advanced planning and implementation of programs like parasite control, and vaccination will help achieve the best results and economic returns from pasture. Consult your veterinarian or livestock specialist for advice on animal health and production issues as they arise.