

# Moose Health and Disease: A Pocket Guide



Alaska Department of Fish and Game  
Division of Wildlife Conservation, 2020



Photo © by Ken Marsh

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**Cover photo:** ©Ken Marsh



# Using this guide

The goals of this guide are to provide hunters and anyone spending time outdoors with basic information about moose conditions that may be encountered during wildlife observation, hunting, or meat processing; and to request help watching for diseases of concern that have not yet been detected in Alaska.

## Information for each condition

**Description:** Basic description of each condition or disease.







**Signs:** Observable indicators of a condition or disease.

**Safety:** Transmission risk and meat safety, pet safety, and wildlife safety information.

**Prevention:** Actions you can take to prevent disease transmission and meat contamination.

**How to report/sample:** Procedures for when and how to report conditions or collect samples.

## Color-coded sections

-  General information
-  Conditions under surveillance: not yet detected in Alaska
-  External conditions
-  Internal conditions
-  Conditions that may not be easily visible
-  Human-caused conditions

# General information

**Never eat raw game meat. Always cook game meat thoroughly to prevent disease.** *Toxoplasmosis*, for example, is caused by a parasite that cannot be seen, and it may be present in the meat of any game animal.

**If you harvest an animal that appears to be sick or diseased, you are still required by Alaska statute to salvage the meat.** You must transport all required meat from the field to fulfill salvage requirements, even if you think the meat is not fit for consumption or you do not intend to eat it.

**Cook any game scraps you may feed your dogs.** Dogs can be infected by diseases and parasites that spread between game and predators/scavengers, such as wolves and foxes. Some diseases do not infect people directly, but indirectly through pets (e.g. *Echinococcus*, *Tularemia*). Prevent these infections by cooking scraps that can be legally fed to dogs (guts, skin, bones).

**Freezing meat will ONLY kill tapeworms.** Many Alaska game parasites have adapted to survive freezing. Universally, cooking your game meat thoroughly is the best solution to protect yourself from internal parasites and diseases.

## **HELP US MONITOR MOOSE:**

**If you suspect that a moose you encounter is exhibiting signs of one of the diseases under surveillance**, please report observations to the Wildlife Health Program. Reports from the public help ADF&G better understand and monitor wildlife health in Alaska.



# How to report

*we need your help to monitor moose health*

- 1) To submit any kind of physical sample from an animal or carcass for disease identification or monitoring, print a form from our website or ask for a copy from an ADF&G office. ADF&G can only accept samples submitted with a "Disease investigation and sample submission" form.
- 2) To submit a wildlife health report to us by email (including photos, GPS locations, and detailed descriptions):  
**dfg.dwc.vet@alaska.gov**
- 3) If you observe a condition of concern, or if you do not have reliable access to the internet, leave a message for the Wildlife Health & Disease Surveillance Program:

**Wildlife Health Program Office: (907) 459-7257**

**Wildlife Health Program Mobile: (907) 328-8354**

- 4) For more detailed information, search "parasites and diseases" on our website: **www.adfg.alaska.gov**
- 5) If you encounter a moose that has been hit by a vehicle, has broken limbs, or other injuries,  
**please do not call the wildlife health program.**

Instead, call your local ADF&G office during business hours. On nights and weekends, contact the Alaska Wildlife State Troopers in your area:

**dps.alaska.gov/AWT/Contact**

# Winter tick (*Dermacentor albipictus*)



**Description:** Winter tick is a blood-sucking skin parasite found on moose from September to April. Infestation causes severe itching, weight loss, and can lead to death, especially in moose less than two years old.

**Signs:** Especially from October-March, large patches of white broken hairs ("ghost moose"), bare patches of red or irritated skin on the neck/shoulder areas in a triangular pattern from rubbing and grooming. Emaciation may be indicated by sunken muscles over the hips and an obvious ribcage. Blood spots or ticks may be found in a moose bed in snow. Ticks on moose may be small and hard to see.

