



## Controlling Predation

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## **Something's Been Killing My Sheep – But What?**

How to Differentiate Between Coyote and Dog Predation

Brian Tapscott, Livestock Specialist, OMAF, 1997

### *Introduction*

The range and extent of predation on Ontario sheep has escalated at an alarming rate to the point where it threatens the viability of many operations. Producers lost almost three times the number of sheep and lambs in 1995 (3,060) as they lost in 1986 (1,149). During the four year period from 1991 to 1994 the sheep industry was compensated an average of \$388,000/year for predation losses, under the *Livestock, Poultry and Honeybee Protection Act*. The total would be substantially higher, as losses attributed to feral or domestic dogs are not included, since they are compensated by the districts, municipalities or townships. As well, animals that are killed, but not found are not included in these figures.

Identifying the cause of death is not easy, but it can be especially difficult for inexperienced sheep producers. The purpose of this factsheet is to aid producers and livestock evaluators in distinguishing between losses caused by predators and non-predator causes. If predation is the cause of death then it is particularly important to identify the species responsible so additional control measures can be implemented to minimize future losses. Heavy emphasis is placed on distinguishing between coyote predation and dog predation, since they collectively account for almost all predator related losses in Ontario flocks.

### *Predation or Scavenging*

A dead sheep has been found. The first question which needs to be answered is whether the sheep was killed by a predator or whether it died of some other cause and the carcass was subsequently scavenged. The key clue to look for in distinguishing between predation and scavenging or carrion feeding is the presence of blood either at the point(s) of attack on the carcass or around the kill site. Bleeding can only occur before, and shortly after death. Bites made to a live animal will produce haemorrhaging which eventually shows as bruising under the skin. However haemorrhaging, and subsequently bruising will not occur on a dead animal which has been scavenged. In densely woolled sheep carcasses it may be necessary to skin the neck and head area in order to see tooth punctures and bruises.

Being opportunistic predators, coyotes often prefer lambs to adult sheep. Distinguishing a newborn lamb which has been killed by coyotes from a stillborn lamb which has been scavenged can be difficult. In order to do so, it must be determined whether the lamb breathed, drank or walked before it was eaten. Alberta Agriculture recommends looking for the following clues:

1. Did the lamb walk? The soft membrane covering the sole of the hoof wears off quickly when the lamb begins to walk. If the membrane is still intact odds are that the lamb was stillborn.
2. Did the newborn lamb breathe? If the animal has breathed the lungs will be pink and feel light and spongy and will float in water. The lungs of a stillborn lamb will be a dark purplish-red colour and will sink when placed in water.
3. Did the lamb nurse? The presence of milk in the stomach is also evidence of a live birth.

If scavengers are given adequate time and opportunity to feed on the carcass, it will be virtually impossible to differentiate between predation and scavenging on an animal's carcass that died from some other cause.

Producers should also search the area where the carcass was found, for other evidence which may explain the cause of the loss. Finding predator tracks, hair or droppings near a carcass may support the theory of predation, but these findings on their own do not automatically mean that predation has occurred, as predators do often scavenge carcasses. Signs of a struggle, drag marks on the ground, broken vegetation and/or blood around the site are all strong evidence of predation. Another possible indicator of a predator attack is if the flock appears somewhat more nervous and vocal than normal.

### *Was It a Coyote or a Dog?*

Based on the above criteria the producer has concluded that predation is the likely cause of death. But what species of predator was responsible? Fortunately each species of predator has its own predatory habits and feeding characteristics. Undoubtedly there will be some exceptions but the following guidelines should better

enable individuals to distinguish between losses caused by the most significant Ontario predators, coyotes and dogs.

**Time of Attack** - Coyotes normally hunt at night but also have been known to kill in the early morning hours. Dogs on the other hand will attack at any time during the day or night.

**Duration of Attack** - Coyote attacks do not generally last very long as they are quick and competent killers. Dog attacks on the other hand tend to be longer and more drawn out as they are generally inefficient predators.

