

Flock Health

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Flock Health

This chapter outlines some of the key management practices that will help you maintain a healthy and productive flock. Remember, the information in this chapter is a very basic introduction to disease prevention and sheep diseases. **It is always best to consult with your veterinarian if you are uncertain about any aspects of the health management of your flock.**

The chapter is divided into three major sections:

Management practices that will help prevent the introduction and spread of disease within a flock.

These practices can be broken down into the following categories:

Regular monitoring of the flock

Reducing environmental stressors

Maintaining a high level of biosecurity (prevent the spread of disease)

Maintaining a regular vaccination and de-worming program

Common diseases of sheep in Ontario.

Administering medication to sheep

Although it is not discussed in detail in this chapter, it is very important to note that high losses in productivity may result due to sub-clinical diseases (contact OSMA for a copy of a research study regarding the effect of flock health on profitability). Although major disease outbreaks are devastating, sub-clinical disorders can also greatly diminish flock productivity. Sheep affected by sub-clinical disorders will not show obvious signs of illness, making these diseases difficult to detect. Carefully monitoring production records is necessary to accurately track changes in performance. For example, subtle drops in the number of lambs weaned or in average weaning weight due to sub-clinical problems may go unnoticed if not compared with records from previous years. Software programs such as Ewebyte or bioFlock can help you monitor and track flock productivity and performance.

Management Practices for a Healthy Flock:

Regularly Monitor your Flock:

Check your flock regularly. By paying close attention, the shepherd will become familiar with the normal behaviour of sheep and have a better chance of identifying and quickly dealing with any problems that may arise. Health problems that are caught and dealt with quickly will affect fewer animals and decrease losses in profitability.

Housed sheep should be inspected at least once a day. A convenient time to check your animals is just after feeding. Sick animals are generally less interested in eating and are likely to remain alone as other sheep move to the feeder. Lameness is also easily detected at this time. When the animals are at the feeder, check for indications of diarrhea (soiled fleece (tag) on the hindquarters). Check the pen floor and walls for anything unusual (blood, diarrhea) and make sure that there is water available. Ewes and lambs should be checked frequently through lambing and lactation. Sheep on pasture should be checked at regular intervals.

In addition to visual health checks, monitoring body condition when you normally handle the animals (e.g. vaccinating, deworming etc.) will help monitor the overall condition of the flock, and pinpoint any sheep that are excessively thin.

Each time you are in the barn or pasture, look for sheep that:

- Are not eating or ruminating
- Remain separated from the flock
- Look 'depressed': head down, droopy ears, dull eyes, hunched stance (back arched with forefeet and hindfeet placed close together under the animal)
- Look hollow (abdomen/flank is excessively concave and hook bones are prominent)
- Show signs of diarrhea (excessive tag or wetness on hindquarters are key signs, excessively watery or bloody diarrhea in the pen)
- Show signs of bloat (distension of abdomen, particularly high on the left side where the rumen is located)
- Show signs of respiratory distress (laboured breathing, nostrils distended, coughing, copious amounts of nasal discharge)
- Show signs of neurological disorders (uncoordinated, moving in circles, abnormal gait or head carriage)
- Show signs of lameness or stiffness

You may wish to separate and catch animals showing abnormal behaviour for a closer examination. Taking note of the following characteristics, as well as the animal's overall appearance, will help you determine what may be wrong. This is also important information to pass along to your vet, if you decide to call for help.

Age (different diseases will be more likely to occur in certain age groups)

Gender and reproductive state (e.g. ewes which are very heavily pregnant or that have just lambed)

Body temperature (normal for an adult is 100.9-103.8°F; lambs are normally higher than adults)

- A high body temperature indicates that the animal is stressed or the body is staging an immune response to an infection.
- A normal body temperature indicates that the problem is due to a non-infectious cause, such as a metabolic disorder
- A low body temperature in very young lambs indicates starvation, and in adults may indicate internal bleeding.

Body temperature can be taken by gently inserting a thermometer into the sheep's rectum. Using a bit of mineral oil or other non-toxic lubricant will make the process easier. Be sure to hold the thermometer while you are taking the temperature, to prevent it from become lost or broken. If you are using a glass thermometer it should remain in the animal for at least 60 to 90 seconds to ensure an accurate result. Digital thermometers signal when the temperature has stabilized (available at pharmacies).

Respiration rate (normal for a sheep is 12-20 respirations/minute) An abnormally high rate is an indication of distress caused by diseases that attack the respiratory tract (such as pneumonia or Maedi-Visna), or could be a sign of severe pain due to injury, etc. It is best to observe respiration rate before disturbing the animal, as the stress of being caught will naturally increase the count. The easiest way to determine the respiration rate is to watch the animal's abdomen and count each complete breath (i.e. 1 breath=1 inhalation + 1 exhalation). Respiration rate will be high in healthy animals that have been running, are stressed, or exposed to high ambient temperatures.

Heart Rate (normal for a sheep is 70-80/minute). Heart rate will increase under the same circumstances as the respiration rate.

Colour of mucus membranes (tissue around eyes and gums). Pale or bluish membranes indicate internal bleeding or poisoning.

Number of animals affected and pattern of affliction. (e.g. problems such as a lack of water or toxins in feed may acutely (suddenly) affect all animals in the pen, while infectious diseases may affect a small percentage of animals initially, and gradually move through the pen and/or barn.)

Reduce Environmental Stress

Stress and the incidence of disease

Many of the pathogens (viruses, bacteria, and protozoa) that cause disease in sheep are present in their everyday environment. A normal, healthy sheep that is well fed and given proper housing will generally be resistant to harmful infections by these pathogens. Undue stress, such as poor nutrition and unsanitary or poorly ventilated housing, will greatly reduce this natural resistance. This allows pathogens an opportunity to successfully invade the body. Some management practices you can use to reduce stress are:

Maintain a consistent routine

Sheep, like most livestock, are creatures of habit and perform best when managed with a consistent daily routine. Sudden changes in routines, surroundings, and feeding patterns will cause stress. This may lead to a decreased growth rate in lambs and poor reproduction rates in breeding animals, as well as increased susceptibility to disease. Try to have contingency plans in place to deal with sudden changes in temperature, weather or feed supply.

In particular, feeding practices should remain as consistent as possible. Various microbes in the rumen perform most of the feed digestion in sheep. Sudden changes in feed or irregular lengths of time between feedings may disrupt the microbe balance in the rumen and cause potentially fatal metabolic upsets. Changes in feed should be made gradually to avoid digestive disorders such as bloat and acidosis. For example, if you want to increase lamb growth by feeding a high grain diet, increase the allotment of grain by a small amount each day over a few weeks until you reach the desired level.

Maintaining Facilities to Minimize Stress

Proper facilities and housing practices are important for disease prevention. Animals that are overcrowded or not provided adequate shelter will have a greater susceptibility to illness. Be aware that there are provincial regulations in place regarding animal housing and operations, particularly dealing with manure management and environmental concerns. Building plans and recommendations for housing are available from OMAF 1-877-424-1300.

General Housing

- Adult sheep need less protection from the cold than lambs, and often do well outdoors during the winter if provided with sufficient windbreaks and bedding. An insulated, well ventilated barn or shed is preferable for intensive confinement rearing or lambing in winter
- Provide good drainage from buildings and corrals to prevent the build-up of disease-causing organisms, which thrive in poorly drained soil
- Provide easy access for manure removal.
- Good ventilation is essential to prevent a build-up of foul air, heat and moisture. Poor ventilation is a leading cause of pneumonia outbreaks.
- Maintain buildings, corrals and fences to prevent injuries to the sheep.
- Have adequate quarantine pens for housing sick or new animals to prevent mixing with the rest of the flock

Lambing Facilities

- Lambs are born with little protection against the cold. If you are lambing during the winter months, plan to have your ewes lamb in a warm, sheltered facility to prevent neonatal losses.
- Although ventilation must be adequate to prevent pneumonia, ensure there are no drafts directly into pens housing young lambs. Check for drafts and ammonia odours at 'lamb height'.

Chapter 8: Flock Health - Good Management Practices

- Poor drainage and sanitation of the lambing or mothering pens will lead to the accumulation of disease causing organisms. Provide sufficient bedding and remove manure regularly to keep pens clean and dry.
- Lambing and mothering pens should be draft free but not excessively warm if lambs are going to be moved to colder areas.
- Overcrowding lambs can increase stress and the spread of disease. See the Code of Practice For the Care and Handling of Sheep for further information: <http://www.nfacc.ca/codes-of-practice/sheep>

Handling Facilities

- Good chutes and handling equipment will greatly ease the task of moving and treating sheep.
- Design equipment to minimize stress on sheep and handlers.
- Avoid using dogs that unnecessarily harass or injure sheep.
- Maintain handling facilities to minimize injuries to sheep (fix loose boards, sharp edges etc.).

Water Supply

Water is an extremely important part of the diet. Sheep, like all mammals, will die much sooner if denied water than any other nutrient. **Check water sources daily.** If using automatic waterers, check that the water is flowing and that the bowl is free of contaminants (hay, straw or feces). Feed intake is dramatically affected by water intake. An indication that there is a problem with the water supply is that all of the animals in the pen will go off feed. If the water is unpalatable due to contaminants, sheep may drink enough to stay alive, but production will suffer as feed intake decreases. Lactating ewes require an ample supply of good quality water to ensure a steady milk supply for good lamb growth.

Observe the following practices to ensure a reliable water supply to your flock:

- Check and clean waterers daily.
- Minimize manure contamination of water by locating waterers at an appropriate height. This will help decrease the transmission of parasites such as coccidiosis, and will improve water intake.
- Have a concrete pad or adequate drainage around watering troughs to prevent foot infections and coccidiosis.
- Send a water sample for analysis at least every two years to determine the levels of nitrates, copper sulfate, and total solids.
- If ponds are used as a water source, monitor the levels of blue-green algae, as high levels may be fatal.

Feeding Facilities

- Use feeders that minimize fecal contamination by preventing sheep from walking on feed. Fence line feeders, feed racks, and self feeders help control disease and parasite problems by keeping feed off of the ground, as well as reducing feed wastage.
- Set up bunks in a manner that allows for easy cleaning and for easy feeding (avoid having to enter the pens to feed the animals).
- Clean bunks as necessary (i.e. spoiled silage, wet grain etc. may be a health risk)
- Allow adequate feeder space so that all animals have equal access to feed. Animals that are not receiving enough feed will be malnourished and more susceptible to disease. Larger lambs that have greater access to feed are more susceptible to clostridial diseases.

Feed Quality and Nutrition

- Providing proper nutrition will greatly increase the health of your sheep, through increased disease resistance and prevention of nutritional and digestive upsets.

Manure Management

- Proper manure management in sheep housing areas helps prevent the build-up of disease-causing organisms and keeps sheep clean and dry. Check the air quality at ‘sheep level’ often to ensure ammonia odours are minimal. Some producers remove manure from sheep housing areas regularly. Others prefer to use a manure pack that is cleaned out once or twice through the season. If you are using a manure pack, be sure to add dry bedding as necessary to prevent the surface from becoming damp.
- Store manure away from buildings and corrals to prevent run-off into sheep housing areas, water sources, and feed supplies. Take precautions when spreading manure to prevent contamination of water sources and oversupplying nutrients to soil. Check the provincial regulations regarding manure storage and consider implementing a nutrient management plan on your farm.

Transportation

Reduce stress during transportation by:

- Loading the truck or trailer appropriately. Sheep tend to push into a corner as a group when panicked, and it is not uncommon to have sheep (particularly lambs) become trapped and die if precautions are not taken during transport. If there are an appropriate number of animals for the space, chances are lessened that lambs will lose their footing and be suffocated. Using separation gates to divide large trailers and avoiding overcrowding will help reduce stress and trampling during transport.
- Thoroughly cleaning vehicles used to transport potential hazardous materials (e.g. farm chemicals, treated seed etc.) before loading sheep.
- Providing sufficient bedding to improve footing and to keep animals clean.
- Clean and disinfecting vehicles after transporting animals.
- Avoiding transporting animals in extreme temperatures.
- Do not transport ‘downer’ animals or those likely to go down during shipping.
- For more information on shipping requirements, contact OSMA or Farm & Food Care Ontario: www.farmfoodcare.org

Biosecurity: Preventing the Spread of Disease

Livestock Biosecurity

A 'Foreign Animal Disease' (FAD) in your flock can have a devastating effect on the health and welfare of your livestock, and the economic viability of your business.

The same is true for every flock in Canada. We have only to look at the foot and mouth disease experience in the UK to see that an outbreak in Canada would permanently alter your business and cost billions to Canada's livestock industry.

You can reduce the chance of an outbreak – or the impact, if it occurs – by having your own biosecurity program.

WHAT IS IT? A management program to prevent the spread of disease

WHY DO IT? **To reduce – in your flock and the national flock:**

- **The chance of introducing disease;**
- **The spread of disease, and;**
- **The cost of disease.**

HOW TO DO IT? As part of the management program for your operation. Consider your inputs, the products you produce, the assets you manage (i.e. the livestock, feed, equipment, and buildings), and the costs and risks you are prepared to bear.

WHERE TO GET HELP? From your veterinarian, commodity group, provincial veterinary service, the CFIA, and the Canadian Animal Health Coalition.

WHEN TO DO IT? **Now.** Implement a control program for your operation right away...and keep it current.

WHO HAS TO DO IT? **You.** You are responsible for animal health on your operation – that is a critical control point in preventing or controlling the spread of disease to the national flock.
Your program will assist those responding to a major outbreak

Do your part...

Prevent foreign animal diseases from entering Canada...

Implement a biosecurity program.

Contact OSMA to obtain a copy of The National Sheep On-Farm Biosecurity Standard and The National Sheep Producer Biosecurity Planning Guide

This bulletin supported by the Western CARD Council

Your Livestock Biosecurity Checklist

Visitors

- Control traffic on and off the farm**
- Post prominent signs** to restrict access and provide directions to the farm office.
- Discourage unnecessary visitors**
 - All visitors must be accompanied, and prohibited or limited from accessing structures or pens containing animals, medications or feed
- Keep a ‘visitor log’**
 - All visitors, service calls and deliveries – no exceptions
 - Date, name, business, contact information, next farm visit, previous farm visit (see www.animalhealth.ca)
- Ask visitors to arrive in clean clothes, footwear, and vehicles**
 - On arrival, instruct visitors as to your sanitation practices
 - Provide clean clothes and footwear if this condition is not met
- Discuss visitors from other countries** with your veterinarian or the CFIA, to assess the risk and appropriate measures

Livestock

- Purchase healthy livestock** from reputable suppliers following good management practices and recognized on-farm food safety programs
- Isolate purchased livestock** for a minimum of 2 weeks
- Purchase quality feed** from feed mills that follow good manufacturing practices
- Separate sick from healthy animals**
- Deadstock should be**
 - Removed immediately from other animals
 - Disposed of as soon as possible according to provincial regulations
 - **Necropsied to confirm cause of death**, if you suspect a contagious and/or reportable disease

Sanitation

- Keep clean...** all personnel, buildings, yards, equipment, instruments, feed storage areas, and feed equipment
- Disinfecting**
 - Choose the right product for the job
 - Clean items with warm water and detergent, before disinfecting
- Use disposable equipment** once, and discard

Wildlife & Pests

- Control or eliminate vermin**
- Protect your feed and water supplies** from fecal contamination by wildlife

Adapted from a Canadian Animal Health Coalition bulletin

Valid Veterinary-Client Relationship

Establishing a valid veterinary-client relationship helps ensure that your veterinarian will be familiar with your flock and management practices, in the event that a problem occurs.

A valid patient/client/practitioner relationship exists when:

(Source: Canadian Veterinary Medical Association)

- The veterinarian has assumed the responsibility for making medical judgments regarding the health of the animals and the need for medical treatment, and the client (owner/caretaker) has agreed to follow the instructions of the veterinarian
- There is sufficient knowledge of the animal(s) by the veterinarian to initiate at least a general or preliminary diagnosis of the medical condition of the animal(s) by virtue of an examination of the animal(s) and/or by medically appropriate and timely visits to the premises where the animal(s) are kept
- The practising veterinarian is readily available for follow-up in case of adverse reactions or failure of the regimen of therapy.

Regular Vaccination and De-worming Program

Sheep Vaccination

The purpose of giving a vaccine is to sensitize an animal's immune system to a specific bacteria or virus, without actually causing the disease. Under natural circumstances, a disease-causing pathogen (bacteria or virus) will enter the body, attack cells, and eventually cause the outward signs of the disease. The immune system will produce antibodies that are specifically designed to recognize and control the pathogen. If the animal survives the pathogen attack, its immune system will retain a 'memory' of that particular organism and will be able to respond more rapidly if it is encountered again. The strength of the immunity and length of time that it lasts depends on the type of pathogen and the overall health of the animal (i.e. poor nutrition and other stresses weaken the immune system). Manufactured vaccines mimic the effects of natural infection by exposing the immune system to controlled amounts of a disabled pathogen. The immune system reacts as it would to the disease, but the animal does not become ill. To maintain a high level of immunity, vaccines need to be given to sheep at regular intervals. If directly exposed to a disease-causing pathogen, even a vaccinated animal may show signs of the disease. However, the severity of the attack should be reduced, as the immune system will be able to respond quickly to the pathogen.

Vaccines designed to mimic viruses may contain live viruses (modified to not cause disease) or killed viruses. Bacterial vaccines contain inactivated bacterial cultures (bacterin) or non-toxic derivations of bacterial toxins (toxoids). Antitoxins are available to reduce the effects of some bacterial diseases in unvaccinated animals (i.e. antitoxin for tetanus may be given if the animal receives a deep puncture wound, etc.).

Before using vaccines, read the manufacturer's label carefully for information regarding administration and dosage recommendations for animals of different ages. Some vaccines are packaged in two parts; a dry component and a liquid component. The vaccine must be reconstituted (liquid portion mixed with dry) before administration. The product label will have instructions detailing the reconstitution and storage of the vaccine (e.g. refrigerate, expiry date). Vaccines that are not stored properly or are used after the expiration date may not provide the proper level of immunity. Consult with a veterinarian if the information on the label is not clear or if sheep are not included in the species listed on the label. Vaccines are most often administered by a subcutaneous injection. A lump will often form at the injection site as part of the normal reaction to the vaccine.