**Safety:** Does not attach to or feed on humans, meat is safe for consumption.

**Prevention:** Risk of introduction to Alaska is primarily from immigrating wildlife or imported livestock. Apply tick preventatives to domestic animals prior to importation into AK.

**How to report/sample:** Email photos and GPS locations of affected moose or sightings of mule and white-tailed deer. For a harvested moose with hair loss, collect several patches of skin and ticks from around edges of hair loss or tail area.



# Chronic Wasting Disease (CWD)



**Description:** CWD is fatal degeneration of the brain of deer, reindeer, elk, and moose (members of the deer family).

**Signs:** Emaciation, listlessness, lowering of the head, droopy ears, blank expression, repetitive walking, drooling, teeth grinding, increased drinking, frequent urination, or death.

**Safety:** No known cases of transmission to humans, but do not consume meat from infected animals.

**Prevention:** Do not bring unprocessed carcasses, heads, or materials from deer, elk or moose to Alaska from out of state. Properly dispose of sick/butchered farmed elk/reindeer parts and never use for bear baiting or trapping. Do not spread urine lures from any deer family members (deer, moose, elk, caribou).

**How to report/sample:** Email photos and GPS locations for dead or infected animals (including any deer, elk, or moose suspected of showing signs of CWD). Check regulations and permit conditions annually for current hunter/harvest sampling requirements.

## Brainworm (*Parelaphostrongylus tenuis*)



**Description:** “Brainworm” is a nematode worm spread by white-tailed deer (that likely show no signs of disease), and rarely mule deer. Brainworm causes brain damage that leads to death in moose. The parasite is spread through deer feces that infect snails/slugs, which can then be swallowed by moose foraging on vegetation.

**Signs:** Walking in circles, stumbling, blindness, unaware/unconcerned of humans, droopy ears, tilted head, extreme weakness, seizures, emaciation, or death.

**Safety:** No risk to humans, and the meat is safe for consumption. Brainworm is fatal to moose and caribou.

**Prevention:** Report and/or hunt mule and white-tailed deer. Do not import deer from outside of Alaska.

**How to report/sample:** Email photos and/or video, and GPS locations of moose behavior or sightings of white-tailed and mule deer. If animal is harvested/dead, collect the head (with brain intact) and submit to the closest ADF&G office.



## Hock sores/Moose fly (*Haematobosca alcis*)



**Description:** Biting flies attack the hocks (upper rear legs) on the rear of moose during summer. Bites develop into sores.

**Signs:** Red, weeping to bloody raised sores, <1 inch in diameter on the back legs above the hocks during June through early September. Numerous black flies, especially around the tail, are likely "moose flies". Moose flies swarm to fresh feces to lay eggs and then return to their moose host to rest and take blood meals. Sores can resemble canine puncture wounds and are often misinterpreted as evidence of dog or wolf attacks.

**Safety:** No risk to humans, and the meat is safe for consumption regardless of the presence of flies or sores. The wounds generally heal. Biting flies do transmit moose legworm and *Setaria* to other moose (described in Internal section).

**How to report/sample:** If flies/sores are seen in western or northern Alaska, email photos and GPS locations. Flies and sores are common in the Interior, Southcentral, and Southeast.

# Papillomas



**Description:** Papillomas, also called warts, are benign growths on the skin or antlers that are caused by viruses.

**Signs:** Smooth or lumpy, raised, often round growths on the antlers and skin. May be on 'stalks', or can hang down off the skin. Papillomas primarily occur on the chest, front legs, or head, and most commonly affect yearling moose. Most eventually fall off and heal.

**Safety:** Warts are on the skin, so meat is safe for consumption. Low risk to humans, but there have been reports of transmission of warts from deer to hunters. It spreads between moose via direct contact or contaminated surfaces when moose rub or scratch.