**Temperament of Flock** - The behaviour of the flock after an attack can be important in determining the species of predator. Since coyotes kill principally for survival, their attacks are usually quick and focused on a small number of sheep. After a kill, coyotes will eat their prey and leave the rest of the flock alone. Consequently a flock witnessing a coyote kill will not normally appear as spooked, stressed or noisy as those suffering a dog attack. After a dog attack the flock is more apt to be nervous and confused because the attack lasts longer, involves more chasing and harassing and usually involves several dogs attacking numerous sheep. As a result, there is normally a lot of commotion and confusion during and after a dog attack.

The only exception to this might be during the period from July to September when the female coyote is teaching young pups to hunt. In such cases the flock may be high-strung due to the puppy's inexperienced attack techniques.

**Extent of Attack or Kill** - The number of sheep killed can also reveal the predator's identity. Kills in excess of two or three animals may suggest that dogs were involved. Dogs normally attack sheep for fun, rather than food, thus their harassment frequently leads to indiscriminate mutilation. Being relatively poor killers, dogs tend to chase sheep extensively and as a result more sheep are attacked, injured or killed over a wider area than in coyote attacks.

Dog attacks often involve more than one dog whereas coyotes normally hunt alone and like most wild predators they tend to kill only what they need to survive. Usually only one or two sheep will be killed with very few sheep injured. Again the possible exception is in the late summer and early fall when the pups are accompanying the adults.

**Location of Attack or Carcasses** - If coyotes are responsible then the carcasses are likely to be found relatively close together, near areas with plenty of cover which provides an easy escape. Carcasses resulting from dog attacks will on the other hand tend to be scattered throughout the pasture as the sheep panic to escape.

**Target Animals** - Being efficient predators, coyotes will generally target the smallest, slowest and most vulnerable animals, which most often, includes lambs. Dogs tend to be non-selective and will attack sheep of any age.

**Attacking Behaviour** - A thorough examination of the carcass or injured animal will provide key clues to narrow the predator's identity. To kill as quickly as possible, coyotes typically attack by biting sheep in the throat just behind the jaw and under the ears. They maintain a grip until the animal suffocates or dies of internal bleeding. The external puncture wounds in the throat may be difficult to see. Internal wounds will generally be a rupture of the larynx and severe subcutaneous trauma and bleeding. Coyotes seldom inflict injuries to other parts of the adult animal or carcass. Lambs will likely have bites to the head, neck and back causing extensive bone and tissue damage.

In late summer or early fall when the female coyote is teaching pups to hunt, some unusual wounds may result from the pups' inexperienced hunting techniques. At this time, bites and rips to different body areas are common. In such cases more than one sheep of a flock can be injured. However, if coyotes are the culprit, one clean kill should have occurred.

Wounds to numerous live sheep on body areas other than the head or neck are signs of dog predation. Dogs usually attack from the side or rear inflicting non-fatal wounds on various parts of the body. Frequently the skin and muscles in the flank, hindquarters and head will be ripped. Neck wounds will be superficial or severe lacerations, unlike the characteristic puncture wounds left by the teeth of a coyote. Lambs killed by dogs will have a slashed and ripped appearance. Clumps of wool lying spread around the attack area likely suggest an inefficient dog attack.

**Feeding Behaviour** - Coyotes generally eat their kill. They start feeding in the abdominal cavity, eating the kidney, liver and lungs. The stomach and intestines are usually pulled out, but are not normally eaten, other than the surrounding fatty tissues. After the organs have been eaten the coyote will feed on the muscle tissue of the rear quarters or the rib cage and shoulder. Reliable signs of coyote feeding include muscle tissue with ragged

edges and splintered and chewed ribs. Coyotes will often rub and roll in the carcass remains then may defecate after feeding. Coyotes generally do not scatter the wool or hide around the site.

Odds are if lambs go missing, coyotes are the probable predator. Coyotes will often take smaller prey back to its den, especially during May and June when feeding its pups.

It is rare that dogs will either remove or feed on a kill. They may however chew on various parts of the carcass. If the dogs do feed they will usually eat from the outside in, generally starting around the anus area, as opposed to the coyote feeding on internal organs first. Coyotes may come back to feed on the carcass while dogs seldom return to feed off kills.