Some of the more common vaccines used for sheep are listed below. **If you are just starting your sheep operation, contact your veterinarian to help determine which vaccines are important for your area. The 'vaccination schedules' provided below are suggestions only. Always follow your veterinarian's advice and/or label instructions for administration.**

Chapter 8: Flock Health – Common Vaccines For Sheep

Common vaccines for sheep:

Vaccine	Comments		Vaccination Schedule
Clostridial (bacterin or toxoid) AND Caseous Lymphadenitis	<p>There are a number of diseases caused by Clostridial bacteria. These bacteria are naturally present in the environment (soil) or in the digestive tract. Clostridial vaccines are generally given in a combination vaccinations (3-, 6-, 7-, or 8-way vaccine); 8-way combinations include tetanus toxoid; 3-way and 6-way shots, may include caseous lymphadenitis.</p> <p>Tetanus antitoxin (different from the vaccine) may be given if an animal has been wounded or is otherwise at risk</p>	Ewes	<ul style="list-style-type: none"> ewes that have not been vaccinated previously should be injected at eight weeks and four weeks before lambing. A single yearly booster vaccination given four weeks before lambing is required thereafter. antibodies from the ewe are passed on to their lambs via colostrum and milk (maternal immunity) to help protect lambs from Clostridial diseases until they are four to six weeks old. This also helps ‘kick start’ the lamb’s immune system
		Lambs	<ul style="list-style-type: none"> maternal immunity from vaccinated ewes will decline when the lambs are approximately six weeks of age. Vaccinating before this age may interfere with development of the lamb’s immune system. lambs should be vaccinated around the time the maternal protection decreases (6 weeks or weaning) if ewes are NOT vaccinated during late pregnancy, lambs should be vaccinated within the first few days of life and again 2-3 weeks after and at weaning. if lambs are going on a high energy finishing ration, they should be vaccinated for Type ‘D’ again at approximately two weeks before the diet change to help prevent ‘overeating disease’ vaccinate bought lambs for Type ‘D’ at purchase and 3 weeks after.
		Ewe lambs	<ul style="list-style-type: none"> ewe lambs selected for future-breeding stock should be vaccinated twice at six weeks of age and at two weeks after weaning
Vibro	<ul style="list-style-type: none"> use only if vibro is a problem in your flock (diagnosed by a pathology lab) or if you purchase ewes from flocks with unknown status (always best to ask for records and history) sheep and cattle vaccines are different 	Ewes	<ul style="list-style-type: none"> if ewes that have been vaccinated annually, give a booster shot 2-3 weeks before breeding ewe lambs (not vaccinated previously) should be vaccinated 2-3 weeks before breeding and given a booster at mid-pregnancy if you are uncertain about the vaccination status of new ewes, vaccinated at purchase and follow ewe lamb schedule

Common vaccines for sheep:

Vaccine	Comments		Vaccination Schedule
Contagious Ecthyma (orf or sore mouth)	<ul style="list-style-type: none"> ●live virus vaccine which can be contagious to people if not applied properly ●vaccine comes with a ‘scratch’ applicator ●light scratch (deep enough for the vaccine to enter the blood system) is made to skin on a wool-free area and vaccine is brushed on ●vaccination does not provide 100% immunity if exposed to heavily infected sheep or environment ●only use in flocks with a history - the vaccine may cause the disease in clean flocks ●check after a week –the vaccinated area should be appear raised and white, and the surrounding area reddish ●resulting scabs are infectious, if vaccinating ewes ensure that they are vaccinated well in advance of lambing (so that lambs do not come in contact with loosened scabs) 	Ewes and/or young lambs	<ul style="list-style-type: none"> ●if you vaccinate ewes, do so well in advance of lambing (2 months prior). Immunity is not transferred to the lamb, but, if the lamb catches the disease, the ewe’s udder will be protected. ●vaccinate ewes in an area of the body free of wool (e.g. inside ear etc.) ●lambs should be vaccinated when a few days old ●vaccinate lambs on inner thigh
Foot Rot	<ul style="list-style-type: none"> ●may be used in infected flocks in conjunction with other treatments 	All	<ul style="list-style-type: none"> ●subcutaneous, high on the neck ●may be necessary to give for a few years before any effects are noted
Rabies	<ul style="list-style-type: none"> ●only use on the advice of your veterinarian if there is a rabies outbreak in your area 		
Lamb pneumonia (PI-3)	<ul style="list-style-type: none"> ●nasal spray vaccine ●may help decrease incidence of pneumonia ●if you have a high incidence of pneumonia in young lambs, it may be more effective to look for and revise problems with housing (ventilation, drafts, sanitation etc.) 	Young lambs	<ul style="list-style-type: none"> ●give shortly after birth

Internal Parasites

Internal parasites can be a major problem for sheep in Ontario. Effective control of internal parasites will make a large difference in the productivity and profitability of your flock. These organisms cause a range of problems including decreased growth of lambs, poor reproductive performance of ewes, and can kill animals if left unchecked. Internal parasites of sheep include worms (e.g. roundworms, lungworms, etc.) and protozoa (e.g. coccidia) that live within the digestive and/or respiratory tract. Damage to the lining of the stomach and/or intestine can be severe enough to prevent nutrient absorption causing diarrhea and severe weight loss. Certain types of worms ingest blood, causing anaemia and weakening the animal.

Although there are a few notable exceptions, the life cycles of most internal parasites are somewhat similar. The adult organisms live and produce eggs in the stomach or intestines of the infected animal. The fertile eggs are passed with the manure and hatch outside the body. After a number of changes, a mobile infective larva is formed, attaches itself to vegetation, and may be eaten by a grazing sheep. The worm reaches sexual maturity after entering the stomach or intestine. The period from when the eggs are passed in the manure until the larvae have reached the infective stage is 3-4 weeks.

With repeated exposures, sheep do develop a natural resistance to parasite infections. This resistance is not as effective as the immunity developed against viruses and bacteria and does not kill the adult organisms. However, the reproductive rate of the parasite is decreased, ultimately reducing the parasite load and the drain on the animal. Therefore, animals most susceptible to parasites are lambs (immature immune system and limited exposure) and animals with weak immune systems (disease, poor nutrition, other stresses). Even though adult animals will be relatively immune, if they are not managed properly they can contaminate the environment increasing the likelihood that vulnerable animals will be infected. Implementing a well-planned parasite management program is a very important aspect of your flock health program.

Chemical dewormers:

Although there are a number of management practices that are important in controlling worms, most effective programs also involve the use of chemical dewormers. Using dewormers at times of the year and/or production cycle when sheep are most vulnerable to parasitism helps increase the effectiveness of treatment and reduce the overall use of chemicals. This will decrease costs and help to maintain the effectiveness of the chemical. (Note: protozoal infections are not treated using dewormers. Discuss treatment with your veterinarian).

One of the most important times to deworm is just after lambing, when there is a sudden release of infective eggs within the ewe's intestinal tract. Treating animals at this time minimizes the exposure of larva to newborn and young lambs.

Examples of deworming schedules are (Consult with your veterinarian and/or producers in your area for other suggestions):

Ewes: Early lambing (January through February)

- Deworming ewes shortly after lambing will help to protect young lambs.
- Deworm ewes again before they go to pasture to prevent pasture contamination.
- If possible, deworm flock again 3 weeks after the have been on pasture
- Deworm ewes at weaning time

Ewes: Late Lambing (April through May)

- Deworm ewes in mid-winter (January, February) before the spring thaw, to prevent heavy contamination of pens or corrals during spring thaw
- Deworm ewes shortly after lambing (before sheep go to pasture) and at weaning time

Weaned lambs:

- Deworm lambs at weaning time or before they enter feedlot or new pasture.

Replacements

- Deworm all newly purchased stock when they arrive on farm at beginning of quarantine period and again 3 weeks later.

After deworming it is advisable keep animals in the same area for 12-24 hours, and then move them to a clean pasture or pen. Moving animals to a new pasture immediately after deworming will contaminate the

pasture, as eggs will be passed with the dead worms. Animals will become re-infected sooner if they are put back into the original pasture.

Resistance to dewormers:

Repeated use of the same dewormer can promote the development of strains of resistant parasites. This means that the dewormer will not be very effective and a large number of the worms will survive after treatment. These worms may pass their resistance to their offspring, creating a new line of resistant parasites. Resistance to dewormers is a growing problem for the sheep industry and as dewormers lose their effectiveness, there are fears that economic losses from parasites will increase. In addition, there are concerns that certain types of these medications may be having a harmful effect on dung beetles (thought to naturally disperse and reduce worm eggs). Reducing the amount and the number of times medication is given will slow down the build up of resistant worms on the farm. The following strategies can help avoid this problem.

Fecal Egg Counts:

Fecal egg counts (done by your vet) are important to determine the level and type of parasite infection. Fecal egg counts before and 10 days after the deworming also help ensure that the dewormer is effective. There should be a decrease of least 85 percent.

Rotating De-wormers:

There are three main groups of wormers—benzimidazoles (e.g fenbendazole); imidazothiazoles (e.g levamisole); and the avermectins (e.g ivermectin). Using a different family of wormer each year (for a full year) will help keep the parasite resistance down in your flock. Performing yearly fecal samples will help to determine if resistance to a particular group of dewormers is occurring.

Nutrition and Health

Parasites are opportunists; as long as the animal is healthy and well cared for, the parasite load will be minimal. However, a poor immune response in stressed or malnourished animals will give parasites a chance to thrive. Animals in this situation are doubly affected, as they must fight the parasite infection as well as the original problem. A high parasite load is often a sign of other health problems, usually poor nutrition. Infected sheep provided good nutrition are, in some cases, able to reduce their worm load significantly.

Pasture Management:

Many parasite larvae do not climb higher than a few centimetres from the ground. Since sheep are able to graze close to the ground, they are generally more susceptible to parasite infection than other livestock. Good pasture management can help reduce parasite problems in grazing sheep. Allowing pastures to ‘rest’ for 6-12 months will help break the parasite lifecycle and clear the pasture of worms, if you have the land base and/or other species on your farm. Other effective methods are to graze hay fields, cropland, or grazing pastures with livestock not affected by sheep parasites (cattle and horses are good, not goats).

Although time between rotations may not be long enough to have a direct effect on larvae populations, rotational grazing programs may help reduce the effect of parasites by providing better nutrition. In addition, as mentioned earlier larvae do not crawl far from the ground, therefore it is important to prevent sheep from grazing the grass down too far. Pasture rotation will also help reduce the amount of fresh manure in the pasture. When possible, livestock avoid grazing near their own feces. As larvae will migrate only ~30cm from the manure, livestock will eat fewer larvae if stocking rates and rotation times are appropriate. Larvae from most worms will die when exposed to dry conditions. Therefore, although overgrazing will increase parasite infections, allowing pastures to become overgrown isn’t the answer either, as the larvae population will increase if not exposed to direct sunlight. Maintaining grass at ~6 cm is ideal.

Harrowing fields aids in dispersing manure, as do dung beetles and earthworms in the soil, helping to dry and kill the larvae quickly.

Since lambs are the most susceptible to infection, manage your pasture rotations to minimize their exposure to parasites. Use a “clean” pasture (not grazed the previous year) if possible when lambing on pasture. If pasturing weaned lambs, move them to a clean pasture and allow ewes to graze the infested areas.

Sanitation

For sheep in confinement housing, cleanliness is the best defence against parasites. To help minimize fecal contamination, use feeders that prevent animals from walking on feed or pulling feed onto the ground. Locate waterers to prevent sheep from defecating in water and in areas with sufficient drainage. Pens, especially lamb pens, should be clean and dry.

Genetic Resistance

Resistance to parasites has a strong genetic link, with certain sheep showing a greater resistance to infection than others. Being able to cull susceptible animals would be an ideal means of not only controlling parasitism, but also eliminating the problem completely. Unfortunately, an on-farm method of effectively and efficiently identifying susceptible sheep has not been developed.

Alternative Dewormers

There is little scientific evidence demonstrating that alternative dewormers (e.g. herbs, diatomaceous earth etc.) have positive effects on lamb growth and/or parasite load.

Summary

Parasites will thrive with:

- mild winter
- moist warm spring and summer
- overgrazed or permanent pastures
- marshy or wet pastures

Sheep are vulnerable when:

- very young or old
- poor immune status (stressful conditions, poor nutrition, weather, overcrowding)
- type and numbers of worms

Preventing parasite infestation in sheep

- strategic use of chemical dewormers
- manage pasture rotations to avoid pasturing young animals on fields recently housing older sheep
- avoid marshy or boggy pastures
- prevent overstocking of pasture, but keep grass reasonably well grazed
- break parasite life cycle (rest period, grazing with cattle etc.)
- maintain sanitary conditions in confinement housing
- discuss parasite control with your vet

Chapter 8:Flock Health - Parasites

<i>Common Internal Parasites</i>			
Parasite	Information/Lifecycle	Signs	Diagnosis
Stomach Worms (<i>Haemonchus</i>)	<ul style="list-style-type: none"> •attach to the stomach lining •suck blood and cause inflammation and ulceration 	<ul style="list-style-type: none"> •anaemia (pale mucus membranes) •swelling under jaw (bottle jaw) •sudden death may occur 	<ul style="list-style-type: none"> •fecal exam •post mortem exam of dead sheep
Intestinal Round Worms	<ul style="list-style-type: none"> •cause damage to the intestinal lining 	<ul style="list-style-type: none"> •enteritis, diarrhea, loss of appetite, loss of body condition, death •may be sudden deaths of fat ewes with large numbers of these worms present 	<ul style="list-style-type: none"> •as above
Lung Worms	<ul style="list-style-type: none"> •more common in areas with wet, marshy pastures •adults live in lungs •eggs are coughed up, and swallowed into the digestive system •larvae hatch and are passed with the manure •sheep are infected after eating larva with grass 	<ul style="list-style-type: none"> •rapid breathing, coughing, weakness 	<ul style="list-style-type: none"> •as above •respiratory distress
Tapeworms	<ul style="list-style-type: none"> •‘sheep-type’ of tapeworms are common, since sheep develop an effective resistance to them, they are not a great problem •‘dog-type’ can be a problem for sheep as they form cysts in the muscles which may lead to condemnation of meat. Regular (at least yearly, before pasturing sheep) deworming of dogs coming in contact with the flock is important 	<ul style="list-style-type: none"> •not generally a problem to the health of the sheep, unless infestation is very heavy and interferes with normal bowel function (not normally seen in sheep over 1 yr) 	<ul style="list-style-type: none"> •found in carcasses at slaughter •fecal exam •may see worm segments (small white flecks) in manure or on hindquarters
Sarcosporidiosis	<ul style="list-style-type: none"> •protozoal parasite •cysts in esophagus, abdominal muscles, diaphragm, or cheek muscles causes condemnation of carcass •no treatment 	<ul style="list-style-type: none"> •no obvious signs 	<ul style="list-style-type: none"> •found in carcasses at slaughter
Coccidiosis	<ul style="list-style-type: none"> • often a major problem in young stock • caused by a protozoa (coccidia) normally present in intestine and in soil • sudden changes in diet and stress can cause coccidia to rapidly multiply and cause infection • older animals become resistant to infections •good feed management (locate feeders and waterers to avoid fecal contamination) •locate pens on well drained land (coccidial organisms from the soil are less viable in dry conditions) •good sanitation (lots of bedding) • if pasturing lambs, avoid using pastures that recently housed older animals 	<ul style="list-style-type: none"> • common intestinal infection characterized by thin, watery diarrhea, often bloody • most often seen in feeder lambs, 2-3weeks after entering feedlot • during initial stages or if lamb is not severely affected, appetite may remain good, but growth and feed efficiency are affected • severely affected lambs go off feed, dehydrate, become weak, die 	<ul style="list-style-type: none"> • consult with a veterinarian. Although this is a common cause of bloody diarrhea there are other diseases that may cause similar signs – correct diagnosis is important to minimize losses •fecal exam •for infected animals, anti-coccidial medication (not the same as dewormers) can be obtained from a vet •to prevent, provide prescribed daily levels of coccidiostat in ration (rumensin, decox) This type of medication requires a vet prescription for lambs

External Parasites

Parasite	Information/Lifecycle	Signs/Diagnosis	Treatment	Prevention
Sheep Ked	<ul style="list-style-type: none"> •wingless insect (6mm) •entire lifecycle (~4 months) on sheep •keds are most numerous in the fall and winter •spread with contact between sheep, worse with overcrowding 	<ul style="list-style-type: none"> •restlessness and unthriftiness •rubbing and loss of patches of wool •adult keds are large enough to see •heavily infested lambs may be stunted due to blood loss •decreased value of wool (rubbing) •decreased value of skins (blemishes from bites) 	<ul style="list-style-type: none"> •shearing will remove many keds •discuss treatments with your vet (dust or spray insecticide) •apply treatments after shearing for best results. 	<ul style="list-style-type: none"> •treat on regular basis after shearing •avoid overcrowding •prevent reinfestation by introducing only clean sheep into the flock.
Lice (Sucking or Biting)	<ul style="list-style-type: none"> •sucking lice feed on blood •biting lice sometimes feed on wool fibres, but more often on loose skin (scurf) and materials contaminating the wool •lice can live for a few days off their hosts 	<ul style="list-style-type: none"> •infested animals constantly rub against objects and scratch and bite themselves, so that their wool becomes dirty, ragged and torn. •severe cases will interfere with feeding and resting. •animals may be unthrifty and young sheep may be stunted in growth. 	<ul style="list-style-type: none"> •lice spread rapidly in a flock •most infestations occur through direct contact and lice can be controlled best by treating infested animals. •clean out bedding and spraying pens before returning animals •same treatment recommended for keds are effective against lice. 	<ul style="list-style-type: none"> •as above
Blow Flies	<ul style="list-style-type: none"> •several species of flies commonly seen during the summer. •flies lay eggs in open sores or on moist wool particularly around the hindquarters of sheep •after hatching the larvae feed on wool material, invade wounds and/or bore into the flesh of the sheep 	<ul style="list-style-type: none"> •affected sheep are normally away from the flock, lying down with their neck stretched out •affected sheep lose condition rapidly. •maggots and smelly wool are obvious •sheep are “eaten alive” by burrowing larvae •absorbing toxins produced by maggots causes the sheep to die in a few days. 	<ul style="list-style-type: none"> •treatment can be effective if carried out early (do regular pasture checks) •shear the animal, and the rest of the flock as soon as possible •remove as many maggots as possible by using benzene or chloroform •consult with your vet (5 per cent Korlan ointment may be affective) 	<ul style="list-style-type: none"> •shear sheep before fly season •sheep scouring from a lush pasture should be inspected often •tail dock lambs to prevent soiling •monitor docking, castration and shearing wounds during the fly season
Mange	<ul style="list-style-type: none"> •mites 	<ul style="list-style-type: none"> •intense itchiness (scratching, biting, rubbing, broken wool fibres) •scabs develop due to rubbing •severity and location of the scabs varies. •itchiness may cause severe productivity decline 		<ul style="list-style-type: none"> •as for lice and keds (avoid buying with new stock most important)
Sheep Nasal Fly	<ul style="list-style-type: none"> •fly related to the warble fly of cattle and bot fly of horses •prevalent in all parts of Canada (active during the summer) •deposits its larvae on or near the nostrils of sheep. •larvae enter nasal passages and sinuses, irritating the membranes. 	<ul style="list-style-type: none"> •large amount of nasal discharge is present •discharge may interfere with breathing. •sheep may push their nose into the ground or against other sheep to keep the flies away. This interferes with feeding and resting, preventing animal from thriving. •in severe cases, nervous disorders may be seen and heavy losses may occur. 	<ul style="list-style-type: none"> •none 	<ul style="list-style-type: none"> •infestations are less severe if sheep are given opportunities to escape from the fly (pastures with access to sheds or dense clumps of brush)

Common Disorders Affecting Sheep in Ontario

Causes of Disease

Health disorders include all diseases and conditions that compromise the productivity and well-being of your sheep. The causes of disorders can be broken down into two basic categories: infectious (transferred either directly from an infected animal or through contact with an object contaminated by an infected animal) and non-infectious (environmental causes). Subcategories of the two basic types of diseases have been briefly described in the following two tables. Although they have been separated, more than one cause may affect an animal at a given time. Indeed, many of the infectious agents are opportunistic and will flourish only when an animal is weakened due to another problem. For example, under normal conditions sheep are exposed to a wide variety of viruses, bacteria, fungi and parasites. However, they may remain healthy unless their immune system is compromised due to environmental stresses, such as poor nutrition or inadequate housing. **The connection between good management and health cannot be stressed enough, as a little prevention can dramatically protect your sheep and your pocketbook from debilitating diseases.**