**Prevention:** Wear gloves when butchering. Wash any cuts with soap and water.

**How to report/sample:** Email photos and GPS locations (or a general area is enough). Cut off one small wart including some of the normal skin around the edges. Keep sample cool, but submit unfrozen to the closest ADF&G office.

# Peruke antlers



**Description:** Peruke antlers are an abnormal and continued growth and retention of velvet antlers usually caused by damaged testicles. Antlers retain velvet, become frostbitten, and are not normally shed.

**Signs:** Noticeably deformed, drooping, or lumpy antlers, often easily broken, with velvet and scabs.

**Safety:** No risk to humans or moose unless the testicles are enlarged from a rare bacterial (*Brucella spp.*) infection. Meat is safe for consumption.

**Prevention:** Do not cut into an enlarged testicle, and do not consume abnormal testicles.

**How to report/sample:** Email photos and a GPS location. If you harvest the moose, check for small or missing testicles and the presence of male and female gonads. If testicles are enlarged or abnormal, take and submit photos. Cut, remove, and submit testicles unfrozen to the closest ADF&G office.

# Slipper foot



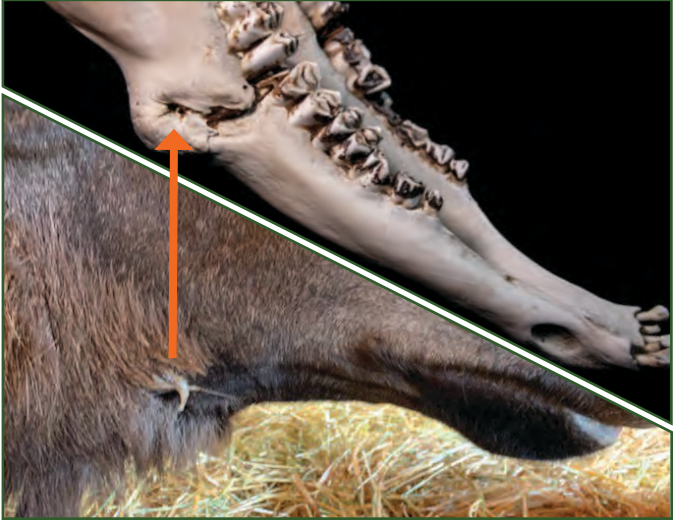
**Description:** Slipper foot (or Sleigh foot) is a foot/h hoof deformation that may be caused by a dietary copper deficiency. Slipper foot is most commonly observed on the Kenai Peninsula, other parts of Southcentral Alaska, and occasionally around the Interior.

**Signs:** Elongated, curled hooves on all four feet. If only one foot is curled, it is more likely trauma or an infection.

**Safety:** No risk of transmission to humans or other animals. Meat is safe for consumption.

**How to report/sample:** Email photos and general (or GPS) locations if observed. If you harvest the moose, submit approximately a golf ball sized chunk of liver, and hooves attached to lower legs (chilled is preferred, frozen is ok) to the closest ADF&G office.

# Lumpy jaw



**Description:** Lumpy jaw is a generic term for a bacterial infection in the jaw bones. It starts from broken teeth, gum infections, or damage to the gums or tooth roots.

**Signs:** Hard swelling or enlargement of the lower or upper jaw. Molars broken, missing, or roots exposed. Yellow or green pus and a foul odor.

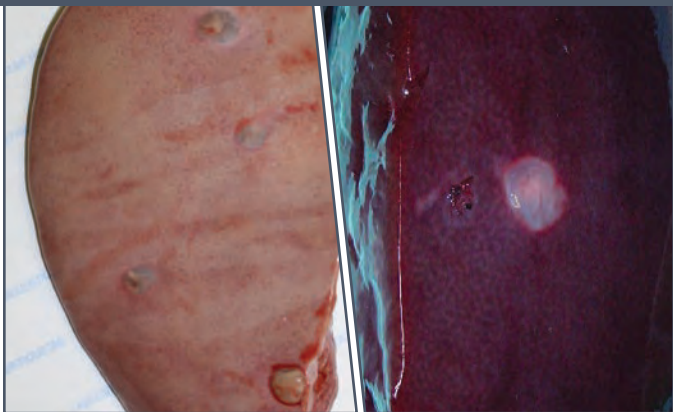
**Safety:** No risk to humans or other animals, but infected meat should not be consumed. Uncontaminated meat is suitable for consumption.