**Tracks at Site** - Since most kills occur on pasture there is rarely distinguishable tracks left behind. However if the ground is sandy or soft from a recent rain, tracks can distinguish the presence of either coyotes or dogs. It must be stressed however that tracks alone do not confirm that animal was the killer (Figure 1). Coyote tracks are more oval shaped and the nail marks left are less prominent than those of dogs. Coyote tracks are more uniform in size while dog tracks will vary in size according to size and weight of the dog species. Coyote tracks tend to follow a straighter line and the rear tracks follow directly in line with or on top of front tracks. A dog's rear tracks are normally slightly to one side of the front tracks.

**Droppings** - Droppings found near the site can also help to differentiate between coyotes and domestic dogs. Hair and pieces of bone in the droppings would suggest either a coyote or feral dog. The droppings from a domestic dog receiving dog food will show no evidence of hair or bones. Coyotes droppings tend to be black, due largely to their consumption of blood, while the domestic dogs droppings will be brown.

### Conclusion

In most instances a prompt and thorough examination of the carcass, the site and live animals associated with the attack will aid in determining whether the death was due to an accident, disease or predation. If predation is the cause of death then the producer must decide if the problem can be resolved by modifying farm management practices (ie. pasturing closer to buildings, implementing night housing, improving dead animal disposal practices). If losses are extensive then the producer should consider implementing other predator control practices (use of livestock guard animals, electric fences, hunting, trapping).

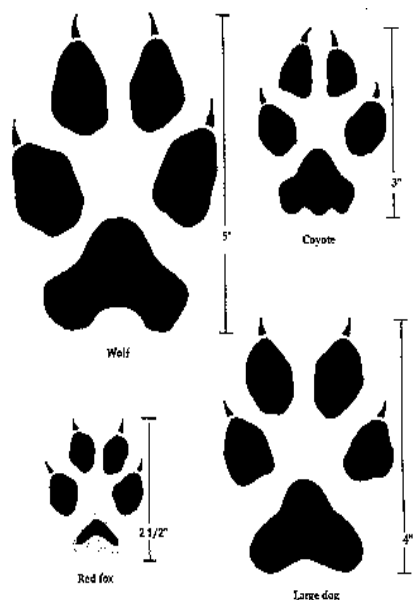


Figure 1: Predator Tracks

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## **Management Practices Can Influence Predation in Sheep Flocks**

Anita O'Brien, OMAFRA Sheep and Goat Specialist

Proper livestock management can help to minimize the risk of predation. Many producers use one or more of the following: using lighted corrals, lambing in the barn, regular inspection of the sheep flock, prompt removal and disposal of dead stock, and perhaps confinement at night.

These practices may not be practical for all producers. For example, it would be extremely difficult to confine a flock of 500 pasture lambing ewes each night. Greater losses would be likely from mismothering, and increased exposure to diseases such as coccidiosis and internal parasites.

For managing predation, a variety of methods must be available, one method will not be effective for every producer. Most successful predator control programs use an integrated approach – combining good husbandry with effective control methods.

Prevention cannot be stressed enough, because after predators kill once they are more likely to return and kill again. If predators have started killing sheep, it is important to stop the killing as quickly as possible.

### **Predisposing Factors**

Although many of the following relationships are not clearly defined, it is important to understand the relationship between predisposing factors and actual or perceived losses to predators.

#### **Coyote Behaviour**

It is becoming an accepted fact that coyotes will tend to kill, and eat (as adults) what they were taught to kill and eat (as pups). Parker's book, *The Eastern Coyote, The Story of its Success*, refers to a number of Canadian studies that strongly support this observation. Coyotes tend to kill animals that are easily caught (least amount of energy expended for maximum gain). Predation may begin because of the availability of sheep weakened by poor nutrition, inclement weather, disease or parasites, or small size (young lambs). This is not to say that these are the only type of livestock that coyotes kill. Many producers will quickly verify that losses are often some of their better ewes, of prime breeding age. A typical pair of mated coyotes in agricultural land in Ontario will have a home range of approximately 10km<sup>2</sup> during the gestation period, to over 30km<sup>2</sup> during nursing in May and June. Obviously, their home range will take them through many farms, some with livestock and differing livestock husbandry practices. Conditions that lead to coyotes killing livestock on one of those farms, puts all farms in their home range at risk of predation.