Infectious Disorders

Infectious Agent	General Information	Examples
Bacteria	<ul style="list-style-type: none"> •single-celled microorganisms that exist either independent (free-living) or as parasites (dependent upon another organism for life). •many dependent bacteria in the body are synergetic (depend on the host, but contribute to the animal as well-e.g. rumen microbes) •two general types of bacteria based on lab methods for classifying (gram positive and gram negative), this is important when deciding which type of antibiotic to use, as particular medications will only be affective against particular organisms. A gram positive specific antibiotic will have little effect against gram negative bacteria. Some antibiotics are broad-spectrum meaning they cover a large number of bacteria types. •antibiotic resistance occurs naturally as bacteria come in contact with the drug. Antibiotic resistance is a major concern for both animal and human health. Improper use and overuse of antibiotics will greatly decrease the length of time that antibiotics will be effective 	Clostridial diseases, foot rot, some types pneumonia, some abortion diseases
Virus	<ul style="list-style-type: none"> • smaller than bacteria and cannot grow or reproduce apart from a living cell. A virus invades living cells and ‘commandeers’ the cell structures to replicate. The cell is often destroyed as the virus replicates •high rate of mutation during replicating means that characteristics of virus populations can change rapidly, making development of treatments difficult •antibiotics do not affect the progress of the diseases caused by viruses. At times a secondary bacteria infection may develop in an animal that is weakened by a viral disease. In this circumstance antibiotics will be useful. •vaccines have been developed to protect against some types of viruses •for some (e.g. Meadi-Visna) blood tests have been developed to detect the presence of the virus in the body •some viruses will eventually be cleared from the body by the animals immune system, other viruses, once caught, will always be present 	Foot and Mouth, sore mouth, rabies, Maedi-Visna
Parasites		coccidiosis, worms, keds
Prion	<ul style="list-style-type: none"> •prions are proteins normally found within the body’s nervous tissue (nerves, spinal column, brain) •for unknown reasons these prions at times will change to a form that resists the normal mechanisms for turn over and break down •prions continue to build-up on the nerve tissue eventually causing nervous disorders 	Scrapie

Non-infectious Disorders

Type	Information	Examples
Nutritional	<ul style="list-style-type: none"> •deficiency or excess of particular nutrients in the diet •can be acute (occur suddenly), but most often is a gradual depletion or build-up of nutrient 	White muscle disease, photosensitivity, copper toxicity
Metabolic	<ul style="list-style-type: none"> •closely tied with nutritional disorders as they are caused by an imbalance in the nutrients supplied in diet with production demands •animal's metabolism can not meet the production demands and nutrients are extracted from the animal's system at a greater rate than they can be replenished •typically rapid onset of signs •occurs at times of sudden increases production requirements (e.g. when a ewe begins lactating) or with sudden changes in diet (e.g.hay diet directly to lush pasture) 	Pregnancy toxemia, hypocalcaemia, grass staggers
Digestive	<ul style="list-style-type: none"> •also linked with nutrition and changes in diet •generally caused by a disruption in rumen function 	Bloat
Genetic	<ul style="list-style-type: none"> •defects which are inherited from parents •intensive line-breeding or inbreeding programs generally cause an increase in these disorders •keeping good breeding and lambing records will greatly aid in culling the problem out of your flock 	Entropion, overshot jaw

Diagnosis of Sheep Diseases

Over time most producers become adept at recognizing and treating common livestock health problems. You should try to learn as much as possible about common diseases and their signs and treatments. If you are confronted with an unfamiliar disease or are uncertain how to handle the situation, consult with your veterinarian. Quickly determining what the problem is and how to treat it may help prevent a major and costly disease outbreak. During the initial phone call to your vet, be sure to have a list of the disease signs on hand. With enough information your vet may be able to make suggestions without making a visit, particularly if he/she is very familiar with your flock management practices. A farm visit, however, may be necessary for the vet to completely assess the situation. As well as providing insights into how to treat the current situation, your vet may have valuable suggestions for preventing future occurrences.

Occasionally animals will die; this is a normal part of farming. However, you should make every effort to determine the cause of death to help prevent the problem from reoccurring and to possibly prevent more losses. Some producers may wish to do a partial post-mortem on the animal themselves to determine if there are any obvious internal signs of disease (e.g. lung abscesses, pulpy kidney etc). Producers may wish to send samples to a veterinary pathology lab for a complete post-mortem. This is particularly important if there have been multiple cases of unexplained deaths or abortions on the farm. As well as looking for visible and microscopic disturbances in body tissue, the pathology lab will be able to develop bacterial cultures to help pinpoint the exact disease cause. Samples are generally sent on referral from your farm vet (i.e. your vet will officially request the post-mortem and provide his/her own observations at the time of submission). To obtain accurate results, the submitted sample must be fresh and/or well preserved (i.e. half decayed samples will yield an invoice, but very little useful information). Samples can generally be refrigerated, but not frozen, to help maintain tissue integrity. The status of slowly progressing diseases may be monitored by occasionally sending older, cull animals to the pathology lab for analysis. In Ontario, the Animal Health Laboratory email: ahinfo@uoguelph.ca at the University of Guelph (519-824-4120 ext 54530) and a satellite lab at Kemptville College (613-258-8320) provide testing. Some private veterinary clinics may also provide some services.

Reportable Diseases:

There are several diseases that occur in sheep that are reportable by Canadian law. If you suspect that your flock may have one of these diseases you must report it to your veterinarian, who will forward the information on to the federal authorities (Canadian Food Inspection Agency). Reportable diseases that have been known to occur in Canada include, anthrax, anaplasmosis, bluetongue (BC only), brucellosis, foot and mouth disease, rabies, scrapie, and tuberculosis.

Digestive System Disorders

Disorder	What do you See?	Cause/Transmission	Treatment	Prevention
Bloat	<ul style="list-style-type: none"> • distension of abdomen, particularly the left side where the rumen is located • depending on severity, the animal may stagger and exhibit signs of pain • can happen as soon as 15 min. after change in diet (i.e. put on pasture for the first time in spring) • in severe cases can be fatal within an hour of first signs • animals of any age can be affected 	<ul style="list-style-type: none"> • gas that is normally produced during fermentation and released through belching becomes trapped in rumen • with 'frothy bloat' (or pasture bloat), the most common type, belching is restricted by the build up of gas in a foam above the rumen contents • 'free-gas' (or feedlot) bloat occurs when rumen pH drops too low, decreasing rumen motility and preventing release of gas. • if severe enough the gas build up restricts breathing and causes death • feedlot bloat is most likely to occur on low fibre/high protein diets (i.e. high grain/low forage feeder diets); pasture bloat more common on pastures with high legume content, seldom occurs on pastures that are at least 50% grasses • change in diet occurs too quickly (i.e. taken from a hay diet onto pasture without adaptation time) • if animals are allowed to become hungry between feeding time or pasture rotations, they may bolt large amounts of feed when it is available 	<ul style="list-style-type: none"> • severe cases are very serious and should be considered a veterinary emergency Pasture Bloat • immediately remove all other animals from pasture and offer dry hay • forcing bloating animals to walk may be enough to help in mild cases • in more severe cases, use a stomach tube (must go into rumen, not just in the throat) to administer defoaming agent (helps break down gas bubbles and allows animal to belch) • trochar or sharp knife: make a hole in the rumen wall ~halfway between the last rib and the hookbone, below the loin- allows gas/froth to escape Feed lot bloat: • stomach tube alone may be effective (allows gas built up due to rumen stasis to escape) • trochar or bloat needle (large needle) also effective in severe cases 	<ul style="list-style-type: none"> • make feed changes gradually • be aware of problems with feeding low fibre feeds (fresh alfalfa/grain) • in the spring begin grazing pastures that are at least 50% grass • make sure animals are full when put on pasture for the first time in the spring (decreases intake until rumen can adjust) • avoid turning animals out for the first time if pasture is wet with dew or rain • if many problems with bloat in feeder lambs, consider revising diet to include more high fibre forage. • consider regular feeding of anti-bloat medication in feed to high risk animals (i.e. feeder lambs) • keep feeding schedules and pasture rotations regular to avoid hungry animals bolting feed • some animals are more prone than others to bloating; consider culling breeding stock that are susceptible • discuss treatment procedures with your vet and know what to do in an emergency
Grain Overload (Lactic acidosis)	<ul style="list-style-type: none"> • most often seen in feeder lambs subjected to recent feed changes • depression, stiffness, lack of appetite, blindness, dehydration and diarrhea common • acute cases coma and death • wool loss and lameness may occur if animal recovers 	<ul style="list-style-type: none"> • sudden intake of easily fermentable feeds (grain, sugar beets, potatoes etc.) • lowered rumen pH disrupts microbe balance and rumen function • often seen in lambs that are switched onto a high grain diet too quickly 	<ul style="list-style-type: none"> • treatment of severe cases is difficult - remove grain immediately, feed good quality hay until signs disappear and reintroduce grain slowly. • antacids neutralize the lactic acid (treat with bicarbonates) • mineral oil drench will help the ingesta move through the digestive track more quickly • losses can be high as some lambs may die and weight gain is halted while lambs recover 	<ul style="list-style-type: none"> • avoid sudden changes in feed • introduce lambs to grain gradually • once lambs are accustomed to grain, maintain regular feeding intervals to avoid lambs becoming hungry and gorging when grain is available again • if feed does run out, allow lambs to fill up on hay before re-filling grain • avoid competition, provide plenty of trough space
Rectal Prolapse	<ul style="list-style-type: none"> • most commonly seen in feeder lambs on a high concentrate feedlot ration or lush pastures. • rectal intestine appears as red ball-shaped structure protruding from the anus. 	<ul style="list-style-type: none"> • too close docking affect rectal nerves • excessive straining due to coccidiosis, intestinal worms, constipation, urinary calculi • inadequate feeder space • excessive coughing (dusty feed, poor ventilation, lung worms) • may be a hereditary predisposition 	<ul style="list-style-type: none"> • when first seen, replace prolapse and fix with a purse string suture (poor results) • amputate rectum surgically (poor results) • slaughter lamb, especially if close to market weight. 	<ul style="list-style-type: none"> • good sanitation, feeder and housing • prevention program for worms, pneumonia, and coccidiosis • if rectal prolapses occur regularly and other predisposing factors eliminated - genetic aspects should be investigated

Digestive System Disorders

Disorder	What do you See?	Cause/Transmission	Treatment	Prevention
Type D Enterotoxemia (Pulpy kidney, Overeating disease)	<ul style="list-style-type: none"> most often the largest, fastest growing lambs that are affected can affect any age but most often nursing lambs (2-12wks) and lambs 4-6 months of age soon after entering the feedlot affected lambs are normally found dead if still alive lambs may show severe abdominal pain, kicking, head tossing, fever, and perhaps diarrhea post mortem: kidneys look mushy, sac around heart distended with fluid, may show bloody spots in the intestines 	<ul style="list-style-type: none"> bacterium (Clostridium perfringens Type D) normally present in the intestine can multiply rapidly under certain circumstances and release a toxin toxin causes systemic blood poisoning 	<ul style="list-style-type: none"> usually too late if a nursing lamb dies, remove rest of flock from lush pasture and/or reduce creep feed if a feeder lambs dies: decrease level of grain in diet and avoid letting lambs become hungry between feedings 	<ul style="list-style-type: none"> vaccinate against Clostridial diseases see page 135 for vaccination schedule introduce increases in grain slowly
Type C Enterotoxemia (Acute bloody enteritis)	<ul style="list-style-type: none"> generally lambs under 3 weeks of age usually found dead small intestine is discoloured with hemorrhagic spots 	<ul style="list-style-type: none"> bacterium (Clostridium perfringens Type C) in intestine produces toxin causing systemic poisoning 	<ul style="list-style-type: none"> as with Type D, usually too late 	<ul style="list-style-type: none"> vaccinate ewes against Clostridial diseases ~ 1 month before lambing
Scours	<ul style="list-style-type: none"> affects lambs most often during first 2 weeks of life lambs born at the end of the season have higher incidence bright yellow or whitish green diarrhea lack of appetite, wet hind end, dehydrated (sunken eyes, gaunt) many lambs that are receiving ample milk will have some yellowish scours, however, they remain bright and alert 	<ul style="list-style-type: none"> overcrowding, cold/wet lambing facilities, poor nutrition (stress leading to a weakened immune system) indigestible milk replacer lack of colostrum lambs from ewe lambs may be more susceptible (decreased immunity in colostrum) 	<ul style="list-style-type: none"> if problem is wide spread in flock discuss with a veterinarian to determine best antibacterial medication to administer change milk replacers if that may be the problem 	<ul style="list-style-type: none"> good pre-lambing nutrition for the ewes and 7 or 8-way vaccination (increase antibodies to colostrum) good management, sanitation, dry bedding, avoid overcrowding isolation of affected ewes and lambs make sure lambs get colostrum within two hours of birth
Coccidiosis (see Internal parasites for more details)	<ul style="list-style-type: none"> common intestinal infection characterized by thin, watery diarrhea, often bloody most often seen in feeder lambs, 2-3weeks after entering feedlot 	<ul style="list-style-type: none"> caused by an intestinal protozoa (coccidia) sudden changes in diet and stress can cause coccidia to rapidly multiply, causing infection 	<ul style="list-style-type: none"> consult with a veterinarian, anti-coccidial medication can be obtained from a vet water and electrolyte treatment for severely dehydrated lambs 	<ul style="list-style-type: none"> good feeding management (place feeders and waterers to avoid fecal contamination) provide prescribed daily levels of an coccidiostat in ration (rumensin, decox) This type of medication requires a vet prescription for lambs

Nutritional Disorders

Disorder	What do you See?	Cause/Transmission	Treatment	Prevention
Copper (Cu) Toxicity	<ul style="list-style-type: none"> • may not be apparent for some time that over consumption of copper is occurring • sudden onset generally after a stressful event (transport, handling etc) • signs include: rapid breathing, yellow tinge to skin and membranes; dark brown urine • most affected sheep die 	<ul style="list-style-type: none"> • sheep are much more susceptible to copper toxicity than any other livestock species • excessive intake of copper over a period of time causes a build up of copper in the liver • liver reaches a maximum holding capacity (1-3 g of Cu/kg liver), may take 30-100 days • as a result of stress, the liver suddenly releases stored copper resulting in the break down of red blood cells and jaundice 	<ul style="list-style-type: none"> • may not know until an animal dies; if diagnosed in post mortem as copper toxicity, treat flock to prevent more • identify and remove the source of high Cu (cattle rations, high-Cu mineral mixes, licks, drenches, corroding Cu water pipes, Cu-contaminated pasture). • add Cu-antagonists to the diet of the "at-risk groups" for 4-6 weeks. The best researched antagonists are Molybdenum (Mo), Sulfur (S), Zinc (Zn) and Iron (Fe) (veterinary prescription) 	<ul style="list-style-type: none"> • be aware of copper levels in supplements (don't allow free access to supplements intended for other types of livestock) • avoid using slurry from hog farms on fields used to produce feed for sheep (high in Cu) • total Cu intake by sheep should be no more than 8-15 mg Cu/kg feed dry matter basis; this can generally be supplied in the diet, without Cu added to a mineral supplement. • have your feeds analyzed • avoid using forages grown on fields fertilized with hog manure (often high Cu output). If this is unavoidable, have soil and feed tested for Cu
White Muscle Disease	<ul style="list-style-type: none"> • most often seen in newborn lambs, but may also occur in feeder lambs that have not grazed green forage for more than three months. • depends on muscle groups affected may see: Stiff gait, difficulty getting up, unable to lift heads or suckle, rapid breathing, sudden death • lambs are prone to starvation, pneumonia, diarrhea 	<ul style="list-style-type: none"> • degenerative muscle disease • deficiency of selenium (Se) interferes with the transport, storage, and usage of vitamin E in the body • seen in areas that are deficient in Se in the soil and therefore in forage 	<ul style="list-style-type: none"> • injection of Se-tocopherol (Vit E) • consult with veterinarian on specific product information 	<ul style="list-style-type: none"> •ensure ewes have sufficient Se in diet during pregnancy •if soil is deficient (determine through feed analysis) provide commercial trace mineral mix with Se • if ewes are not supplemented nutritionally, inject ewe and lamb after birth with Se/Vit E solution
Grass Tetany	<ul style="list-style-type: none"> • most often seen in ewes, 4-6 weeks after lambing • relatively uncommon • affects animals recently turned onto pasture • animal is uncoordinated (staggers), muscle twitching, may have convulsions (legs remain rigid) 	<ul style="list-style-type: none"> • deficiency of magnesium (Mg), and possibly calcium (Ca), and high potassium (K) levels • some areas are naturally low in Mg, therefore decreased in forages • heavy applications of nitrogen also interferes with plant ability to take up Mg • lush grass forage may also decrease Mg absorption by animal • also considered a metabolic disorder 	<ul style="list-style-type: none"> • emergency treatment with Mg and Ca solutions (consult your vet) • recovery occurs quickly if treated in time 	<ul style="list-style-type: none"> •if it is a problem test soil and forages for Mg content •consider legume/grass combination for pastures (legumes convert nitrogen and provide higher mineral levels) •soils with low Mg can be upgraded by application of limestone or supplement animal's diet •apply fertilizer at recommended levels

Nutritional Disorders: Poisonings (often cause signs of neurological disorders)

Disorder	What do you See?	Cause/Transmission	Treatment	Prevention
Plant Poisonings	<ul style="list-style-type: none"> ●most plant poisonings are characterized by signs such as: ●sudden death ●laboured or very rapid breathing ●frothing at the mouth and excessive salivation, weakness, inability to stand ●convulsions or erratic behaviour, greenish saliva (vomiting) ●coma ●other plants (e.g. St. John’s wort, trefoil, certain clovers) cause animals to become sensitive to light (skin not covered by wool is burnt, inflammation and eventually sloughs) ●dark skinned sheep less affected than light skinned sheep ●red clover may cause infertility in ewes if fed during the breeding season 	<ul style="list-style-type: none"> ●plant poisoning is not likely to occur on cultivated grounds or well managed pasture. ● most poisonous plants are unpalatable and livestock rarely eat them when other forage is abundant. ●More prone to eat poisonous plants when other plants are not available (in the spring and fall, during a drought or on an overgrazed pasture). 	<ul style="list-style-type: none"> ●treatments generally ineffective by the time the sheep is found ●sheep affected with signs of light sensitivity should be removed from vegetation ●provide sheds or shade is available ●if severe, burned areas can be treated with antibiotic ointments 	<ul style="list-style-type: none"> ●prevention much more effective than treatment ●don’t overgraze pastures ●have plenty of drinking water, calcium, phosphorous and mineral mix available at all times to prevent depraved appetites. ●manage pastures to discourage weeds ●a list of poisonous plants found in Ontario is available from OMAFRA
Nitrate poisoning	<ul style="list-style-type: none"> ●animals fed heavily fertilized immature crops ●acute cases: increased heart rate, mucous membranes are bluish (gums etc.), muscle tremors, coma, death ●chronic cases: reduced performance, decreased milk production, reproductive problems 	<ul style="list-style-type: none"> ●nitrate altered to nitrite in blood stream, decreases oxygen transfer to cells ●increased risk during droughts or if plants are stressed (accumulation of nitrates in plant) 	<ul style="list-style-type: none"> ●acute cases have a poor prognosis ●change diet for chronic cases 	<ul style="list-style-type: none"> ●apply fertilizers at recommended rates ●consider testing forages ●monitor closely if decreased plant growth likely
Farm yard poisoning	<ul style="list-style-type: none"> ●varies with cause 	<ul style="list-style-type: none"> ●paint, batteries, smelters ●pesticide (insecticide, herbicide, rodenticide etc.) 	<ul style="list-style-type: none"> ●varies with cause, contact your veterinarian 	<ul style="list-style-type: none"> ●keep the barn yard, sheep pens, and pasture free of toxic materials ●prevent exposure to fresh paint ●clean up or fence off garbage sites that sheep may access.
Urea Poisoning	<ul style="list-style-type: none"> ● affects animals being fed urea in diet ● uneasiness, tremors, excessive salivation, rapid breathing, uncoordinated, bloat. 	<ul style="list-style-type: none"> ● improper mixing of urea supplement into a grain ration ● sudden increase in urea supplement in diet ● excess urea broken down into ammonia which is absorbed into the bloodstream – as with nitrate poisoning 	<ul style="list-style-type: none"> ● call a veterinarian to treat cases of urea toxicity ● as an emergency measure, vinegar may be administered as a drench - lowers rumen pH and neutralizes ammonia 	<ul style="list-style-type: none"> ●follow label instructions when adding urea supplement to the diet