**Prevention:** Do not cut into or consume swellings or suspected infected parts. Liberally trim away any meat that had contact with pus with clean knives.

**How to report/sample:** Email photos and a general location. No sampling requested.

# Tapeworm cysts in liver

(*Taenia hydatigena*)



**Description:** Cysts in the liver are made by larval tapeworms. When canines (e.g. wolves and coyotes) consume a moose liver with larval tapeworms, worms then develop into adults in the wolf intestines. Tapeworm eggs are then shed in wolf scat. Moose eat vegetation contaminated with the eggs from scat.

**Signs:** Several or many small blister-like fluid-filled cysts in the liver often appear like a small circular “window” on the surface and contain a white tapeworm. Eventually they become white, star-like scars on the surface of the liver.

**Safety:** Meat is suitable for human consumption. No direct risk of infection to humans, but there is some risk of indirect infection from exposure to dog or wolf scat when these canines have scavenged or consumed uncooked liver.

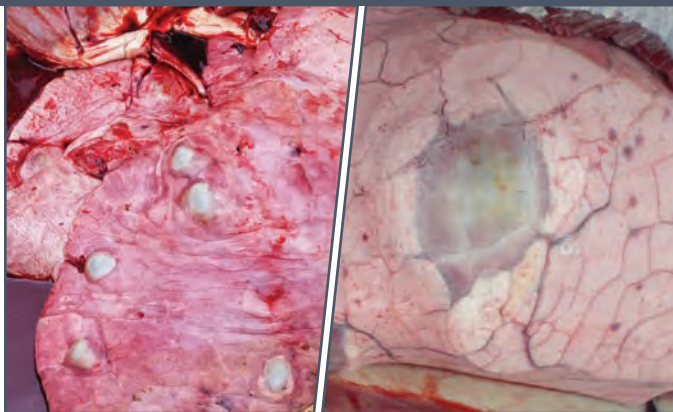
**Prevention:** Do not feed raw infected organs to dogs as tapeworms can infect dogs. Hard freeze or cook any scraps or organs you feed to dogs. Wear gloves when handling potentially contaminated dog scat or wolf hides. De-worm dogs that have scavenged on game.

**How to report/sample:** Liver cysts are common. No reports or samples requested.



# Tapeworm cysts in lungs

Cystic hydatid disease (*Echinococcus canadensis*)



**Description:** Cysts in the lungs are made by larval tapeworms with a similar life cycle to liver tapeworms.

**Signs:** Typically, only in the lungs, with multiple cysts, ½ to 3 inches in diameter, deep in the lungs but may be visible on the lung surface. Cysts have thick walls, and 'explode' a clear, watery fluid and tiny circular larvae.

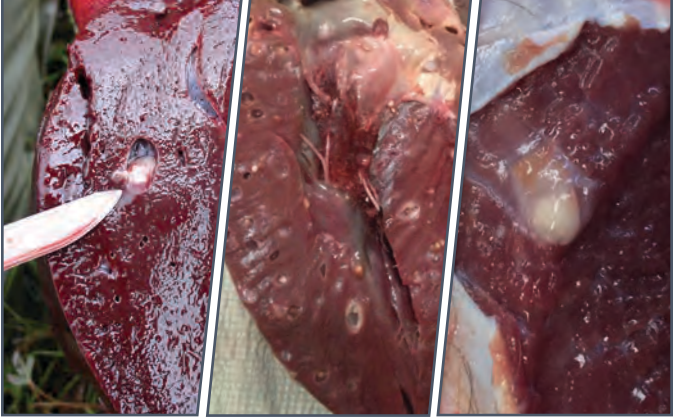
**Safety:** Meat is suitable for human consumption. No direct risk of infection for humans, but there is some risk of indirect infection from exposure to dog or wolf scat when these canines have consumed uncooked lungs.