#### **Availability of Normal Food Supply**

When normal food sources are scarce, predators will investigate other potential food sources. Livestock fit that category. Once predation starts, producers must be prepared to implement removal options to prevent further kills.

#### **Previous Predation on Farm**

Farms where predation has been a problem in previous years tend to have repeat occurrences of predation each year, particularly if no predator removal program has been implemented.

#### **Health of Flock**

Healthy sheep tend to have higher lambing rates, lower overall death losses, and may be less susceptible to predation. Ewes in good condition will generally raise stronger lambs. Orphaned and otherwise abnormal lambs are likely to be initial victims of predation. Once the coyote is used to hunting the flock, older and healthy animals will be at risk.

#### **Recordkeeping**

Knowing how many sheep you have in a particular pasture helps to quickly determine when losses begin. Keeping track of losses can be very beneficial in eventual control or removal of the problem predator. They can help identify loss patterns, or high risk pastures.

**Season and Location of Lambing**

Highest predation typically occurs from late spring through September-October due to high feed requirements of raising pups. Lambs born on pasture are more likely to be at high risk to predation than older lambs or mature sheep. On the other hand, winter born lambs, raised indoors and hand fed may be as much at risk since they are not as alert or suspicious of humans or strange animals as lambs born on pasture.

**Corrals and Night Confinement**

Although this may be a practical option for small flocks, or flocks of dry ewes that lambed during the winter, it is not a feasible option for large, commercial flocks that have young lambs with them on pasture.

**Deadstock Disposal**

An Alberta study indicated that predator losses were lower on farms where deadstock was promptly removed and disposed of, compared to farms that did not handle deadstock was not properly.

**Human Presence**

Frequent checking of flocks can discourage predation before problems arise. Periodically changing the time of day when the flock is checked can deter coyotes from attempting kills.

**Novelties**

Things like bells on a number of sheep in the flock; aluminium pie plates hung around the perimeter of the pasture, playing the radio, etc. can discourage coyotes from preying on flocks. Anything that causes an irregular sound or reflection can be effective. Again, these sorts of things may be suitable to some producers and not others. Each individual situation must be assessed as to what is most suitable.

### **Livestock Guard Animals**

By: Ralph Stevenson, Former OSMA Director

(Modified by OSMA, 2002)

Livestock guard animals live with the flock, protecting the sheep from predation, without harming or interfering with the flock. It is important to remember that all types of guard animals should bond with the flock, not with humans. To be effective, they cannot be raised or treated like pets. Guard animals currently being used with sheep are:

#### **Dogs**

These dogs are reared with the flock and have proven to be extremely successful in warding off predators. There are several breeds that have, for centuries, proven their worth by placing themselves between the flock and potential danger. Some of the more common guarding breeds are Great Pyrenees, Maremma, Akbash, and Komondor. Producers interested in procuring a guard dog should do the necessary research to determine the characteristics and temperament of each breed and decide which breed best suits the shepherd's expectations.



#### **Donkeys**

Donkeys are gaining popularity due to their relatively low cost, low maintenance requirements, natural herding instinct, and their inherent dislike for canines. It would appear that the most effective guard donkey is a jenny with a foal. Adult male donkeys may be overly aggressive towards the sheep. Although donkeys do well on grass hay and pasture, they tend to become obese on high-quality diets and may develop laminitis (founder). Donkeys' feet should be trimmed every 3-4 months. Donkeys are a monogastric species, which means that feed is not subjected to microbial fermentation until after it has passed through the animal's own system. Therefore, medications and mildews in feeds will be absorbed directly into the animal's system. NEVER allow a donkey access to a medicated lamb ration, as even trace amounts of certain medications (e.g. ionophores) will be toxic. Additional reference material on guard donkeys can be obtained from the OSMA office.

#### **Llamas**

The llama is very adaptable to many environments and bonds well with sheep and lambs. Likewise, the llama will eat the same feed as sheep and is not prone to foot problems associated with high quality feeds. Although females may be quite expensive, neutered males are reasonably priced and have developed an excellent reputation as a flock protector. It is a good idea to train the llama to halter and to come when called, otherwise considerable effort could be expended in a sheep and llama chase. Unlike true ruminants, which have a four-chambered stomach, llamas have three-chambered stomachs. However, their digestive system is closer to a ruminant's in function than it is to a monogastric species (donkey, horse). There are several llama breeders in Ontario.