Respiratory Disorders

Disorder	What do you See?	Cause	Treatment	Prevention
Pneumonia	<ul style="list-style-type: none"> any animal under stress may develop pneumonia – weak lambs are the most susceptible lambs become feverish (40 to 41°C ;104 to 106°F), stop suckling and/or go off feed, become listless, weak and gaunt fast shallow breathing at first, followed later by laboured breathing (puffing of sides), discharge from the nose in poor conditions there can be a high death losses in a short time. some affected lambs appear initially to respond to treatment but will show chronic signs (coughing, especially after moderate exercise and poor growth), that do not respond to antibiotics post mortem: lung abscesses 	<ul style="list-style-type: none"> stressed lambs (cold/wet, underfed) in presence of a variety of bacteria and viruses normally found in environment (PI-3 virus, pasteurilla bacteria) stress factors such as sudden changes in temperature, drafty, poorly ventilated overcrowded conditions sudden chill, starvation, exhaustion, allows the bacteria and viruses to invade the lungs. 	<ul style="list-style-type: none"> make sure of diagnosis before treatment is started take dead lambs to a veterinary clinic or laboratory immediately to differentiate from other causes. treatment with antibiotic, as recommended by veterinarian. 	<ul style="list-style-type: none"> keep lambing area clean and dry ventilation of lamb barn is very important. If pneumonia is a persistent problem consider contacting an agricultural engineer or government specialist to assess barn avoid stress and overcrowding of lambs vaccine may be helpful in some cases
Shipping Fever	<ul style="list-style-type: none"> following weaning, transport, auction sales and other stress factors. high fever, droopy ears, off feed, reluctant to walk, rapid shallow breathing, progressing to laboured, frothy open- mouth respiration sudden deaths are common when septicemia (blood poisoning) occurs. 	<ul style="list-style-type: none"> variety of viruses and bacteria that are normally present in the respiratory tract take advantage of lowered resistance of lambs causing pneumonia. 	<ul style="list-style-type: none"> separate healthy from sick lambs treat sick lambs with antibiotics (consult a veterinarian) drench or stomach tube to prevent dehydrated lambs. 	<ul style="list-style-type: none"> avoid excessive stress at weaning delay deworming, castration, vaccination until about ten days after shipping introduce lambs to feed gradually provide good housing, dry bedding and avoid overcrowding try not to mix lambs of various sources too quickly after arrival using medicated feeds during stress periods may help (consult with vet)
Maedi Visna	<ul style="list-style-type: none"> slowly progressing of sheep usually seen after 3 years of age some infected animals never show symptoms, but can infect others gradually increasing respiratory distress, loss of body weight and death. (occasionally neurological) decreased milk production due to ‘hard-bag’ mastitis of both sides of udder (decreased lamb growth) 	<ul style="list-style-type: none"> virus, spreads primarily from ewes to their lambs through colostrum and milk also spread from sheep to sheep by direct contact (respiration) possibly through blood healthy seeming, infected sheep can spread the virus 	<ul style="list-style-type: none"> none 	<p>Active Prevention</p> <ul style="list-style-type: none"> Contact your veterinarian or OSMA for details on the Maedi-Visna testing program Blood sample flock and cull positive animals Maintain tight biosecurity to prevent re-introduction <p>Passive Prevention: cull all sheep showing signs of progressive respiratory disease</p>

Wasting Diseases

Disorder	What Do you See?	Cause/Transmission	Treatment	Prevention
Johne's Disease (Paratuberculosis)	<ul style="list-style-type: none"> •most often noticed in animals over 1yr of age •progressive weight loss to emaciation •may be diarrhea and soiling of fleece on hindquarters •poor lamb performance •affected animal dies after a period of illness 	<ul style="list-style-type: none"> •intestinal damage due to bacterial infection, leading to inability to absorb nutrients •transferred by contact with infected animal (feces, colostrum, placenta) •bacteria can survive for 2yrs in environment 	<ul style="list-style-type: none"> •none, cull suspected cases 	<ul style="list-style-type: none"> •blood or fecal sample flock and cull positives (tests not always accurate) •maintain sanitary barn conditions •buy breeding stock from a known reputable source •consider testing a percentage of cull animals at diagnostic lab to determine incidence in flock (high incidence depopulation and restocking is an option). Accuracy of test may be questionable – consult with your vet.
Maedi-Visna (see Respiratory diseases for details)	<ul style="list-style-type: none"> •some animals may be infected but not show signs, other than general wasting 			
Caseous Lymphadenitis (Pseudotuberculosis)	<ul style="list-style-type: none"> •most often seen in animals over 6 months •signs depend on where disease manifests itself, may be no external signs but poor condition: <ul style="list-style-type: none"> external: lymph nodes of neck, under jaw, face, shoulder are enlarged, often abscess (open pus-filled sores) internal: abscesses form in lungs and other internal organs (respiratory distress) •general weight loss, poor production •sudden death may occur 	<ul style="list-style-type: none"> bacteria enters through cuts and abrasions in skin •transmitted by direct contact between animals and contaminated shearing equipment •bacteria can survive for months in the environment 	<ul style="list-style-type: none"> •culling of infected animals recommended •abscesses will heal, but reoccur 	<ul style="list-style-type: none"> •very common disease, often spread by purchasing infected breeding stock •vaccine available; treat new stock before entering flock (often given in 3 or 6-way shot with clostridial vaccines) •avoid cutting animals with shears, disinfect shears between animals •shear groups less likely to have the disease first (e.g. young animals before older animals)
Dental disease	<ul style="list-style-type: none"> •most often in older sheep (3 yrs and older) •decreased appetite •weight loss •no signs of neurological disorders (not uncoordinated etc.) •tooth loss, bad breath, poor gums 	<ul style="list-style-type: none"> •infection by various types of bacteria •cause unknown, maybe related to calcium:phosphorous imbalance in diet and/or excessively hard feeds (roots etc), possible genetic link 	<ul style="list-style-type: none"> •none 	<ul style="list-style-type: none"> •check Ca:P balance in diet •good quality feed •purchase young stock and check teeth before purchase •check for tooth loss in adults as part of pre-breeding check (with condition scoring and udder check)
Scrapie (See 'Neurological Diseases for details)	<ul style="list-style-type: none"> •disease varies in signs, may see significant wasting before neurological signs – reportable disease 			

Neurological Disorders

Disorder	What Do you See?	Cause/Transmission	Treatment	Prevention
Tetanus (Lockjaw)	<ul style="list-style-type: none"> •limb stiffness, stilted gait •as disease advances, animal will stiffen completely and not be able to open jaw •convulsions, often triggered by sudden noises •3rd eyelid membrane may be visible •breathing difficult •death occurs in 3-4 days 	<ul style="list-style-type: none"> •bacteria in soil (<i>Clostridium tetani</i>) enters body through wound and produces a toxin which damages nervous system •bacteria grows in absence of oxygen, therefore deep puncture wounds are problematic •most often seen in lambs after castration or docking (elastator bands and contaminated knives) 	<ul style="list-style-type: none"> •usually too late by the time animal shows obvious signs •clean damaged area and any dead material •if animal has not been previously vaccinated, dose with tetanus antitoxin and tetanus toxoid (vaccine) 	<ul style="list-style-type: none"> •vaccinate ewes using an 8-way (Clostridial and tetanus toxoid) prior to lambing •use clean equipment for castration and docking, house lambs in sanitary conditions •don't use elastator bands on farms with previous cases of tetanus
Listeriosis (Circling Disease) (also see abortion diseases)	<ul style="list-style-type: none"> •most often seen in feedlot lambs, but also possible in animals of any age •depression, off feed, fever •one side of the body is affected (face paralysis, droopy ear, lip and eyelid) •animal walks in a circle •convulsions, death •diagnostic lab can identify bacteria and examine brain for abscesses 	<ul style="list-style-type: none"> •bacteria (<i>Listeria monocytogenes</i>) forms abscesses in brain •contracted from infected sheep through cuts •spoiled feed (particularly silage) often implicated 	<ul style="list-style-type: none"> •antibiotic treatment rarely successful 	<ul style="list-style-type: none"> •provide good quality feed •properly dispose of deadstock •keep pregnant ewes away from sick lamb area
Polio Encephalomalacia	<ul style="list-style-type: none"> •seen most often in feeder lambs •non-infectious (no fever) •may see blindness, staggering, head pressing, progressing to convulsions, coma, and death 	<ul style="list-style-type: none"> •not known for certain, but thought to be a deficiency of thiamine (vitamin B1), due to microbes in the rumen depleting thiamine supplies (can be provided in diet but not available to the animal) •high mineral content in water may be a contributing factor •deficiency will eventually give rise to neurological disorder 	<ul style="list-style-type: none"> •this is an emergency situation, (contact vet) but if the animal is treated quickly the prognosis is good •intravenous thiamine injections •separate animal during recovery 	<ul style="list-style-type: none"> •consider adding brewer's yeast to grain rations •avoid feeding mouldy hay •provide adequate water and water analysis

Neurological Disorders

Disorder	What Do you See?	Cause/Transmission	Treatment	Prevention
Scrapie	<ul style="list-style-type: none"> •relatively rare, but reportable disease •long incubation time, animal may be infected at birth but no signs until sheep is 2yrs or older •typically extensive loss of wool due to rubbing •uncoordinated, muscle tremour, twitching, grinding teeth, convulsions •some sheep die quickly with few signs, most die within six months of first signs •diagnosis only confirmed by lab exam of the brain after death 	<ul style="list-style-type: none"> •prion disease (abnormal protein in body which builds up in nervous tissue) •transmitted to lambs and older sheep that come in contact with placenta and birth fluids of an infected animal 	<ul style="list-style-type: none"> •no treatment •reportable by law, contact your vet immediately if you suspect your flock may be infected 	<ul style="list-style-type: none"> •careful screening of breeding stock sources •voluntary federal scrapie program is in development to identify flocks at risk of infection, may involve live-animal test and/or testing for genetically resistant animals
Rabies	<ul style="list-style-type: none"> •restlessness, twitching lips, excessive drooling (note: not all drooling animals will have rabies, often may be an obstruction in the throat or mouth, however, always wear gloves if you may come in contact with saliva) •animals may act either excessively docile (depressed form) or aggressive butting against wall or fence etc. •males may show sexual behaviour •animal is progressively paralyzed and generally dies within six days 	<ul style="list-style-type: none"> •viral disease which attacks the central nervous system •usually contracted from the bite of an infected animal (dog, fox, skunk etc.) 	<ul style="list-style-type: none"> •none •reportable disease, contact your veterinarian immediately 	<ul style="list-style-type: none"> •no vaccine for sheep •vaccinate farm dogs annually •control populations of potential carriers (foxes, skunks etc.)
Maedi-Visna (see Respiratory Diseases for details)	<ul style="list-style-type: none"> •Maedi-Visna has a respiratory form and a much less common neurological form (very rare in North America) •staggering, gradual paralysis 			

Foot Diseases of Sheep

Disorder	What do you See?	Cause/Transmission	Treatment	Prevention
Foot Rot	<ul style="list-style-type: none"> •starts as a scald with moist, reddened skin between the claws of the hoof •as the infection progresses, it spreads and the outer portion of the hoof wall ('horn) which, starting at the heel, will separate away •dead tissue appears as a greyish, moist zone beneath the loose horn •there is often a foul odour, but no pus formation •maggot infestation is a common complication during the fly season •acute lameness, sheep walk on their knees if front feet are infected •sheep lose body condition because of pain and some interference with feeding •no abscesses form, and the area above the hoof is seldom involved •sheep may not be obviously affected but they could be carriers. 	<ul style="list-style-type: none"> • both <i>Fusiformis necrophorus</i> and <i>Bacteroides nodosus</i> types of bacteria need to be present to cause foot rot •initial scald is caused by <i>f.necrophorous</i> bacteria; scald irritation allows <i>b.nodosus</i> bacteria to enter deeper layers; infection created by <i>b.nodosus</i> allows deeper invasion of <i>f.necrophorous</i> •bacteria is picked up from the soil and certain conditions increase likelihood of infection •in wet footing (heavy rainfall, marshy pastures) hooves become soft and surrounding skin is easily irritated or injured •bacteria grow in the absence of oxygen, therefore overgrown or deformed hooves are more susceptible as there tend to be cracks and pockets in hooves 	<ul style="list-style-type: none"> •foot rot is notoriously difficult to completely clear up - contact your veterinarian for an exact diagnosis and detailed recommendations for treatment. •treatment is expensive, labour intensive, and may take weeks to months to be successful •footbath is essential (formaldehyde, copper or zinc sulfate) •examine and trim feet of all sheep (even those not showing signs - disinfect trimmers between each sheep) •identify all affected sheep and isolate as a 'diseased' flock •new cases will likely occur, so monitor 'clean' flock closely and remove affected animals as soon as possible •'clean' and infected animals should go through footbath (individual sheep must stand for at least five minutes) •your vet can provide a detailed treatment regime 	<ul style="list-style-type: none"> •only buy new stock from known and reputable flocks •check feet on new stock for any signs of rot, and keep in quarantine for 2-3 weeks before mixing with the rest of the flock •perform regular hoof trimming on the entire flock and/or cull sheep with poor feet •avoid wet, muddy pastures and corrals if possible
Foot Scald	<ul style="list-style-type: none"> •inflammation of skin between the toes •some separation of the hoof from the foot may occur, but there is no greyish rotting and no offensive odour 	<ul style="list-style-type: none"> •caused when <i>Fusiformis necrophorus</i> alone is present •seen when feet are wet for a prolonged period (heavy rains, marshy pastures) 	<ul style="list-style-type: none"> •as infection remains on the surface, treatment less intensive than with foot rot •put sheep on clean dry ground and they recover quickly •foot bath may speed recovery. 	<ul style="list-style-type: none"> •avoid using wet pastures and corrals
Foot Abscess	<ul style="list-style-type: none"> •may separate hoof from sole •often causes swelling and rupture of skin above the hoof •trimming shows yellowish pus material when abscess is opened •sheep may become quite ill and die of blood poisoning in acute, severe cases •if chronic infection is deep enough to involve joints and connective tissues, simple treatment will not be effective and chronic arthritis may develop 	<ul style="list-style-type: none"> •infection entry is through broken toes, scald injury, cracked walls, injury on junky yards, wooden sticks 	<ul style="list-style-type: none"> •simple abscesses may be drained, flushed out with 2 per cent tincture of iodine and an injection of antibiotic given into the muscle •sheep with badly swollen foot may need to be treated by a veterinarian 	<ul style="list-style-type: none"> •maintain pastures (clear junk etc)

Metabolic Disorders Associated with Pregnancy and Lambing

Disorder	What do you See?	Cause	Treatment	Prevention
Pregnancy Toxemia	<ul style="list-style-type: none"> • usually affects ewes carrying multiple lambs in late pregnancy • ewes who are too fat or too thin are more at risk • usually occurs in more than one ewe in the flock, as the flock is exposed to the same feeding conditions. • ewe keeps separate from the flock, and appear depressed (head down, droopy ears), eventually progresses to weakness, staggering and blindness. • total lack of appetite, normal body temperatures 38.9°C (102° F) • grinding of teeth as though in pain, staggering, loud breathing • sometimes there are convulsions, coma and death. • breath smells ‘sweet’ • a post mortem exam shows fatty liver and multiple fetuses in late development • only silage, hay, and straw are being fed (energy shortage). 	<ul style="list-style-type: none"> • ewe is unable to consume enough energy to support her and her rapidly growing lambs because of inadequate nutrition or loss of appetite. • reduced feed intake capacity due to growing fetuses in late pregnancy (digestive fill is restricted) • improper sugar metabolism, which leads to low blood sugar, high ketone levels in blood, fatty liver. 	<ul style="list-style-type: none"> • call your vet • generally unsatisfactory • glucose intravenous gives only temporary results, and is not very effective • glycerol or propylene glycol by mouth four times per day • consult with your veterinarian about inducing lambing or performing a Caesarean section. 	<ul style="list-style-type: none"> • adequate and increasing energy levels must be provided in the diet during the last 4 to 6 weeks of gestation • provide the pregnant ewes with fresh water and adequate feeder space. • regular body condition scoring will aid in early detection and prevention of this disease. • keep ewes in good condition, not too fat, nor too thin • increase grain intake gradually over final six weeks of pregnancy, by ~1.5lb per head (grain provides increased energy, while causing little gut fill) • avoid stress, such as excessive handling, shipping, deworming, vaccinations, overcrowding, feed changes during final four weeks of pregnancy.
Hypocalcaemia (Milk Fever)	<ul style="list-style-type: none"> • usually occurs shortly before or after lambing • staggering, tremors and a stilted gait. • sheep may go down after an hour or two • hind legs stretched backwards, head may be turned toward the flank • although another name for this disease is milk fever, there is no fever, temperature is usually decreased to 35.0 to 36.7° C (97-98° F) • ewes often look bloated (rumen motility decreases and gases accumulate) • most ewes will die if not treated promptly. 	<ul style="list-style-type: none"> • pregnant or lactating ewes having low levels of blood calcium due to the growth of the fetus or the increased milk demands. • high Ca and low P in feed, e.g., lots of good alfalfa but no grains or minerals causes body to release Ca from body stores too slowly for the sudden Ca demands due to lactation • excessive handling, shearing, feeding stresses, deprivation of feed may cause this disorder 	<ul style="list-style-type: none"> • an injection of 80 ml of calcium borogluconate under the skin will help most ewes within an hour. • severe cases may require an intravenous injection 	<ul style="list-style-type: none"> • avoid rough handling during late pregnancy (avoid stress) • good quality Ca-P minerals should be available at all times. Watch copper levels if fed free choice. • avoid sudden changes in feed or interruption in feeding routine with pregnant ewes.