**Prevention:** Do not feed raw infected organs to dogs as tapeworms can infect dogs. Hard freeze or cook any scraps or organs you feed to dogs. Wear gloves when handling potentially contaminated dog scat or wolf hides. De-worm dogs that have scavenged on game.

**How to report/sample:** Lung cysts are common. No reports or samples requested.

# Tapeworm cysts in muscle/heart

(*Taenia arctos* and *Taenia krabbei*)



**Description:** Cysts in the heart, muscles, or tongue are made by larval tapeworms with a similar life cycle to lung and liver tapeworms. Moose get muscle/heart cysts from ingesting eggs shed in scat of bears (caribou get them from wolf scat).

**Signs:** Cysts are a bit larger than a rice grain, semi-opaque, fluid-filled blisters with a white spot, which is the larvae inside. Cysts are usually in the muscles, especially the legs, and the heart or rarely the tongue.

**Safety:** Meat is suitable for human consumption, and humans are not at risk of infection. Moderate risk to dogs if fed uncooked moose parts.

**Prevention:** Do not feed raw infected organs to dogs as tapeworms can infect dogs. Hard freeze or cook any scraps or organs you feed to dogs. Wear gloves when handling potentially contaminated dog scat or wolf hides. De-worm dogs that have scavenged on game.

**How to report/sample:** Muscle and heart cysts are common. No reports or samples requested.

# Serous atrophy



**Description:** A condition among bulls resulting from metabolic changes occurring late in the rut. This condition is common and normal, and bulls will generally recover, unless they are badly injured or the winter is severe.

**Signs:** Prominent hip bones and sunken muscle over shoulder and rump. Watery, jelly-like fat under the skin, around the heart, kidneys, and over the guts (red, green, or iridescent in color). The odor is acrid, like urine. The bone marrow may be reddish yellow to watery pink in color. The liver may be tan, very soft, mushy in texture (called "fatty liver").

**Safety:** Meat is suitable for human consumption as long as it is free of abscesses (see next page).

**Prevention:** Avoid hunting during peak- or post-rut for large bulls. If the hip bones and sunken muscle are noticeable, consider harvesting another bull that may be more palatable.

**How to report/sample:** If seen at other times, or if other injuries are noted, report to the closest ADF&G office. To verify, unfrozen liver samples and photographs can be submitted.

# Abscesses (“pus pockets”)



**Description:** Abscesses contain pus - an accumulation of white blood cells working to contain an infection. When under the skin, abscesses rupture and drain like a boil. Abscesses form due to a wound, foreign object, or from internal infection.

**Signs:** Soft swelling, may have a white capsule, and contain thick yellow to greenish material. As an abscess resolves, it becomes dry, crumbly and eventually firm, white fibrous scar tissue. May be in any organ, between muscles, or associated with lymph nodes.

**Safety:** Low risk for humans, but infection from pus entering a skin break is possible. If otherwise normal, uncontaminated meat is suitable for consumption when fully cooked.

**Prevention:** Trim liberally around swellings and do not cut into abscesses to avoid contaminating meat. Portions of meat or organs containing abscesses or contaminated by a ruptured abscess should not be eaten. Wash and disinfect any knives that have come into contact with pus.