#### **Horses**

Although not widely recognized, several experienced producers have had excellent results in minimizing predator attacks by pasturing horse(s) with their sheep. Apparently, draft horses are particularly effective, although the feed bill could be hard to justify if the horse were only used for predator control. As donkeys, horses are monogastrics and have similar management requirements.

## **Protecting Livestock From Predation With Electric Fences**

Alberta Agriculture Fact Sheet, 1997

(Modified by OSMA, 2002)

Electric fences are an important tool for protecting sheep from predators such as coyotes, wolves, bears and domestic dogs. Studies have shown a 90 per cent reduction in sheep predation losses, when using electrified pasture fences.

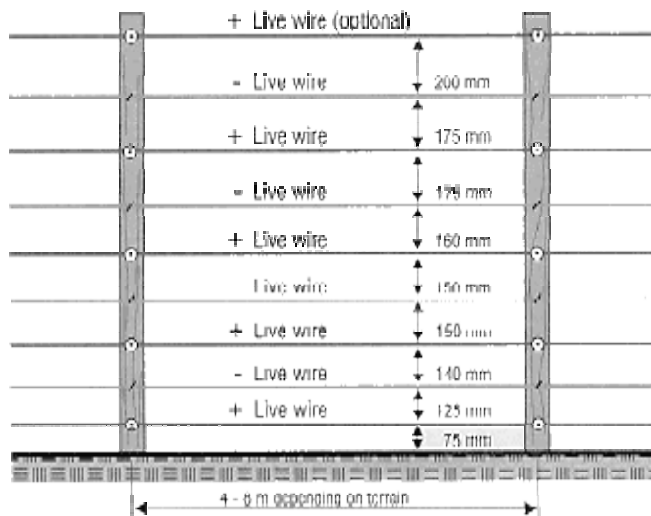
Electric fences are easily adapted to most livestock operations, are relatively easy to maintain and are economical to build. However, they require routine inspection and maintenance to ensure proper operation and protection capability. Also, snow and frozen ground in winter can greatly reduce the effectiveness of electric fences for predation control.

### *Electric fence designs*

An effective electric fence for predator control can be constructed with either a multiple of single strand wires or a combination of wire mesh and single strand wires. A mesh-wire fence is more expensive to build than a fence made from single strand wire. However, an electrified mesh-wire fence presents a greater physical barrier to predators and requires less maintenance and fewer electrified wires than a fence using only single-strand wires.

### **Nine-wire fence**

An electric fence made with 9 single strands of 12.5 gauge, high-tensile smooth wire and spaced as shown in Figure 1 provides an effective barrier to predators. The overall height of this fence design is 1.37 m. Wires are alternating, charged (+) and grounded (-), beginning with the bottom wire as a charged wire. The top wire should be charged when cattle or horses are either enclosed or share a fence to prevent them from damaging the upper portions of the fence.



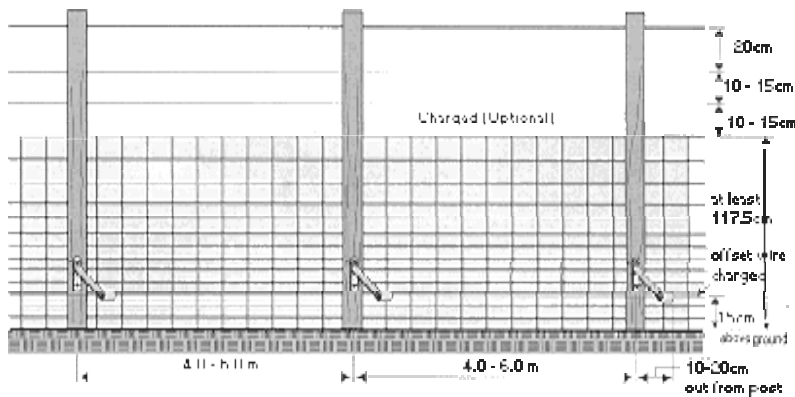
**Figure 1. Nine-wire fence, viewed from inside the fence**

### **Mesh-wire fence**

Galvanized, high-tensile mesh wire should be used for predator control. This wire is more versatile and longer lasting and can be stretched tighter than standard farm mesh wire. The high-tensile mesh wire is reasonably priced and available from fencing suppliers in various heights. Galvanized mesh at least 1.2 m high with predator-proof spacings (smaller spacings on the bottom section of the mesh than at the top section) is recommended.