Disorders of Ewe Reproductive Tract

Disorder	What do you See?	Cause	Treatment	Prevention
Vaginal Prolapse	<ul style="list-style-type: none"> •seen in ewes and ewe lambs in the later stages of pregnancy. •mild vaginal prolapses are difficult to detect. Sometimes if the ewe is lying down a small round protrusion of the vaginal wall from the vulva will be seen. As the problem progresses, more of the vaginal wall can be seen. •drying, infection, irritation and freezing of the tissues lead to the ewe straining. If the prolapse is large enough the urethra may become blocked and the ewe will be unable to urinate. •in very severe cases, the vaginal wall will tear, the intestines may be pushed out, and the ewe will die quickly. 	<ul style="list-style-type: none"> •over-conditioned ewes •too much coarse roughage •genetic predisposition •overcrowding at feeders •hypocalcaemia, calcium phosphorous (Ca:P) imbalance in diet) •excessive coughing or straining •age: three year old and older ewes more susceptible •internal pressure and lack of room, e.g., full rumen, multiple lamb pregnancy 	<ul style="list-style-type: none"> •needs immediate attention •clean prolapsed tissue gently with a mild disinfect and replace. •If found in early stages the prolapse may be replaced quite easily •more difficult or almost impossible if found caked with manure, sunburned or frozen •there are products on the market that can be used to hold it in position, for example, plastic spoon-shaped retainers and trusses. •a veterinarian should be consulted before attempting suturing of tissue 	<ul style="list-style-type: none"> •provide adequate feeder space to prevent ewes from pushing and shoving for grain. •provide a high quality of roughage during the last trimester of pregnancy to ensure adequate vitamin and mineral intake, especially calcium. •cull affected ewes (although the problem will correct itself after lambing, it will probably occur with future pregnancies) •don't use offspring from such ewes as replacement breeding stock •do not dock tails too short
Uterine Prolapse	<ul style="list-style-type: none"> •occurs directly after lambing •uterus becomes inverted and hangs from the vagina as a large red mass with the cotyledons or "buttons" readily identifiable. •if the ewe appears very weak, has pale mucus membranes, and feels cold, she is most likely haemorrhaging internally and little can be done to save her. 	<ul style="list-style-type: none"> • excessive straining from difficult births is often the cause • genetic predisposition? 	<ul style="list-style-type: none"> •uterine prolapse is an emergency - call your veterinarian immediately. • an epidural anesthetic will be given to prevent straining and the prolapse gently washed and replaced. The vulva will be sutured closed to prevent a recurrence. 	<ul style="list-style-type: none"> •if the water bag breaks, but there is no further progress within an hour, the ewe should be examined, and if possible the problem corrected before the ewe becomes exhausted •get competent help for difficult lambing cases •ensure adequate rations during the last stage of pregnancy •prevent ewes from becoming obese
Malignant Edema	<ul style="list-style-type: none"> •hot, puffy, painful swelling in the region of vulva (greenish discoloration) •ewe depressed, off feed, quite ill, could be quite lame on one side in early stages •death usually follows in 24 hours. 	<ul style="list-style-type: none"> •a deadly clostridial disease (bacteria <i>Clostridium septicum</i> and <i>C.chauxei</i>) commonly seen at lambing time •failure to properly wash your hands before assisting a lambing ewe •unsanitary lambing facilities •bruising, laceration of vagina during lambing •infected afterbirth membranes 	<ul style="list-style-type: none"> •none 	<ul style="list-style-type: none"> •Clostridial vaccination •wash hand and clean vulva using soap and warm water before attempting to help the ewe during lambing

General Information About Abortion

Cause	Prevention
<p>•most abortion diseases are spread by direct contact through feed and water or contaminated material (fluids, placenta, fetus). Brucellosis, an exception to the rule, is spread by the ram during breeding.</p> <p>•diagnosis (determining the type of organism causing the abortion) is difficult by looking at fetus It is important that the whole fetus, its membranes (placenta or afterbirth) be submitted to the provincial veterinary lab in all cases of abortion. Fresh, preferably clean specimens are necessary for good results</p> <p><i>If the laboratory cannot detect, isolate or identify infectious abortive agents after a number of suitable submissions, one should look for non-infectious causes of abortions such as:</i></p> <ul style="list-style-type: none"> • nutritional deficiencies (vitamin A, iodine) or malnutrition • rough handling, accidents • exhaustion after stress, transport over long distance, dog attacks, etc. • any disease accompanied by high fever • hormonal disturbances, (estrogens, or progesterones). • young ewes that are still growing may be more prone to stress/nutrition related abortions 	<p>•abortion storms can rapidly decimate your lamb crop and profits for an entire year. It is therefore very important to implement preventative measures and minimizing the spread of the disease if it does occur.</p> <p><i>Prevention:</i></p> <ul style="list-style-type: none"> •consult your veterinarian about implementing an effective vaccination program (possibly including the use of a coccidiostat) •do not feed on the ground and provide clean water. •prevent contamination of feed and water with feces of rodents, birds and cats. Neuter cats and maintain a stable adult cat population. •maintain first lambing ewes as a separate unit. •maintain purchased replacement ewes as a separate unit. •avoid stressing the sheep. Avoid crowding and unsanitary facilities. •do not bed pregnant ewes with bedding from lambing area. •maintain high standards of sanitation and hygiene while lambing; wash and disinfect hands frequently. <p><i>If abortions do occur:</i></p> <ul style="list-style-type: none"> •submit aborted fetuses and placentas to a diagnostic laboratory to identify the infectious agents. If the abortion storm is prolonged, several samples should be submitted as there may be more than one cause. •immediately isolate aborted ewes from the rest of the flock – do not mix with replacement stock •clean the area where the ewe aborted-remove all traces of fetal material (bury) and spray area with disinfectant •consult with your veterinarian about possible antibiotic or antiprotozoal medications •check for contamination of feed supplies (especially if you are using silage). •monitor and possibly treat aborted ewes for uterine infections (injectable antibiotics and/or uterine infusion)

Contagious Abortions

(Caution: many infectious agents causing abortion in sheep can be transmitted to humans. Pregnant women are advised not to handle lambing ewes)

Disorder	What do you See?	Cause	Prevention
<p>Enzootic abortion (Chlamydia)</p>	<ul style="list-style-type: none"> ●late pregnancy abortions, stillbirths and weak lambs ● when first introduced in a flock, abortion rates may run from 25-60% of the ewes. After the first outbreak, the incidence of abortion may drop to 1-5% ●newly purchased ewes and ewe lambs are most susceptible in contaminated farms. ●the placenta is often severely damaged and may be retained; membranes are opaque, reddened and thick ●fetus may have abnormal levels of fluid in the abdomen and enlargement of the liver ● recovered ewes are usually resistant for two to three years 	<ul style="list-style-type: none"> ● the major sources of infection are aborted fetuses, placentas, vaginal discharges, and feces from carriers ● the organism enters a non-pregnant ewe and lays dormant until the ewe conceives (accumulates in the placenta). The organism does not initiate an immune response during the dormant stage. During the infective stage, the ewe develops an immune response that clears the organism from the system. ● ewe usually only aborts once in her lifetime, but may remain a carrier ●an infected ewe may have a normal lamb, but spread the bacteria when stressed 	<ul style="list-style-type: none"> ●a vaccine is available and generally considered to be effective in sheep. ●crowding at lambing time increases the risk of abortion in the same or subsequent lambing season. ●no effective way to identify infected or carrier animals. Control measures are, therefore, based on accurate diagnosis and good hygiene such as isolation of aborting ewes and disinfecting infected pens.
<p>Vibriosis (Campylobacter, Campylobacter jejuni)</p>	<ul style="list-style-type: none"> ●late pregnancy abortions, stillbirths, and weak lambs are common. ●abortion rates may reach 80-90% in previously unexposed flock ●infected ewes generally recover following abortion and can be expected to be immune to re-infection for several years ●some ewes die of complications such as infected uterus or fetal/placental retentions ●new and young ewes are most likely to abort in flocks with a history of vibrio 	<ul style="list-style-type: none"> ● some infected ewes will continue to shed bacteria in their feces. ● new ewes are infected by oral ingestion. 	<ul style="list-style-type: none"> ●effective vaccine available ●clean flocks should be vaccinated if replacement ewes are purchased from other flocks. ●replacements should be vaccinated when brought into a flock of vibrio carriers ●vaccinate just before flushing or breeding or at weaning time.
<p>Toxoplasmosis (Toxoplasma gondii)</p>	<ul style="list-style-type: none"> ●generally does not cause clinical signs or detrimental effects in non-pregnant, healthy ewes. ●in stressed and immunosuppressed ewes, neurological signs and death on rare occasions ●result in pregnant ewes varies with stage of pregnancy when infected: first two months =embryonic death and reabsorption; mid gestation=abortion or weak lambs; the last trimester =weak lambs or healthy, but infected lamb ●typical losses averaging 15-20% of the lamp crop. 	<ul style="list-style-type: none"> ● protozoa which causes coccidiosis-like disease in cats ● infection in sheep follows ingestion of feed or water contaminated with cat feces containing protozoa eggs 	<ul style="list-style-type: none"> ●treatment of ewes during pregnancy with anticoccidial drugs and immunization with a live vaccine or by exposure of susceptible sheep to infection before pregnancy ●the risk of infection greatly reduced by preventing contamination of sheep feed with cat feces. Keeping cats out of sheep barns to prevent Toxoplasmosis must be weighed against the benefits of rodent control

Contagious Abortions

(Caution: many infectious agents causing abortion in sheep can be transmitted to humans. Pregnant women are advised not to handle lambing ewes)

Disorder	What do you See?	Cause	Prevention
Salmonella	<ul style="list-style-type: none"> •abortion may occur earlier in gestation but are most common in the last month of gestation. •abortion rates as high as 70%. •diarrhea in ewes is common •lambs may also contract the disease and die. 	<ul style="list-style-type: none"> •ewes that have aborted are immune but can carry and shed bacteria for up to four months 	<ul style="list-style-type: none"> •no vaccine available •ampicillin may help (consult your veterinarian)
Listeriosis	<ul style="list-style-type: none"> •may also cause neurological signs as well, although both neurological and abortions are rarely seen at the same time •number of ewes affected depends on feeding practises and degree of silage spoilage 	<ul style="list-style-type: none"> •moldy silage most often implicated 	<ul style="list-style-type: none"> •never feed moldy silage to sheep, especially pregnant ewes •no vaccine available •antibiotics may help, consult your veterinarian
Brucellosis (Brucella ovis)	<ul style="list-style-type: none"> •relatively rare cause of abortions in ewes 	<ul style="list-style-type: none"> •bacteria passed from infected rams to ewes 	<ul style="list-style-type: none"> •perform pre-breeding and pre-purchase checks of rams for unusual scrotal swellings – don't buy rams with abnormalities •brucellosis is a reportable disease

Lactation Disorders

Disorder	What do you See?	Cause	Treatment	Prevention
Mastitis	<ul style="list-style-type: none"> •mastitis can develop rapidly •may be an obvious cause (damage to udder, bruising, wire cuts, sore mouth scabs) •various levels of severity (some cases are sub-clinical, but will still cause injury to the udder and decrease milk production) •in the obvious cases, the udder becomes hot and painful (may cause fever) •ewe carries one leg away from udder •lamb may look hollow if milk decreased •mastitis is a common sign of the Maedi-Visna virus, both sides of the udder are hard but not hot 	<ul style="list-style-type: none"> •bacteria such as <i>Staphylococcus</i> spp. or <i>Pasteurella</i> spp causes infection of the udder •maybe related to injury or unsanitary conditions 	<ul style="list-style-type: none"> •depends of severity of infection •frequent stripping of milk out of udder (at least twice per day) •intravenous or intramuscular antibiotics injections may be useful 	<ul style="list-style-type: none"> •unless lumps and abscesses are very small, the affected and recovered ewe should be culled from breeding flock. •keep ewe housing areas clean and well bedded •if you suspect Maedi-Visna, see Respiratory Disorders for details
BlueBag Masitis	<ul style="list-style-type: none"> •very severe form of mastitis •udder is very swollen, hard, and has a greenish colouration •infection generally spreads through the body (systemic poisoning) •the ewe becomes feverish, quite ill and may die in a day or two •if ewe recovers, the affected half of the entire udder no longer produces milk 	<ul style="list-style-type: none"> •as above, likely to have an udder injury 	<ul style="list-style-type: none"> •call your vet •hot packs applied to udder using hot water and liniments •intravenous or intramuscular antibiotic injections may be useful •early treatment is essential 	<ul style="list-style-type: none"> •as above
Agalactia (Lack of Milk)	<ul style="list-style-type: none"> •ewe produce little or no milk. •may be little udder development as the ewe nears lambing •no fever, illness, pain, or edema of udder •there may be a hard fibrotic lump within the parenchyma of the udder with an extension from this fibrous mass descending down into the teat canal, causing an interruption of milk flow •milk (if there is any) appears normal in colour and consistency, simply not enough of it •occurs among first time lambing ewe lambs as well as older ewes. •maternal behaviour may be normal, or ewes may be less willing to allow lambs to nurse (especially with young ewes) 	<ul style="list-style-type: none"> •cause not known •possible influencing factors: •chilling of udders •excessive barley feeding •mastitis infection not cured •mycoplasma infection •early lambing (Dec-Jan). 	<ul style="list-style-type: none"> •none (some ewes are slow to start milking after lambing, and milk production may pick up after a few days) 	<ul style="list-style-type: none"> •cull affected ewes.

Disorders Affecting Male Sheep

Disorder	What Do you See?	Cause/Transmission	Treatment	Prevention
Urinary Calculi (Water Belly)	<ul style="list-style-type: none"> ●most often seen in feedlot lambs (rams and wethers) ●restlessness, repeated straining and grunting, kicking at belly ●abdomen will begin to swell (water belly) ●animal will begin to show signs of toxicity and die if urine if not passed 	<ul style="list-style-type: none"> ●obstruction of penis by kidney stones (solid particles in urine form into masses) ●stones prevent passage of urine 	<ul style="list-style-type: none"> ●contact your veterinarian 	<ul style="list-style-type: none"> ●Calcium (Ca) and phosphorous (P) balance in diet is important in minimizing problem (if P in diet is higher than Ca more likely to have problems) ●always provide ample clean water (lack of water concentrates urine)
Epididymitis	<ul style="list-style-type: none"> ●semen quality is affected, decreasing fertility in rams (poor conception in ewes) ●signs vary depending on severity of injury and bacteria involved, one or both testicles may be affected ●acute infections will cause testicles to enlarge rapidly, ram may have abnormal gait due to pain ●chronic infections may cause abscesses to form in the testicles and epididymis, leaving lumps and obstructions. ●some chronic infections may have no associated pain 	<ul style="list-style-type: none"> ●bacterial infection resulting from injury 	<ul style="list-style-type: none"> ●none 	<ul style="list-style-type: none"> ●difficult to prevent as the testicles in rams are prone to injury and infection (large and close to the ground), however, examination for abnormal swelling before breeding will help prevent reproductive losses. ●it is advisable to cull rams with abnormal testicles.
Sheath Rot (Pizzle Rot)	<ul style="list-style-type: none"> ●affects rams and wethers ●most often seen in animals on a high protein diet (concentrate or legume pasture) ●swelling and possible obstruction of prepuce ●irritation of surrounding area 	<ul style="list-style-type: none"> ●irritation of sheath and prepuce from urine and ammonia ●bacterial infection in the area results 	<ul style="list-style-type: none"> ●clean scabs, urine and pus from affected area ●apply antibiotic cream 	<ul style="list-style-type: none"> ●if this is a frequent problem, consider modifying the diet

Others

Disorder	What do you See?	Cause	Treatment	Prevention
Sore Mouth (Orf, Contagious Ecthyma)	<ul style="list-style-type: none"> •8-10 days after exposure, small red spots appear which become small blisters •blisters break and form scabs after 3-4 days •common areas of infection are nose, eyelids, feet, and udder •young lambs have difficulty sucking and ewe may resist nursing if udder is sore •weaned lambs and adults may have difficulty eating and show lameness depending on affected areas 	<ul style="list-style-type: none"> •virus, spread by direct contact between sheep via equipment •more susceptible if there are small cuts on the lips or gums present •cross contamination between ewe's udder and lamb's mouth is common 	<ul style="list-style-type: none"> •self curing for weaned lambs and adults •nursing lambs should be monitored to ensure they are not becoming dehydrated (depressed, hollow-sided) •antibiotic creams have little affect since the causative agent is a virus <p>Sore mouth is contagious to humans – wear gloves when handling infected animals</p>	<ul style="list-style-type: none"> •a vaccine is available for flocks that have a serious problem with sore mouth (See vaccines page 135) •wear gloves when vaccinating
Navel Infection	<ul style="list-style-type: none"> •may have few initial signs •if severe, depression, high fever, weakness, lack of appetite, and death can occur quickly, if not treated promptly. •commonly gives rise to joint ill 	<ul style="list-style-type: none"> •infection of the navel cord at birth and extension into belly. 	<ul style="list-style-type: none"> •antibiotics given daily for several days 	<ul style="list-style-type: none"> •maintain sanitary lambing facilities •treat all navels with iodine or other disinfectant.
Joint Ill	<ul style="list-style-type: none"> •infection of one or more joints of the legs of lambs. •stiffness, pain when getting up or walking •there may or may not be enlargement of joints depending on the type of causative organism •affected lambs become rough, gaunt, unthrifty and develop into runts •joints may 'fuse' preventing lamb from standing 	<ul style="list-style-type: none"> •bacteria may enter the body of the newborn lamb through the navel cord and localize in the joints •tail docking or castration wounds may also be bacteria entry sites 	<ul style="list-style-type: none"> •acute cases can be treated with antibiotics •damage to joints will be permanent if treatment occurs too late 	<ul style="list-style-type: none"> •as above •put lambs in clean grass pasture after docking or castration •sanitary lambing facilities and clean surgery important.
Entropion	<ul style="list-style-type: none"> •inward turning of eye lid •excessive tearing and matting of wool on face •cloudy or ulcerated eye •eyes remain close and seem painfully •blindness can result if not corrected 	<ul style="list-style-type: none"> •severe cases are likely genetic •sometimes merely due to dried up birth fluids in wool, causing eyelid to invert •eyelashes rub against eyeball causing whitish discoloration •ulcerations of eye and blindness can occur if uncorrected. 	<ul style="list-style-type: none"> •clear dried birth fluids from area surrounding eye •if it is a hereditary defect, fold out lower eyelid and apply wound clip, stitch to keep eyelid rolled out •eye ointment or pinkeye powder will help clear irritation once the underlying cause has been corrected 	<ul style="list-style-type: none"> •breeding records may implicate a ram or ewe as being the genetic carrier

Administration of medication to sheep

Tips For Using Antibiotics

Antibiotics are, of course, only one type of the medications that you may use to treat sheep. However, with recent concerns regarding the use of antibiotics for livestock production, it is important keep in mind how and when to use this type of medication. Using antibiotics responsibly helps maintain the effectiveness of these important drugs and helps producers save on medication costs. Further information on using antibiotics can be obtained through the Canadian Sheep Federation's Food Safe Farm Practices program. Visit www.cansheep.ca. Some basic rules when using antibiotics are listed below:

1. As a producer, know what diseases are prevalent at particular production stages or seasons. Consult your veterinarian if you are uncertain about the diagnosis.
2. Recognize the limitations of antibiotics. Remember that some bacteria are only sensitive to certain antibiotics, and that antibiotics are not effective against diseases caused by viruses. An antibiotic will not remove scar tissue from lungs, and there is no advantage in treating some animals with persistent respiratory problems.
3. Take the sheep's temperature. If the temperature is normal (101-103°F), the cause of the disorder is not likely to be due to an infection and antibiotics will generally not be effective.
4. Monitor animals regularly and treat early. Infections are more difficult to treat once they are well established.
5. Follow label or veterinarian instructions regarding dosage and length of treatment. Do not cut the treatment time short even if the animal appears to have recovered. Although it may seem that you will save a dose or two of antibiotic by decreasing the treatment time, in the long run you could be creating even larger problems. The antibiotics may have only had time to curb the bacteria growth, but not completely eliminate the population. The remaining bacteria have a good chance of surviving and becoming resistant to the antibiotic.
6. Identify animals that have been treated. Ensure that everyone that works on the farm understands the identification system and is recording each time medication is administered. Dosage and withdrawal dates must also be recorded.
7. Vary antibiotics if the one you are using is not effective after the first round of treatment. Maintain records regarding which medication has been effective in the past.
8. Take care of drugs and store according to label recommendations (e.g. refrigerate, store out of direct light etc.). Watch expiry dates and do not use outdated drugs. Medications that are old or not stored correctly may be less effective at eliminating all of the bacteria (possibly leading to resistance), and in some cases may become toxic to the animal you are treating.
9. Antibiotic residue in meat and milk is a major food safety concern. Maintain records regarding the withdrawal dates of all medications administered to animals. Double-check your records before shipping animals for slaughter. If you accidentally ship animals that have not met the withdrawal dates, notify the buyer as soon as possible.
- 10. Prevent problems. Do not rely on antibiotics to replace good management. Provide sheep with a dry, clean environment, ample feed and have a biosecurity plan in place.**

Injection Methods

Prepared by veterinarians in the Veterinary Science Group, OMAF

Do more good than harm.

Injection is the only method of administration for many medicines and vaccines. Although the purpose of an injection is to benefit your animal, each injection has the potential to do harm, besides pain or suffering. The injection could also create residues, scar tissue, or abscesses. Here are methods of giving vaccines and injectable treatments to avoid problems at injection sites and to maximize the benefits of your treatments.

Read the Label

Manufacturers guarantee their products for safety and efficacy when used according to label directions. Extensive research revealed the best site, route, and dosage for the product. The most common injectable routes are subcutaneous (SQ), intramuscular (IM), and intravenous (IV). Read the label, look for the following information, and follow the directions.