**How to report/sample:** Abscesses are common. No reports or samples requested.

## Legworm (*Onchocerca cervipedis*)



**Description:** Legworm is a roundworm spread between moose by biting flies.

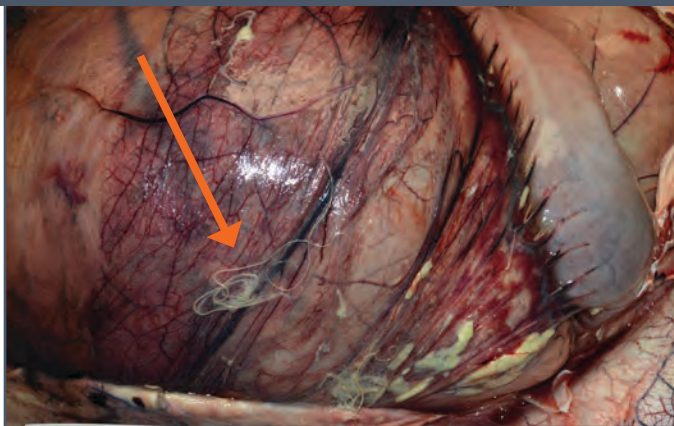
**Signs:** Slender, white thread-like worms up to eight inches long, under the skin of the legs or brisket.

**Safety:** Meat is suitable for consumption. No risk of infection to humans and moose are not usually harmed by carrying the worm.

**Prevention:** Prevention of spread between moose is not feasible or necessary. Legworm is not transmissible to humans.

**How to report/sample:** Email a photograph and a general location. Collect whole worm and submit (frozen or unfrozen) to the closest ADF&G office.

## Setaria peritoneal worm (*Setaria yehi*)



**Description:** Setaria worms are frequently found free ranging in the abdominal cavity of moose, and are 2 to 4 inches long, very thin, and whitish in color. Larvae are spread between moose by biting flies.

**Signs:** Many moose have a few worms with no reaction. Some moose that are already ill or struggling, such as calves in late winter, will develop peritonitis (inflammation) of the abdominal lining.

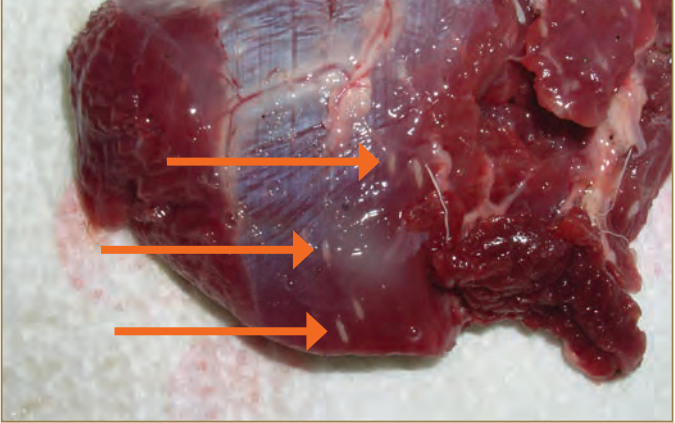
**Safety:** Humans cannot be infected. The meat is suitable for consumption, except when a moose has extensive amounts of yellow pus clots covering the guts.

**Prevention:** There is no risk to people from the presence of worms. If pus is present in the abdomen, cook all meat and prevent pus from entering skin cuts during butchering.

**How to report/sample:** A few worms are very common and reports are unnecessary. If a moose has an abdomen filled with dozens of worms and pus on the organs, please report by email, and include a GPS location and photos.



# Sarcocystis (*Sarcocystis spp.*)



**Description:** *Sarcocystis* is caused by single-celled parasites in muscle of moose, and other big game. Parasites are spread by bears, coyotes, or other carnivores through scat.

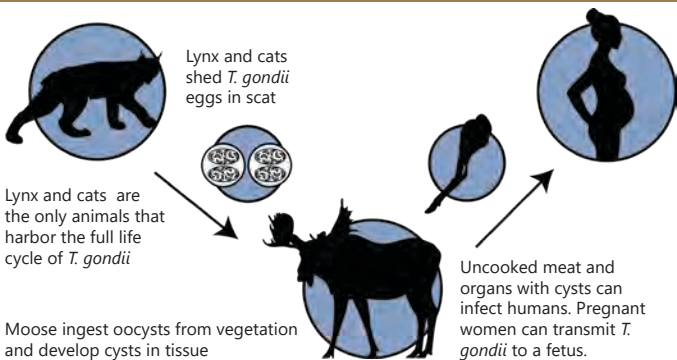
**Signs:** Barely noticeable tiny white streaks common in the muscles or heart. May look like grains of rice.