To build a new fence, place the mesh wire on the inside of the pasture posts. Pull the mesh taut, position the bottom of the mesh tight to the ground and staple the mesh securely to the posts. The fence wire must be tight to the ground to reduce the chances of a coyote digging under.

If a fence is not taut, the wires will sag and make a space easier for coyotes to penetrate. Single strand, 12.5 gauge high-tensile wires can be placed 15 cm or less apart above the mesh to increase the height of the fence to 137 cm or more. Figure 2 shows the recommended mesh-wire fence configuration, which is also electrified.



**Figure 2. An electrified, high tensile mesh-wire fence, viewed from outside the enclosure**

An existing sheep fence made from mesh and barbed wire can be electrified. The fence must be in good condition, and the wire must be free of rust, undamaged and taut. The spacing in the mesh wire must be no larger than 15 cm by 15 cm, as coyotes, foxes and small domestic dogs may crawl through larger spaces. Fence posts must be sturdy and, to prevent predators from jumping over, tall enough to support a fence of at least 137 cm. If the posts are not tall enough to support the top wires, add extensions to increase fence height to at least 137 cm. To stop predators from digging under the fence, place a charged 12.5 gauge high-tensile wire 10 - 15 cm above ground level and 10 - 20 cm out from the mesh.

If the fence posts are 10 cm or more in diameter and the mesh is attached to the inside of the posts, insulators and the charged wire can be attached directly to the outside of the posts. If the fence posts are less than 10 cm in diameter or the mesh is on the outside of the posts, offset brackets will be needed. Brackets can be built or purchased.

#### *How an electric fence works*

Under normal operating conditions, an electric fence functions as an incomplete (open) circuit with repeating pulses of electricity generated by the energizer sent through the charged wires of the fence. When an animal touches a charged wire, it grounds the fence, creating a closed circuit. An electrical pulse travels through the animal and back to the energizer, delivering a shock to the animal.

Other objects and materials including vegetation, sticks, fallen trees and non-insulated posts in contact with charged wires can also create a partial or total closed circuit. This partial or closed circuit can result in a reduced electrical charge (voltage) and an inadequate shock to repel predators that contact charged wires of the fence. Fences should be checked and maintained regularly to address this potential problem.

*Fence line selection and preparation*

Careful planning and proper fence line preparation are important first steps in the construction of an effective fence for predator control.

Select the most level ground to run the fence. Do not cross creeks, sloughs, ravines or other unstable and difficult areas if at all possible. Keep the fence line as straight as possible. Clear trees, shrubs and debris from the fence line. Make the fence line wide enough both to prevent trees from falling on the fence and to permit a vehicle to be driven beside it for fence construction, inspection and maintenance.

Coyotes usually penetrate mesh or nine-wire fences by digging or crawling under the bottom wire. So it is extremely important to level the fence line properly. The fence line must be even enough to run a charged wire within 7.5 to 10 cm of the ground. The distance from the bottom wire to ground level may vary a good deal if fence lines are not levelled. An uneven fence line may permit coyotes to get under the wire. If the charged wire touches the soil, the voltage may be inadequate to keep coyotes out.

After completion of the fence, the fence line should be re-seeded to grass to prevent erosion and weed growth. Select a low-growing grass species that will minimize the risk of vegetation grounding the bottom charged wire. Common broad-leaved weeds that cause grounding problems can be controlled with herbicides.

For more information on electric fences see [Fencing with Electricity](#), an Alberta Agriculture, Food and Rural Development publication with detailed information and diagrams explaining how to choose and build the type of electric fence best suited to your needs.

The book defines and discusses the components of an electric fence; types of electric fences, including electrifying existing fences; fence safety and maintenance; troubleshooting tips and references for further information.