1. The **product name**, the **active ingredient** and the concentration appear on the label.
2. The **description** of its use describes a product and its purpose.
3. The **instructions for preparation** describe how to prepare a product for injection.
4. The **formulation** describes the contents of the package and tells you if the product is suitable for injection.
5. **Warning** statements show hazards to human health from handling the product, the withdrawal time, and restrictions on use.
6. The **withdrawal time** is the minimum time between the last treatment and the slaughter of the animal for food (or sale of the milk). This is the time needed to allow for residues to deplete to safe levels.
7. **Product usage** information appears on the side panels of a label.
8. The **precautions** statements alert you to **storage** and **safe handling** practices to maintain stability and potency.
9. The **indications** statements show the species, class of livestock, and the disease conditions for the product.
10. **Dosage and administration** statements show the directions for use (e.g. how much, how often, how long), and the route of administration (e.g. IM, SQ, IV), and the timing of treatment.
11. **Cautions and contraindications** statements warn about hazards to animal health and safety (e.g. known adverse reactions).
12. **Restricted uses** will appear on the labels of some products. (e.g. do not use in sheep).
13. **Read package insert for complete directions**, additional precautions or more complete instructions.
14. The **expiry date** is the date past which the product should not be used. It is valid only if the product has been properly stored.
15. The **lot number** describes the manufacturer's batch during production. It is used to trace the drug if necessary.

Keep your glasses handy for reading labels. The print is often small.

Bottles and Bottle Tops

1. Clean bottle tops with alcohol and cotton.
2. Place one sterile needle in the bottle top to fill the syringe and use a separate needle for injection.
3. Remove needles from all bottles prior to storage.
4. Write the date the bottle was opened on the label.

The Injection Site

1. Choose SQ when given a choice of IM or SQ on the product label.
2. Choose muscle tissue of lesser value to consumers (e.g. neck) for IM injections.
3. Give SQ injections in the neck in front of the shoulder or over the ribs behind the shoulder.
4. Inject through an area of clean dry skin.

Clean Equipment

1. Wash your hands before and after handling products.
2. Use sterile disposable needles and syringes.
3. If not using disposable equipment, clean and sterilize all equipment before and after use.
4. Use only hot water to rinse syringes before using modified live virus vaccines. Chemicals may destroy the live virus.
5. Use hot water and mild disinfectants to clean syringes for other injectable products.

Needles

1. Use a new, sterile, disposable needle for each animal.
2. If using the same needle for multiple injections, change the needle frequently (e.g. 10 animals) to ensure it is not bent or burred (slight bent at the point).
3. Choose the smallest needle size for the product to minimize tissue damage and reduce leakage at the injection site. Use 16 or 18 gauge needles for most injectable products (20 for lambs).
4. Choose the correct length needle, 1 inch for IM and 0.5 inch or less for SQ sheep.

Restraint

Ensure the animal is properly restrained the animal to prevent injury to yourself or the animal, and to prevent needles from breaking off in tissue.

Volume of Injectable Product

1. Inject quantities no greater than recommended on the label (for one dose).
2. Split large volumes into smaller amounts and inject in different locations (e.g. opposite side of the neck). For IM injections, inject no more than 10 ml per site. For SQ injections, inject only 20 ml per site.

Multiple Injections

1. Choose different body locations (e.g. opposite sides of the neck) when repeating injections over a number of days.
2. Place repeat injections about 4 inches from a previous injection site.

Needle and Syringe Techniques

1. Eject air from the syringe before injecting the product.
2. After inserting the needle, check that it is not in a blood vessel when injecting IM or SQ. Pull back on the plunger and observe for blood. If blood appears, remove the needle and put it in a slightly different location.
3. Give SQ injections into a tent of skin. Lift a fold of skin and insert the needle through the skin into the tented space. The needle enters the skin at an angle of 30 to 45 degrees to the body. Use a 0.5 to 1 inch long needle.
4. Give IM injections deep into a muscle. Your needle must be long enough to penetrate skin, subcutaneous tissue and fat to reach the muscle. The needle enters at a 90 degree angle to the body. A 1 inch needle will suffice.
5. For IV injections, get advice and training from your veterinarian. Consider enrolling in a Livestock Medicine course (see pamphlet in this chapter)

Mixing Products

1. Do not combine vaccines or products unless the label clearly states to do so. Mixing inactivates products through changes in pH, alterations to chemical composition, or precipitation out of solution.
2. Do gently shake or agitate products to ensure that they stay in proper suspension in the bottle. Some products settle out and you need to invert and gently shake the bottles before and during use.

Adverse Reactions

Injecting medicines into sites other than the one recommended on the product label can lead to adverse reactions.

Examples include:

1. delayed absorption of the drug, achieving lower than therapeutic levels, and less-effective treatment
2. delayed absorption of the drug and extended withdrawal times due to residues from pooling of the product in tissue;
3. moderate to severe tissue reaction with pain, swelling, interruption of blood supply and delayed absorption of the product, or formation of scar tissue and excessive trim at slaughter; or
4. allergic reactions, shock, or death.

Records

1. Keep records of injections given to your herd or to individuals. (See Chapter 4 for a sample record)
2. Record the animal identification, date, product name, dosage given, the route, the site, and the withdrawal time.
3. Ask your veterinarian for written instructions when medications are being dispensed.
4. Save the box tops or labels with product names, lot numbers and expiry dates.
5. Keep a package insert for reference.

For further information, please contact your local veterinarian.

Chapter 8: Flock Health - Administration of Medication

Injecting Medication:

The follow table is intended to give a brief overview of different injections methods. If you are uncertain how to proceed, contact your veterinarian.

Route	How to administer	When to use	Tips and precautions
Subcutaneous Injections (SC) (under the skin)	<ul style="list-style-type: none"> •follow instructions above for preparing the dose •SC injections are given by lifting up (tenting) the skin under front legs or on the neck and insert needle underneath the skin (into the ‘tent’) •insert the needle at an angle, rather than straight across (may go through the other side of the skin fold) or straight down (may hit the muscle) 	<ul style="list-style-type: none"> •if both IM and SC are listed on the label, always use SC •many vaccines can be given this way 	<ul style="list-style-type: none"> •using a large gauge needle will prevent loss of medication after injection (hole is smaller) •particularly with large doses there may be a lump at injection site, this not a generally problem and will disperse. •on occasion, an abscess may form at site
Intramuscular Injections (IM) (into the muscle)	<ul style="list-style-type: none"> •when giving IM injections always inject into the neck muscles (avoid neck bones and shoulder blades). Do not inject into the hindquarters as this may result in having high priced cuts of meat condemned due to injection scars or abscesses •pull plunger of syringe back after inserting needle to make sure that the needle did not penetrate a blood vessel. Injecting many medications directly into the blood stream, can cause sudden death 	<ul style="list-style-type: none"> •only use this method if no alternative is listed on the label 	<ul style="list-style-type: none"> •avoid drugs that are extremely irritating to muscles
Intravenous Injections (IV) (into a vein)	<ul style="list-style-type: none"> •before attempting this method have someone familiar with the technique show you what to do •most often given in the jugular vein in the neck (in the groove of neck) •if you are right handed, use your left hand to ‘bridge’ vein (place light pressure across the vein to cause a slowing of the blood flow) •vein should bulge above your hand (direction of the animal’s head) •with a finger of your right hand, feel for the exact location of the vein (feels spongy and springy) •once you’ve located the vein, insert the needle (no syringe) at a shallow angle (see tips and precautions) •the needle should go in with little resistance and blood should flow readily from the open end of the needle •carefully attach the syringe and give the dose slowly to avoid shock 	<ul style="list-style-type: none"> •used in emergency situations (pregnancy toxemia, polio, etc.) when medication administered by other methods will not be absorbed quickly enough to save the animal 	<ul style="list-style-type: none"> •IV delivers medication to the animal’s system very quickly; this is good as it can save animals, but the results of incorrect dosing are also more immediate – be sure you have the correct dose and medication •it is suggested to attach the syringe after the needle is in the vein to help prevent accidentally inserting the dose into a major artery near the jugular. As arterial blood flows to the cells (including the brain), medication in the artery will generally kill an animal. By injecting the needle without the syringe attached you can assess the blood flow (arterial blood is bright red and will pulse strongly out of the needle; venous blood is darker in colour and tends to flow out of the needle at a steady rate).- If in doubt, do not give the dose.
Udder Infusion	<ul style="list-style-type: none"> •read label instructions •wash udder and teat and disinfect end of teat with alcohol •insert tip of tube or syringe into teat opening and deliver dose •massage udder after injection 	<ul style="list-style-type: none"> •localized treatment of mastitis 	<ul style="list-style-type: none"> •if you are using cattle preparations, be sure you use a small size needle to avoid injuring the ewe’s teat
Intraperitoneally (IP)		<ul style="list-style-type: none"> •administration of glucose to lambs 	<ul style="list-style-type: none"> •do not attempt this method unless you have received instruction; adhesions, infections,

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(Abdominal)		and intestinal obstructions can occur
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Oral Administration

Route	How to administer	When to use	Tips and precautions
Drench	<ul style="list-style-type: none"> •always use a proper drenching ‘gun’ •sheep should be standing •stand behind the sheep (if you do not have a chute or an assistant to hold the sheep, you may wish to back the sheep into a corner to prevent it from backing up as the dose is given) •place your free hand under the jaw and hold the head in a natural position, avoid pulling the head too far back or to the side. •inserted the nozzle of the gun into the side of the mouth over the tongue towards the throat; give the dose gently. 	Used to administer individual doses of liquid medication (i.e. liquid dewormers)	<ul style="list-style-type: none"> •check nozzles for rough edges that may cause damage to the back of the throat. •do not insert the nozzle to far into the throat. The trachea (windpipe) lays directly beneath the esophagus (leading to the digestive system). If the liquid is forced into the trachea, the sheep will inhale the drench.
Bolus	<ul style="list-style-type: none"> •insert the bolus gun (or balling gun) as given under “drenching” •ensure that the gun is far enough in the throat, and depress the handle of the gun 	Used to administer individual doses of medication in pill form	<ul style="list-style-type: none"> •be sure proper size boluses are used in sheep (big cattle pills could become stuck halfway down and cause choking and bloat).
Stomach Tubing (lambs)	<ul style="list-style-type: none"> •specially designed tubes are commercially available or any new, flexible (3/8 " diameter) tubing can be used with a 60 cc plastic syringe to deliver the milk. • lay the tube alongside the lamb and measure from the last rib to the mouth. Make a mark on the tube at this point with a piece of tape or a marker pen, and allow an extra foot of tubing past this point • hold the lamb on your lap and ensure that the lamb’s head is upright (don’t tube while the lamb is laying flat on it’s side). • put your thumb in the mouth, between the teeth, and gently pry the mouth open. • insert the tube through the side of the mouth and feed it slowly into the mouth as the lamb swallows. Keep a finger in the mouth while the tube goes down to prevent the lamb from chewing it. Keep passing the tube until the mark on the tube is level with the mouth. • there may be a small amount of resistance as the tube passes into the throat, however, if the lamb struggles violently or if you can only pass the tube half way to your mark, the tube may have accidentally entered the trachea (windpipe). Pull the tube out and try again. • attach a syringe full of milk to the tube and slowly inject it (10-15 seconds). 	Giving colostrum or electrolyte fluids to young lambs to weak to suckle	<ul style="list-style-type: none"> • depending on the amount inhaled, the sheep may develop pneumonia or suffocate. • unless it is absolutely necessary, avoid stomach tubing lambs. When lambs suckle they activate a reflex that by-pass the rumen and leads the milk into the abomasum. Without this reflex the milk will end up in the rumen possibly cause digestive upset and preventing the antibodies in the colostrum from being properly absorbed.
Feed and water	<ul style="list-style-type: none"> •medicated feed can be purchased premixed from the feed mill. Feed at the recommended level •if mixing medication in feed or water on farm, always follow label instructions exactly •check mixing and feed/water distribution •if mixing or administration errors are made, contact your veterinarian 	Mostly used as prophylactic (preventative) treatment of certain diseases (e.g. coccidiosis or shipping fever)	<ul style="list-style-type: none"> •do not rely on this method if animals are off-feed •label bins with medicated feed to prevent mistakes in feeding • ensure there is adequate feeder space for all animals in the pen

Chapter 8: Flock Health - Administration of Medication

Oral Administration - con't

Route	How to administer	When to use	Tips and precautions
Stomach tubing (adults)	<ul style="list-style-type: none">•hold sheep as with drenching•insert a speculum (stiff metal tube) into the throat (don't force it too far); speculum prevents the sheep from chewing on the hose•pass a pliable rubber hose (3/4" in diameter and 3 to 5 feet long) through the speculum into the rumen (as with tubing lambs, mark the approximate distance on the hose)•administer medication directly into the rumen	<ul style="list-style-type: none">•treating for bloat or other digestive upsets	<ul style="list-style-type: none">•as when stomach tubing lambs, do not force tube if there is undue resistance

Topical Medications

This type of medication can be placed directly on the skin for absorption into the system (i.e. deworming medications) or to treat localized infections (eye ointment, antibiotic creams etc.). If you use topical medications, particularly dewormers, ensure that the recommended withdrawal time have been met before allowing the animals to be shorn.

Figure 1: Lamb receiving IM injection.





MINISTRY OF AGRICULTURE
FOOD & RURAL AFFAIRS

The New Framework Regulating Deadstock

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 - Nutrient Management Act, 2002 (NMA)
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Background

When the Dead Animal Disposal Act (DADA) was enacted in 1968, the deadstock disposal industry was dependent on the salvage and rendering of deadstock into secondary materials. Following the DADA, Regulation 263 came into effect and set out the requirements for the industry. Deadstock and meat plant materials were transformed at rendering plants into fats and protein, both of which were traditionally used in animal feeds and other industrial by-products. Deadstock collectors and renderers marketed these materials in Canada and abroad. The discovery of Bovine Spongiform Encephalopathy (BSE or Mad Cow Disease) has had a drastic impact on cattle farmers, deadstock collectors and renderers as the traditional markets for cattle by-products have been lost. As such, meat/bone meal has become a waste management issue for the industry leading to additional costs of doing business in the livestock sector.

Introduction

The Ministry of Agriculture, Food and Rural Affairs (OMAFRA) and the Ministry of the Environment (MOE) proposed changes to DADA, and the government has now replaced the DADA, which formerly regulated the disposal of deadstock, with two new regulations.

The new framework builds on the requirements in the DADA and continues to focus on minimizing potential food safety and animal health risks while also minimizing environmental impacts and disease threats. The regulation under the Nutrient Management Act, 2002 (NMA) addresses on-farm disposal. The regulation under the Food Safety and Quality Act, 2001 (FSQA) addresses disposal when the animal dies at places other than the farm. Both regulations provide greater flexibility for industry in the disposal of deadstock. The DADA and regulation have been repealed.

Regulation 347 under the Environmental Protection Act (EPA) was also amended to clarify the definition of agricultural waste, and to clarify which activities managed under the new NMA and FSQA regulations are exempt from waste disposal requirements under Part V of the Act and Regulation 347. The new amendments include an update to existing terminology associated with the definitions of "agricultural waste" and "farm operation" and exemptions from Part V of the Act and this Regulation.

New Regulations

1. Nutrient Management Act, 2002 (NMA)

The regulation under the NMA sets out requirements for the disposal of dead farm animals on the farm. This regulation applies to all farm operations, regardless of the requirement to have a nutrient management strategy or plan under O. Regulation 267/03. The purpose of introducing standards for on-farm disposal of deadstock is to protect the environment and provide some separation between deadstock and live animals.

This regulation sets out requirements for the disposal of not only cattle, goats, sheep, horses and swine as per the DADA, but also deer, elk, alpacas, llamas, bison, yaks, donkeys, ponies, rabbits, poultry and fowl, ratites, and fur bearing animals.

The operator of the farm is responsible for disposing of the animal within 48 hours of its death, which was the requirement of the DADA. The two exceptions to this rule are:

- ✧ If a delay occurs in order to perform a post mortem on the animal, or
- ✧ If the animal is put into temporary storage conditions as specified in the regulation.

Additional disposal options for greater flexibility to manage deadstock include:

- ✧ Burial
- ✧ Incineration
- ✧ Composting
- ✧ Disposal vessels
- ✧ Collection by a licensed collector
- ✧ Anaerobic digestion
- ✧ Delivery to a waste disposal site approved under the EPA
- ✧ Delivery to a disposal facility as defined under the FSQA
- ✧ Delivery to a licensed veterinarian for post mortem and disposal.

If an operator chooses to bury, incinerate, or compost deadstock, the regulation establishes requirements to minimize impacts on the environment. Minimum separation distances have been established from:

- ✧ Livestock housing facilities
- ✧ Field drainage tiles
- ✧ Residential and commercial lands
- ✧ Surface water
- ✧ Bedrock and aquifers
- ✧ Wells including municipal wells and floodplains.

For each disposal option there are specific operating requirements that will have to be met in order to safely dispose of the dead farm animal. In some cases, there are limitations on the volume of deadstock being disposed.

Transportation

The transportation requirements under the regulation state that a farm operator may transport only his/her own deadstock:

- ✧ To a common bin or collection point for collection by a licensed deadstock collector
- ✧ To a veterinarian for the purposes of a post mortem
- ✧ From one farm to another for disposal if he/she owns the property where the disposal will take place
- ✧ To a site approved under the EPA or licensed under the FSQA that is not a provincially licensed meat plant.

During transport, the deadstock must be kept out of public view, and in a container

designed or equipped to prevent leakage. Each surface that comes into contact with the deadstock must be impervious and capable of being cleaned and sanitized. Transportation under these circumstances does not require approval under the FSQA.

Record Keeping

The operator will be required to maintain records for two years for all methods of disposal. The records must include documentation that demonstrates compliance with the regulation.

Emergency Conditions

Provisions for emergency conditions exist where an operator cannot, under circumstances such as a barn fire, comply with the NMA requirements with respect to storage, disposal or transportation of the dead farm animals. The regulation allows the operator to apply for approval to arrange for storage, disposal, or transportation that would not otherwise meet the requirements of the regulation. In this situation, each case would be decided individually. The circumstances would be weighed against the potential threat to the environment if an alternate method of disposal were used.

2. Food Safety and Quality Act, 2001 (FSQA)

The regulation under the FSQA provides for the management and disposal of deadstock off-farm. It is designed to protect public health by preventing meat from deadstock from entering the human food chain. The regulation establishes the following to minimize the impacts on animal health and the environment:

- ✧ Transportation
- ✧ Processing
- ✧ Storage, and
- ✧ Disposal standards and requirements.

The risk of the spread of animal diseases is also reduced by the measures established by the regulation. The measures provide greater flexibility with additional disposal options to effectively manage the processing and disposal of deadstock.

The FSQA regulation applies to the management of the mortalities of the following farmed animals that could enter the human food chain:

- ✧ Cattle
- ✧ Goats
- ✧ Sheep
- ✧ Horses
- ✧ Swine
- ✧ Deer
- ✧ Elk
- ✧ Alpacas
- ✧ Llamas
- ✧ Donkeys
- ✧ Ponies
- ✧ Rabbits
- ✧ Poultry
- ✧ Fowl
- ✧ Ratites.

The regulation does not apply to furbearing animals, other than rabbits, as the interest is only with animals that could potentially be served as food.

Permitted methods of disposal are set out for deadstock that is disposed of beyond the farm premises and deadstock disposed of by custodians of the animals at their time of death. Custodians include owners or operators of:

- ✧ Fairs and exhibitions
- ✧ Sales barns
- ✧ Assembly yards
- ✧ Race tracks
- ✧ Transporters of live animals
- ✧ Vet clinics.

Veterinarians that receive deadstock for post mortems are deemed to be custodians and must dispose of the carcasses in accordance with the regulation.

Operators of sales barns, assembly yards and feeding stations that choose to accept (from livestock transporters) the carcasses of animals specified as deadstock that die in transit are deemed to be custodians and must dispose of the carcasses in accordance with the regulation.