**Safety:** No known risk to humans, moderate risk to dogs if fed uncooked game.

**Prevention:** Cook meat thoroughly and cook any scraps fed to dogs.

**How to report/sample:** Sarcocystis is common. No reports or samples requested.

# Toxoplasmosis (*Toxoplasmosis gondii*)



**Description:** Toxoplasmosis is caused by a microscopic, single-celled parasite in the muscles and brain. Cats (lynx) are the only hosts that can shed infected eggs (oocysts) into the environment where moose or other intermediate hosts can be infected. Humans may swallow eggs from contaminated soil, water, or raw meat; a fetus can be infected via the placenta. Human symptoms may include no signs at all to flu-like symptoms, eye problems, seizures or coordination problems, or death in infants.

**Signs:** Most infected animals will not show signs of illness, and toxoplasmosis is not visible in the meat. However, moose may be dull, depressed, or have trouble walking or seizures.

**Safety:** This condition is extremely rare in moose, but can be potentially hazardous to pregnant women and fetuses if parasites are transmitted from moose meat to humans.

**Prevention:** Wash hands and butchering instruments after handling raw meat. Cook all meat thoroughly. Pregnant women should not handle or eat uncooked meat.

**How to report/sample:** If a person is diagnosed, contact the AK Dept. of Public Health (main number): (907) 269-8000. Report diagnosis by email to ADF&G if willing.

# Human-caused moose conditions

*Preventable conditions/injuries caused by people*

## **Chokecherry/Bird Cherry tree poisoning**

These invasive ornamental trees (*Prunus spp.*) are toxic to ruminants (cud-chewing mammals) and can kill moose in less than 20 minutes if they ingest leaves after a frost or from a tree that has been stressed or fertilized. Cyanide is released in the rumen and the moose may die. A bitter almond odor may or may not be noticed when the moose is opened. Cyanide gas from the rumen can kill anyone who inhales it in an enclosed space. Moose dying from this can secondarily poison a person or animal if they consume the meat, even if cooked. Fresh clippings should not be left accessible to moose. Never consume a moose if found dead in a residential area *and* the cause of death is unknown.

## **Japanese and Common Yew poisoning**

The ornamental 'evergreen' Japanese yew (*Taxus spp.*) has short, flat needles. All yew are highly toxic to all mammals. If yew is ingested, moose may die nearby the bushes. Do not plant yew bushes, and remove them if you have them.

## **Dog attacks and bite wounds**

Moose living around urban areas are regularly injured by dogs, especially calves. Calves can be killed outright, and both calves and older moose can die within days of being bitten by a dog from the subsequent wound infection.

## **DO NOT FEED MOOSE**

Feeding moose is illegal, and can cause moose to become habituated to people, conditioned to expect food, and aggressive. Especially in winter, the moose digestive tract is adapted to only low quality woody browse. Consumption of incompatible food items such as long stem hay or straw, fruits (particularly bananas), and pelleted feeds can kill moose by causing bloat, severe diarrhea, or an obstruction in the digestive tract. Do not put out salt licks. Aggregations of feeding moose can also increase transmission of parasites and pathogens, and cause increased rates of disease.

For information about wildlife disease, or to learn more about moose and moose hunting, go to:

[www.adfg.alaska.gov](http://www.adfg.alaska.gov) or [www.hunt.alaska.gov](http://www.hunt.alaska.gov).



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Hunters are important founders of the modern wildlife conservation movement. They, along with trappers and sport shooters, provided funding for this publication through payment of federal taxes on firearms, ammunition, and archery equipment, and through state hunting license and tag fees.