A custodian disposing of deadstock must dispose of it by:

- ✧ Having the animal collected by a licensed deadstock collector
- ✧ Transporting the deadstock to licensed operators of:
 - ✧ Transfer stations
 - ✧ Composting facilities
 - ✧ Salvaging facilities
 - ✧ Rendering facilities
- ✧ Transporting the deadstock to an approved waste disposal site, or
- ✧ Transporting the deadstock to equivalent facilities outside of Ontario that can legally accept deadstock.

Deadstock can only be transported in vehicles, trailers or containers designed and equipped to:

- ✧ Prevent leakage or escape of the deadstock material
- ✧ Keep the carcasses from public view and
- ✧ Withstand repeated cleaning and sanitizing.

Any vehicle used to transport deadstock must meet these requirements. Any person transporting deadstock must hide the carcasses from public view.

Collectors

Any person in the business of transporting and collecting deadstock must be licensed as a collector and meet the requirements for vehicles and proper transport (see previous section).

Collectors must display proof of their licence in the windshield of their vehicle.

Collectors are required to dispose of deadstock by:

- ✧ Transporting the deadstock to licensed operators of:
 - ✧ Transfer stations
 - ✧ Composting facilities
 - ✧ Salvaging facilities
 - ✧ Rendering facilities, or
 - ✧ Transporting the deadstock to an approved waste disposal site, or

- ✧ Transporting the deadstock to equivalent facilities outside of Ontario that can legally accept deadstock.

Transfer Stations

The FSQA regulation sets out licensing, facility, and operating requirements for transfer stations, which are sites that receive and consolidate deliveries of deadstock for shipment to:

- ✧ Licensed operators of deadstock
- ✧ Salvaging facilities
- ✧ Composting facilities
- ✧ Rendering facilities and
- ✧ An approved waste disposal site, or
- ✧ Equivalent facilities outside of Ontario.

All shipments from a transfer station must be transported by a licensed collector.

Salvaging Facilities

Licensees that operated receiving plants under DADA immediately before the FSQA regulation came into effect are now licensed as operators of salvaging facilities. The regulation continues to require meat from deadstock that is distributed to be cut into prescribed portion sizes, denatured, packaged and labelled. Meat fed to the salvagers own animals or used for baiting may be cut into larger portions and that meat is provided some specific exemptions to the denaturing, packaging, and labelling rules.

Any person that accepts deadstock carcasses for feeding to captive wildlife is required to:

- ✧ Be licensed as a salvager, and
- ✧ Ensure the carcasses are handled and fed in a manner that prevents the scavengers or pests from removing the carcass or any part of it from the area where the feeding occurs.

Any dead animal that the operator does not use or process must be transported from the facility by a collector.

Broker

A broker must be licenced to purchase and sell meat from deadstock in a raw form. The regulation sets out the requirements for denaturing, packaging, and labelling when a broker alters the meat.

Composting

The FSQA regulation provides for centralized composting of deadstock. It sets out the application, siting, facility and operational standards and requirements for those centralized deadstock composting facilities. The facility and operational requirements provide for various composting and curing methods as well as for composting pads made of different materials. The regulation establishes turning, temperature and substrate standards. Compost that is derived from deadstock and that has been composted in accordance with the regulation may only be sold if it meets all of the prescribed standards for finished compost. Material that fails to meet the requirements may be re-composted or disposed of at an approved waste disposal site depending on the regulatory defect(s). The regulation specifies who may transport material, other than finished compost, from a composting facility.

Any dead animal that the operator does not use or process must be transported from the

facility by a collector.

Rendering

The regulation sets out license application requirements for rendering facilities.

Any dead animal that the operator does not use or process must be transported from the facility by a collector.

Record Keeping

Collectors and operators of disposal facilities are required to keep a record of every animal received and of its disposal. Brokers are required to keep records of the meat the broker receives and of its disposition. Records are required to be retained for three years.

Operators of composting facilities are required to keep additional records and retain them for the periods as specified in the Regulation.

Emergency Conditions

Under both regulations, in circumstances where the director believes an emergency exists and compliance is impractical, alternative methods of storage, disposal, or transportation of the dead animals may be authorized with specified conditions attached.

Licence Fees

There is no fee for licences.

3. Environmental Protection Act (EPA)

In order to harmonize the new deadstock regulations, amendments to Reg. 347 General – Waste regulation under the EPA were also required. The amendments exempt the following from Part V of the Act and the Regulation unless the material is transferred to a waste disposal site that is operated under a Certificate of Approval or Provisional Certificate of Approval:

- ✦ Disposal of dead animals under the FSQA and the NMA, inedible material within the meaning of O. Reg. 31/05 (meat) under the FSQA, or material that has been condemned or derived from a carcass at a registered establishment under the Meat Inspection Act (Canada); and
- ✦ Composting material and cured compost from a dead animal composting facility that is operated under a license issued under the FSQA.

Exemptions to Part V of the EPA and regulation (waste management) will apply to manure from any location and certain solid waste plant material not chemically treated as long as it is transferred directly from the generator to a farm operation to improve the growing of crops.

The amendments to Reg. 347 under the EPA include an updated definition of agricultural waste by defining a farm operation as:

- ✦ An agricultural, aquacultural, or horticultural operation that grows, produces or raises farm animals, or produces agricultural crops and the processing and transportation in relation to products produced.

In addition, the amendments clarify that Section 29 of the Act applies to these wastes for which the Minister of the Environment has the power to require a municipality to accept

at its disposal site if it is in the public interest.

Larger industrial companies which process agricultural products are required to manage their wastes according to current waste management legislation consistent with other Ontario industries.

To review the actual regulations go to: <http://www.e-laws.gov.on.ca>.

For more information:
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Nutrient Management Act, 2002
Burial of On-Farm Deadstock

H. Fraser, P.Eng.

Factsheet

ORDER NO. 09-029 AGDEX 729/400 JUNE 2009

(replaces OMAFRA Factsheet *Proper Burial Techniques for Small Farm Animals and Poultry Mortalities Under 25 kg*, Order No. 03-049)

This Factsheet describes some of the requirements for on-farm burial of deadstock as specified in Ontario Regulation 106/09 under the *Nutrient Management Act, 2002* (NMA). The Factsheet does not cover all burial requirements contained in the regulation nor deadstock burial under emergency situations such as after a fire or other catastrophe. For this information, refer to the regulation.

HOW AND WHY BURIAL WORKS

For generations, farmers have buried deadstock by digging a pit or trench, placing carcasses in it and covering them with excavated soil material (Figure 1). Burying deadstock must be done properly to:

- prevent a nuisance to neighbours
- protect against digging by scavengers
- maintain biosecurity for adjacent livestock operations
- protect local ground- and surface water

Decomposition of buried deadstock is like a slow, composting process. Composting deadstock works best if they are mixed well with a good carbon substrate, such as sawdust, under favourable moist, warm, aerobic conditions. Similarly, burying deadstock works best if they are:

- mixed with soil (or have as much soil to deadstock contact as possible)
- buried in well-drained, warm soils, with more aerobic (oxygenated) conditions.

Under favourable conditions, decomposition can occur in a few months, especially in the biologically active upper layers of the soil. However, under poorer conditions, decomposition can take years, especially if deadstock are packed together in wet soil, and buried deep, where soil temperatures are cool.



Figure 1. Burial is a traditional deadstock disposal method, but it must be done properly.

ADVANTAGES OF BURIAL

- simple, requiring little training
- uses readily available equipment
- relatively inexpensive
- suitable to many locations
- biosecure, since deadstock remain on the farm

The regulation permits farmers to keep deadstock in cold storage for up to 14 days following death, or in frozen storage for up to 240 days. Freezers can work well in conjunction with burial for smaller deadstock, since a freezer can be filled over time, then emptied in a burial pit when digging conditions are suitable. Because freezers have fixed volumes, it is easy to match their frozen contents to a predetermined burial pit size.

Ministry of Agriculture,
Food and Rural Affairs



Table 1. Minimum setbacks required under O. Reg. 106/09.

Feature	Setback
Highway	30 m
Lot line of land on which burial pit is located	15 m
Flow path to top of bank of the nearest surface water or tile inlet	100 m
Field drainage tile	6 m
Lot line of land that has an industrial or parkland use	100 m
Lot line of land in a residential area, and from land that has a commercial, community or institutional use	200 m
Municipal well	250 m
Drilled well with depth at least 15 m and watertight casing to depth at least 6 m	50 m
Any other well (such as a gas well)	100 m
Livestock housing facility, outdoor confinement area, and residential structure (neighbour's house) located on land not part of the land on which the burial pit is located	100 m
Another burial pit on the same parcel of land, if it is open (still in use and not closed) or has been closed for less than 10 yr	60 m
Areas subject to flooding once or more every 100 yr	Not allowed
Organic soil, or soil that is hydrologic soil group AA	Not allowed

SELECTING THE RIGHT SITES FOR BURYING

Locating the burial site in the right place is critical for good carcass decomposition and protection of the environment. Generally, soil materials ranging from sandy loams to clays that are well-drained to imperfectly drained are suitable for burial. However, the regulation does not permit burial of deadstock in soils where there is a higher risk of polluting groundwater. These soils include:

- organic soils (more commonly known as peat, muck, bog or fen soil)
- soils considered hydrologic soil group AA, which have a combination of rapid infiltration rates (e.g., gravel) as well as a depth to the uppermost identified bedrock layer of less than 0.9 m. These conditions are not common in Ontario.

The regulation does not permit the burial of deadstock in areas subject to flooding once or more every 100 yr. To find out if you are in such an area, contact your local conservation authority or municipality. The regulation requires the lowest point of a burial pit to be at least 0.9 m (3 ft) above the top of the uppermost identified bedrock layer or aquifer. Table 1, above, shows several setbacks for burial pits. For more specific information, see the regulation itself.

Table 2. Number of deadstock per burial pit.

Average weight per deadstock (kg)	Number to fill a burial pit ¹
2.5 kg (small deadstock: poultry, mink)	1,000
50 kg (mid-size: sheep, veal, goats, swine)	50
500 kg (large: cattle, horses)	5

¹ Maximum allowable total: 2,500 kg

DIGGING SAFELY

The regulation specifies a maximum of 2,500 kg total deadstock per burial pit, so the weight of each dead animal determines the number of deadstock per pit (Table 2, above). Due to the 2,500 kg/pit limitation, very large or deep pits are not necessary; generally, digging deeper than about 1.2 m (4 ft) makes little sense. Limiting the depth of burial pits to 1.2 m places deadstock in the biologically active part of the soil, protects groundwater and avoids the dangers of deep trenches.

The Construction Safety Association (CSA) defines trenches (pits) as excavations where the depth exceeds the width of the pit. The CSA cautions anyone digging trenches to be aware of factors such as soil type, moisture content, weather or excessive weight that might cause cave-ins, such as heavy equipment beside a trench.

Never climb into any pit deeper than 1.2 m (4 ft) unless it is properly sloped, shored or protected by a trench box. This is impractical for burying deadstock. Figure 2 shows different pits 1.2 m (4 ft) deep that will hold about 2,500 kg of deadstock. Closing these pits would require a minimum of 0.6 m (2 ft) of soil, to form a mound higher than the level of the ground at the perimeters of the pit.

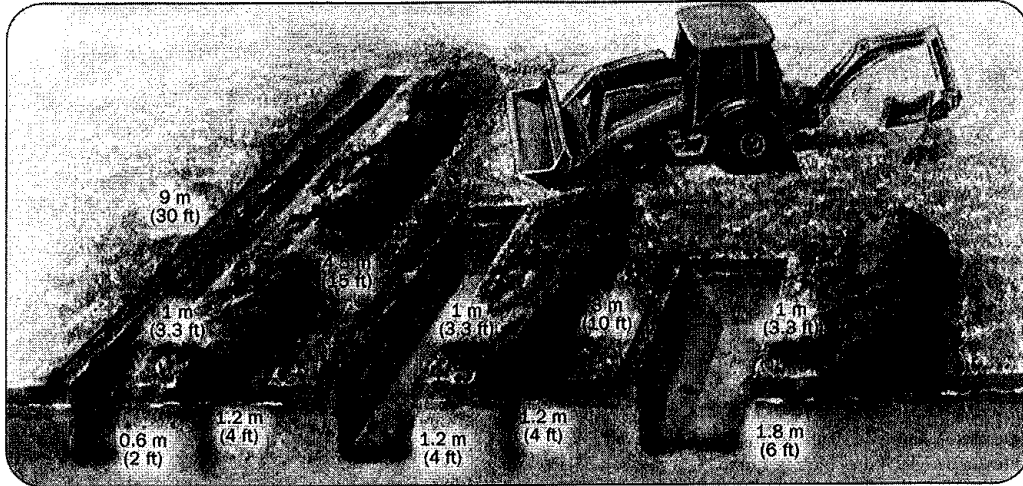


Figure 2. Each of these pits will hold about 2,500 kg of deadstock. Bury smaller deadstock in narrow pits, to maximize soil-to-carcass contact, and larger deadstock in wider pits, to accommodate their awkward body dimensions.

TYPE OF PITS

There are three types of pits (Table 3): single-use, multiple-use or auger pits (Figure 3).

The type of soil determines the strength and stability of pit walls; this is especially important for pits that will remain open for up to 120 days. Suitable soils that will allow pit walls to be stable for an extended period include:

- Type 1 soils (compacted loamy and clayey soils, dense loamy glacial tills)
- Type 2 soils (well-structured loam, clay loam, clay)

Unsuitable soils that might have unstable pit walls over an extended period include:

- Type 3 soils (sand, granular materials, and silty or wet clays)
- Type 4 soils (silty clays with high moisture content)

Table 3. Types of burial pits.

Type	Suitability
Single-use pit	Death of one or more animals at the same time (due to sickness, heat stress) or for deadstock stored over time so burial is done all at once (e.g., a freezer full of dead chicken broilers). Single-use pits are usually open only a few hours.
Multiple-use pit	Operations with daily to weekly deadstock (weaner pigs, poultry). Since all deadstock placed must be covered at all times with 0.6 m (2 ft) of soil, dig these pits oversized, since soil is being constantly added as deadstock are placed, which takes a lot of room. Flag pits as open or fence them off. Frozen soil may make covering a pit difficult in winter.
Auger pit	Smaller deadstock on smaller farms with a few periodic death losses.



Figure 3. Pits can be dug quickly using a tractor auger. Augers over 0.6 m (24 in.) in diameter and augers that dig more than 1.2 m (48 in.) deep are costly and require a lot of tractor power. Auger pits will only hold a few smaller deadstock.

Once a pit is dug, its sides are exposed to drying. The longer the exposure, the greater the risk of a cave-in. Rain, melting snow, thawing earth and surface water all produce changes in soil conditions that can severely affect pit stability. Heavy equipment beside a pit can affect its stability, so stay as far away as possible. Place the soil excavated from the pit at least 1 m (3.3 ft) from the edge of the excavation.

The regulation specifies a burial pit must be immediately closed when 120 days have elapsed since the day the pit was first opened, or when 2,500 kg of deadstock have been buried in the pit, whichever comes first.

HOW BIG SHOULD THE PIT BE?

Deadstock have odd shapes, making them difficult to bury, especially if they have begun to bloat or rigor. The effective burial bulk density (EBBD) of deadstock is the *weight of a deadstock carcass at death, divided by the effective volume it takes up in a burial pit.*

$$EBBD = \frac{\text{weight of deadstock carcass at death}}{\text{effective volume it takes up in burial pit}}$$

The effective volume is difficult to establish, because different animals have different profiles and awkward shapes when buried, and there are unavoidable air pockets. The EBBD of deadstock is estimated in the broad range of 175–1,000 kg/m³ (10.9–62.4 lb/ft³), but for planning, use 400 kg/m³ (25 lb/ft³). When soil is placed on deadstock, it fills some air pockets, and as deadstock decomposes, soil settles into body cavities.

Use Table 4 as a guide for burial pit dimensions dug by backhoe. Modify dimensions as necessary based on the shape of your deadstock. It is **better to over-dig than under-dig**. Once deadstock are in the pit, do not move them again. Because deadstock must be covered with at least 0.6 m (2 ft) of soil, multiple-use pits may have to be longer than shown in Table 4.

The dimensions in Table 4 are based on:

- EBBD: 400 kg/m³ (25 lb/ft³)
- 2,500 kg ÷ 400 kg/m³ = 6.25 m³ (220 ft³)
- Pits are 0.9–1.2 m (3–4 ft) deep
- Pit widths are in multiples of 0.6 m (2 ft), a typical backhoe bucket width.
- The top of deadstock is below original grade level.

Table 4. Approximate dimensions of burial pits based on total weight of deadstock to bury and relative size of animal.

Deadstock Size and Type	Pit Dimension	Total Weight to Bury		
		250 kg	1,000 kg	2,500 kg
Small (poultry, mink)	width	0.6 m	0.6 m	0.6 m
	depth	0.9 m	1.2 m	1.2 m
	length	1.2 m	3.6 m	9.0 m
Mid-Size (sheep, veal, goats, swine)	width	1.2 m	1.2 m	1.2 m
	depth	0.9 m	1.2 m	1.2 m
	length	0.6 m	1.8 m	4.5 m
Large (cattle, horses)	width	NA	1.8 m	1.8 m
	depth		1.2 m	1.2 m
	length		1.2 m	3.0 m

EXAMPLE: 40 dead feeder lambs weighing a total of 1,000 kg require a burial pit at least 1.2 m wide x 1.2 m deep x 1.8 m long (4ft x 4ft x 6ft)

Formula for calculating length of pit in metres:

$$L = \frac{\text{Total kg of carcasses}}{\text{EBBD (kg/m}^3\text{)} \times \text{width of pit (m)} \times \text{depth of pit (m)}}$$

Use Table 5 as a guide for tractor auger burial pit dimensions, knowing the total weight of deadstock to bury and the type of animal. Modify dimensions as necessary, based on the shape of your deadstock. Unless an auger pit has a large diameter and is augered deep, it will not hold many deadstock, but it may be an option for some operators.

Table 5. Approximate dimensions (m) of burial pits based on total weight of deadstock to bury in auger pits and relative size of animal.

Deadstock Size and Type	Depth, Diameter	50 kg	200 kg
		Small (poultry, mink)	depth
	diameter	0.3 m	0.6 m
Mid-size (sheep, veal, goats, swine)	depth	0.9 m	1.2 m
	diameter	0.45 m	0.75 m

EXAMPLE: 8 dead feeder lambs weighing 200 kg in total require an auger burial pit at least 1.2 m deep x 0.75 m diameter (4 ft x 2.5 ft).

DIGGING NEAR FIELD DRAINAGE TILES

Field drainage tiles are prevalent on Ontario farms. To prevent leachate reaching them, avoid burying deadstock near tiles. The regulation specifies that every part of a burial pit must be at least 6 m (20 ft) from a field drainage tile. Further, if any part of the burial pit is less than 15 m (50 ft) from a field drainage tile, deadstock must be placed so that the highest point of the uppermost deadstock is lower than the lowest point of the nearest field drainage tile. This way, any leachate from the burial pit would be below the level of the tile and would not be able to reach it (Figure 4).

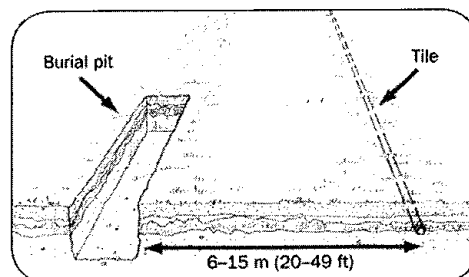


Figure 4. The regulation specifies that deadstock cannot be buried within 6 m (20 ft) of a tile drain. If there is a tile drain within 6–15 m (20–49 ft) of the burial pit, the highest point of the uppermost deadstock must be below the level of the lowest point of the tile drain. If tiles are more than 15 m (49 ft) from the burial pit, no tile-related restrictions apply.

PLACING DEADSTOCK IN BURIAL PITS

Within about 48 hr of death, some carcasses begin to bloat due to retained gases; lancing (puncturing or venting) carcasses larger than 100 kg is sometimes necessary. Use a bale spear to cut a deep stab wound posterior to the ribs to vent the thoracic and abdominal cavities. Lance deadstock just before placing it in the pit. Noxious gases and bodily juices are likely to escape.

Plan carefully how to place carcasses in the pit. Do not drop them in from a tractor front-end loader bucket unless your front wheels are well back from the pit. Push large, heavy carcasses, such as cows, into the pit from the side. Always stay as far away as possible from the pit with the tractor (Figure 5).

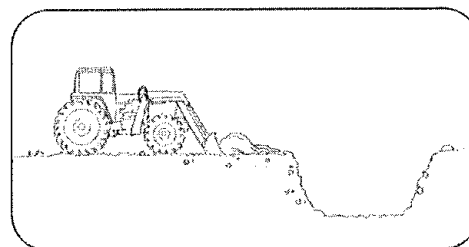


Figure 5. Pushing large deadstock, such as cows, into a burial pit is safer than getting too close to the pit with a tractor and loader and dropping it in.

Adding lime on top of carcasses is not recommended. In the past, lime was added to discourage scavengers, prevent odours and slow decomposition. Correctly buried deadstock will not attract scavengers or produce odours.

COVERING DEADSTOCK WITH SOIL

Place as much soil as possible in the spaces between deadstock to encourage quicker decomposition. Reduce the chance of a cave-in by pushing in soil rather than dumping it in. The regulation specifies a burial pit must be closed by filling it with enough soil that the top of the fill soil forms a mound higher than the level of the ground at the perimeter of the pit by the greater of half the depth of the pit measured with reference to its lowest point or 0.6 m (2 ft).

This ensures enough soil on top of the deadstock to reduce the chance of scavenging, but also allows for settling as the deadstock decomposes and soil falls into the voids between them (Figure 6). The minimum amount of soil required above ground after closing the pit varies depending on pit depth (Table 6).

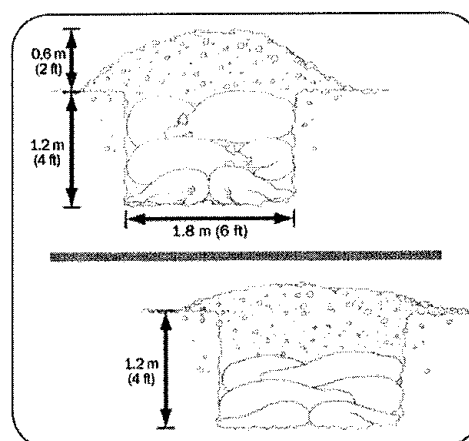


Figure 6. Mounded soil on top of the deadstock reduces the chance of scavenging and allows for settling as the deadstock decomposes and soil falls into the voids.

Table 6. The minimum amount of soil required above ground to close a pit varies depending on original pit depth.

Depth of Pit	Minimum Soil Depth Required Above Ground
1.8 m (6 ft)	0.9 m (3 ft)
1.5 m (5 ft)	0.75 m (2.5 ft)
1.2 m (4 ft)	0.6 m (2 ft)
0.9 m (3 ft)	0.6 m (2 ft)
0.6 m (2 ft)	0.6 m (2 ft)

Lightly compact the soil using a front-end loader or backhoe bucket. Do not drive over the pit. Mark the area with a flag for a period of time so you can find the location again and monitor it for scavenger problems, uneven settling or leaching. See O. Reg. 106/09 for the recordkeeping required for the deadstock, including the location. Include GPS coordinates of the site if possible.

CASE STUDY – COST OF BURIAL

Joe grows 25,000 chicken broilers per crop on a 9-week cycle and produces 6 crops per year. His death loss is 4%, and the average carcass weight is 0.76 kg. Joe wants to use chest freezers holding 0.71 m³ each (25 ft³) to collect and freeze dead birds as they occur. He proposes burying all the birds from the freezers once every 6 months, or about every 180 days, in May and November, when the freezers are full.

- How many freezers does Joe need?
- How big a burial pit should the hired backhoe operator dig each time if the bucket is 0.6 m (2 ft. wide)?
- What is the cost per year per kg of deadstock?

1. 25,000 birds x 6 crops x 4% death loss x 0.76 kg/bird = 4,560 kg/yr (2,280 kg every 6 months)
 - At *EBBD* 400 kg/m³, freezers hold 0.71 m³ x 400 kg/m³ = 284 kg each
 - 2,280 kg ÷ 284 kg/freezer = 8 freezers
2. Extrapolating from Table 4 for small animals and 2,280 kg, the pit must be at least 0.6 m wide x 1.2 m deep x 8.2 m long (2 ft x 4 ft x 27 ft).
3. New freezers of this size cost about \$1,000 each, so 8 freezers, amortized over a 10-yr life, is \$800/yr (8 x \$1,000 per freezer/10 yr). Assuming a hired backhoe and operator costs \$80/hr, and 5 hr travel to and from the farm, dig the pit, push the birds in, then cover and close the pit, this is \$400 twice annually, or \$800/yr.

The burial pit costs per year are:

\$800 for freezers
~~\$800~~ for hired backhoe labour
 \$1,600 total yearly cost

The cost to bury (not including labour to transport and empty freezers of deadstock to the burial pit) is:
 $\$1,600/4,560 \text{ kg} = \$0.35/\text{kg} (\$0.16/\text{lb})$

This Factsheet was written by Hugh Fraser, P. Eng., Agricultural Engineer, OMAFRA, Vineland, and reviewed by Dan Ward, P.Eng., Agricultural Engineer, OMAFRA, Stratford.

**Do you know about Ontario's new Deadstock Regulations
under the *Nutrient Management Act, 2002 (NMA)*?**

This Factsheet is for informational purposes only and is not, and should not be, construed as legal advice. In the event of a conflict between this Factsheet and the NMA and/or O. Reg. 106/09, the NMA and/or O. Reg. 106/09 govern. Please review the NMA and O. Reg. 106/09 and, if you have any questions about the application or interpretation of these regulations or have other legal questions, consult a lawyer.

Also consult with the applicable federal legislation (if any) in this area to ensure that you are also in compliance with federal requirements regarding the disposal of farm animals that die on a farm.

For more information on the NMA, call the Nutrient Management Information Line at 1-866-242-4460, e-mail nman.omafr@ntario.ca or visit www.ontario.ca/omafr.

Factsheets are continually being updated so please ensure that you have the most recent version.



MINISTRY OF AGRICULTURE
FOOD & RURAL AFFAIRS

On-Farm Euthanasia of Sheep and Goats

Author: Gerrit Rietveld - Animal Care Specialist/OMAFRA
Creation Date: 30 October 2003
Last Reviewed: 14 October 2009

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4. Conclusion
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The decision to humanely end the life of an animal may be necessary in cases of severe injury or disease or as a result of disasters such as fire or flood. On-farm euthanasia may be the most practical and humane way for a livestock producer to relieve an animal's pain and suffering if it is unfit to travel, or to prevent drug residues from entering the food supply.

Whenever possible, livestock producers should consult with a veterinarian before deciding to euthanize an animal. A broken leg with exposed bone, or exposed internal organs are examples of severe conditions that might call for euthanasia. The following questions will help in deciding whether to treat, slaughter or euthanize an animal that is injured, extremely weak or disabled:

- Is the animal in pain or distress? If yes, consider treatment.
- Is the animal likely to recover? If yes, consider treatment.
- Does the animal have the ability to access feed and water? If yes, consider treatment.
- Have medications been administered? If yes, check withdrawal period.
- Have drug withdrawal times been cleared? If yes, consider slaughter.
- Can the animal be humanely transported? If yes, consider slaughter; you will need a veterinary certificate to transport the animal.
- Does the animal show any clinical signs that you don't recognize or that you recognize as a reportable disease? If yes, you must contact your veterinarian.

Methods of Euthanasia

Euthanasia must be performed in a way that minimizes fear and anxiety in the animal. Good stockmanship practice dictates that producers have an ethical and moral responsibility to provide a humane death for animals in their care, without causing additional pain or suffering.

There are three basic methods appropriate for on-farm euthanasia: overdose by barbiturate; stunning with a penetrating captive bolt, followed by bleed-out; and gunshot. Each method has advantages and disadvantages. Euthanasia by barbiturate overdose must be performed by a veterinarian. Producers who choose the captive bolt pistol or gunshot method must take precautions to prevent serious injury to themselves and others.

To choose the most appropriate method for your operation, consider human safety, animal welfare, required skills, costs and other factors.

Table 1 outlines the three methods and considerations for each.

	Method	Human Safety	Animal Welfare	Skills Required	Cost	Other
Overdose by Barbiturate	Intravenous administration of a barbiturate	Restrain the animal	Excellent rating	Proper technique for intravenous injection	Veterinary fee	Can only be administered by licenced veterinarian
Penetrating Captive Bolt	Penetration of the skull and brain by captive bolt, followed with bleed-out by cutting all the main arteries and veins in the neck	Restrain the animal Be cautious of falling or thrashing animals	Good rating Correct cartridge strength, target site and penetration angle on animal is essential	Correct and safe use of captive bolt pistol Correct and safe use of sharp knife	Low - after purchase of captive bolt pistol	Results in some body movement Results in large volume of blood that requires proper disposal
Gunshot	Penetration of the skull and brain by bullet	Restrain the animal Be cautious of falling or thrashing animals Be extremely cautious about bullet ricochet	Good rating Correct size of firearm and ammunition, and correct target site and penetration angle on animal is essential	Correct and safe use of firearm	Low - after purchase of firearm	Results in some body movement and blood Requires firearm acquisition certificate Local by-laws may prohibit the use of firearms

Penetrating Captive Bolt and Gunshot

An experienced person can produce rapid unconsciousness in an animal by using a penetrating-type captive bolt or shot from a firearm which is aimed at the correct target site and penetration angle for the species and age of animal. The same anatomical targets and penetration angles are used for both a penetrating captive bolt pistol and a firearm (see Figures 1 and 2).

Penetrating Captive Bolt

- ✧ Ensure the animal is well restrained.
- ✧ Use the appropriate cartridge strength for the animal (refer to the manufacturer's manual).
- ✧ Place the captive bolt pistol firmly against the animal's head on the target site, and shoot.
- ✧ Be careful to avoid injury from thrashing limbs when the animal collapses.
- ✧ Cut both the carotid arteries and jugular veins in the neck with a sharp knife to bleed-out the animal after stunning. These arteries and veins are on both sides of the throat.

Gunshot

- ✧ Ensure the animal is well restrained.
- ✧ Plan to shoot outdoors when possible.
- ✧ Have a backstop (e.g., an earth berm, manure pile, or something that will stop the bullet if you miss or it over-penetrates) behind the area you are aiming at.
- ✧ Use a firearm and ammunition that are appropriate for the size, age and type of animal. The ammunition used to euthanize an animal must be powerful enough to make the animal

- immediately unconscious and to penetrate the head deeply enough to destroy the areas of the brain that control breathing and circulation.
- A .22 calibre firearm, using "long-rifle" hollow-nosed ammunition or a .38 calibre firearm can be used to successfully euthanize sheep and goats.
- Hold the firearm 5-25 cm (2-10 in.) from the target site. To avoid personal injury, do NOT place the firearm muzzle against the animal's skull. Aim the shot down the line of the spine so that the bullet will enter the brain stem (the beginning of the spinal cord), and shoot.
- Be careful to avoid injury from thrashing limbs when the animal collapses.

Target Site and Penetration Angle

The target site for euthanizing sheep and goats without horns is at a point on the forehead at the mid-line, just above the eyes, as shown in Figure 1. The shot must be directed at an angle down the line of the spine and into the bulk of the body (or where the body would be if the animal were to be standing normally).

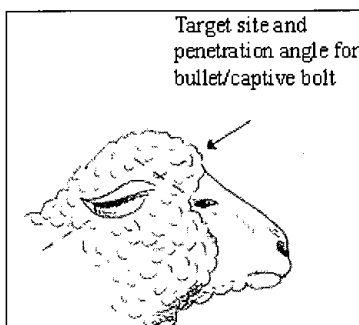


Figure 1. Target site and penetration angle for sheep and goats without horns.

Heavily horned sheep and goats should be shot behind the poll, directing the shot in a path downward just behind the eyes and towards the nose, as shown in Figure 2.

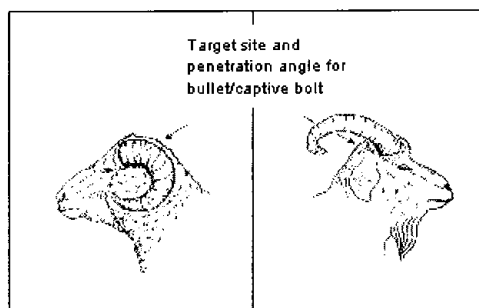


Figure 2. Target site and penetration angle for sheep and goats with large horns.

Confirmation of Death

It is essential that you confirm the animal's death directly following euthanasia. A standing animal should immediately collapse. Its muscles may involuntarily contract, usually for no longer than 20 seconds. After this, it may show some poorly coordinated kicking or paddling movements before the muscles completely relax.

Check the animal for breathing, heartbeat and blinking response (corneal reflex). There should be none. The eyes should be fixed and dilated. To check the blinking response, touch the surface of the animal's eye (the cornea). Any eye movement or blinking shows sustained or recovering brain activity. If there is any sign of breathing, heartbeat or blinking, repeat the euthanasia method or use an alternate procedure.

Disposal of Mortalities

The proper disposal of livestock mortalities is critical in preventing environmental contamination and the spread of disease. In Ontario, the *Dead Animal Disposal Act (DADA)* regulates the disposal of dead cattle, swine, sheep, goats and horses, and any parts, including blood.

Under *DADA*, producers are required to properly dispose of on-farm mortalities in a safe and environmentally friendly manner within 48 hours of death. When euthanizing an animal, it is a good idea to choose a location where you can easily reach the mortality and to quickly dispose of it.

DADA permits the following three disposal methods:

- ✧ Pick-up by a provincially licenced deadstock collector
- ✧ Burial under 0.6 m (2 ft.) of soil on the farm
- ✧ Composting on the farm

Refer to OMAFRA factsheets "*Burial of On-Farm Deadstock*" (Order number 09-029) and "*Deadstock Disposal Options for On-Farm*" (Order number 09-025) for details about these methods of on-farm disposal.

Conclusion

Human safety and animal welfare must over-ride economic considerations when deciding if, how, when and where an animal must be humanely destroyed.

Euthanasia, although an unpleasant task, is an inevitable component of animal husbandry. Careful planning and training can help to minimize a person's stress associated with carrying out this necessary act, and prevent the unnecessary suffering of animals. Discuss euthanasia options for your farm operation with your veterinarian, then develop an action plan and update it annually as part of your flock or herd health program.

Notice and Disclaimer

The Ministry of Agriculture, Food and Rural Affairs does not recommend any specific one of the methods described above. Producers must determine which method is appropriate for their individual circumstances. Possession and use of firearms are governed by federal legislation; producers should ensure compliance with all legislative requirements and ensure adequate safety precautions are used. The Ministry of Agriculture, Food and Rural Affairs are not liable for injuries or damages resulting from the use of the above methods.

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Related Links

- ↘ [Burial of On-Farm Deadstock, Order number 09-029](#)
- ↘ [Deadstock Disposal Options for On-Farm, Order number 09-025](#)
- ↘ [Deadstock Disposal](#)

For more information:
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Local: (519) 826-4047
E-mail: ag.info.omafra@ontario.ca



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MINISTRY OF AGRICULTURE
FOOD & RURAL AFFAIRS

Euthanasia Action Plan for Sheep and Goats

Author: Gerrit Rietveld - Animal Care Specialist/OMAFRA
Creation Date: 30 October 2003
Last Reviewed: 16 May 2008

Work with your veterinarian to develop a euthanasia action plan appropriate for each species and stage of production on your farm. This plan should be kept in an obvious location in the barn. Review the plan with any new employees and annually with all staff and your veterinarian.

Farm Name: _____

Date: _____ **Prepared by:** _____

Phase of Production	Euthanasia Method	Alternative Method
Lambs and Kids		
Ewes and Does		
Rams and Bucks		

Important Telephone Numbers:

1. Veterinarian: _____
Phone: _____
After Hours/Emergency: _____
2. Transporter: _____
Phone: _____
3. Non-ambulatory Transporter: _____
Phone: _____

Adapted from Ontario Pork's booklet *On-Farm Euthanasia of Swine: Options for the Producer*

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Methods of On-farm Euthanasia and Their Considerations

Method	Human Safety	Animal Welfare	Skills Required	Cost	Other
Overdose by Barbiturate	Intravenous administration of a barbiturate	Restrain the animal	Excellent rating	Proper technique for intravenous injection	Veterinary fee Can only be administered by licenced veterinarian
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OSMA Health Programs

The Ontario Sheep Health Program



What is the Ontario Sheep Health Program (OSHP)?

OSHP is a flock health program developed at the University of Guelph and used as a reference for other sheep health programs across Canada and internationally



How can OSHP help sheep producers?

OSHP uses methods of disease control and flock evaluation proven to increase the efficiency and productivity of livestock operations

OSHP promotes a strong working relationship between producers and veterinarians to increase the awareness of on-farm and provincial flock health concerns

OSHP can be modified for use on all types of sheep operations

Certification in OSHP demonstrates that a producer:

- ✓ follows procedures to ensure on-farm disease control and quality assurance practices
- ✓ commits time and effort into optimizing flock productivity and health



How do producers become certified under OSHP?

Producers wishing to enroll in OSHP should contact the Ontario Sheep Marketing Agency (OSMA) for an application form

Producers are required to pay \$75 to OSMA for materials and administration for the first year and \$42 for subsequent years

After receiving the materials, producers quantify past flock productivity and set goals for future improvement. Their veterinarian then visits the farm to review relevant management practices, including disease control, bio-security, and quality assurance.

If the all requirements of the program are met the veterinarian will approve the producer for certification. The process is repeated yearly.

If you are interested in participating in this program please contact OSMA:
Phone: 519-836-0043, email: admin@ontariosheep.org, Fax: 519-836-2531

Maedi-Visna Flock Status Program (MVFSPP)

Maedi-visna is a debilitating viral disease that can undermine the economic viability of a sheep flock. The name Maedi-Visna is an Icelandic description of the two major forms of the disease (Maedi=progressive pneumonia and Visna=wasting). Although it is ultimately fatal, most of the economic loss attributed to this disease is due to decreased milk production; lowered weaning weights; increased incidence of severe arthritis and wasting; higher than average number of respiratory infections; and decreased ewe fertility. In one study, it was found that 66% of healthy appearing, Maedi-Visna positive ewes had udder lesions and their lambs had lower than average weaning weights. The disease is common in many sheep producing countries, and 70% of flocks tested in Ontario in the late 1980's had at least one positive animal. There is no cure or treatment for the disease, however, there is a reliable blood test that can identify infected animals.

The Maedi-Visna Flock Status Program is a voluntary program administered by the Ontario Sheep Marketing Agency, in conjunction with the University of Guelph.

The goals of the program are:

1. To identify and control the disease in participating flocks
2. To establish the economic costs and benefits of eradicating the disease

Producers are able to establish a 'whole flock' status (all adult animals are tested) or a 'monitored' status (a representative group of adults are sampled). Producers participating in this program are eligible for a discounted fee for laboratory analysis of blood samples. Producers are required to uniquely identify adult sheep, follow bio-security requirements, and follow the protocols of the program. Although it is recommended, enrolment in the OSHP is not required.

If you are interested in finding out more about the Maedi-Visna program, please contact the OSMA office at (519) 836-0043 or email admin@ontariosheep.org.