







# A Field Guide To

# COMMON

# WILDLIFE DISEASES

# AND PARASITES

# IN ALASKA





Alaska Department of Fish and Game



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# INTRODUCTION

Although most wild animals in Alaska are healthy, diseases and parasites can occur in any wildlife population. Some of these diseases can infect people or domestic animals. It is important to keep track of wildlife diseases, so changes can be seen and steps taken to reduce their impact.

The information in this field guide should help hunters:

- recognize sickness in an animal before they shoot,
- identify a disease or parasite in an animal they have killed,
- know how to protect themselves from infection,
- help wildlife managers monitor wildlife disease and parasites.

The diseases in this booklet are grouped according to where they are most often seen in the body of the animal: skin, head, internal organs, muscles, general.

## **General Precautions:**

Hunters should look for signs of sickness in animals before they shoot, such as:

- · poor condition (weak, sluggish, thin, or lame),
- swellings or lumps, hair loss, blood, or discharges from the nose or mouth,
- abnormal behaviour (loss of fear of people, aggressiveness).

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# If you shoot a sick animal:

#### · Do not cut into diseased parts.

- Wash your hands, knives and clothes in hot soapy water after you finish butchering and disinfect with a weak bleach solution.
- If meat from an infected animal can be eaten, cook meat thoroughly until it is no longer pink and juice
- from the meat is clear.

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Do not feed parts of infected animals to dogs.

It is important to report wildlife diseases. Turn in samples or report what you see to the nearest ADF&G biologist.

# When collecting samples you should:

- Wear rubber gloves to protect yourself.
- Place each sample in a separate plastic bag.
- Unless otherwise noted, keep samples frozen or cool.
- Record the following information:

Date and location collected 20

Type of animal

Sex and estimated age of the animal

Description of the sample

Any other conditions that may be important (e.g., unusual weather, signs of a struggle)

The pages at the end of this booklet can be used to record your information.



Under Alaska statutes, it is against the law to waste, destroy, abandon or allow to spoil: the meat of big game, other than bear, wolf, or wolverine; and the raw pelt or hide of any furbearing animal, including bears. (Sometimes bear meat <u>must</u> be salvaged. See hunting regulations.) It is also against the law to feed the meat of big game other than bear, wolf or wolverine to domestic animals.

**For more information**, contact your local Fish and Game biologist. (See contact information on page 58.)

# TABLE OF CONTENTS



Contagious ecthyma





Papillomas (Warts)

.....p.8



Samson hair loss in foxes



Moose fly .....p.12



Warbles.....p.14



Lice.....p.16



Nose bots



Lumpy jaw

# **Internal Organs**



Alveolar hydatid disease







Cystic hydatid disease



Liver tapeworm cysts





# Muscle



Muscle tapeworm cysts



Trichinosis



Sarcocystosis





Rabies



Brucellosis



Abscesses



Exertional myopathy



Hoofrot







Besnoitiosis



Starvation/Malnutrition



#### **CONTAGIOUS ECTHYMA**



Dall sheep with scabby ecthyma lesions on muzzle.

#### What causes ecthyma?

 Contagious ecthyma is caused by a virus spread by direct contact with scabs on infected animals.

#### Where does ecthyma occur?

- Ecthyma occurs throughout Alaska wherever Dall sheep, muskox or mountain goats are found.
- · It is most common and severe in younger animals.
- Humans can also be infected.

# What are the signs of ecthyma?

- Pus-filled blisters form into thick scabs on the head, mainly on the lips, mouth, nose, eyelids, and ears.
- Scabs on the mouth may make it difficult or painful for animals to eat.
- Scabs can also occur on the udder and the top of the foot just above the hoof.
- If scabs are on the feet, animals may be lame.
- · Animals that are heavily infected may be weak.

# How can I protect myself?

- You can get ecthyma by touching scabs on an infected animal or by touching anything that has come in contact with the scabs. The virus enters through cuts or scratches in your skin or through your eyes, nose or mouth.
- · Wear gloves.
- Do not cut into blisters or scabs.
- Wash your hands, knives, and clothes with hot soapy water after you finish butchering.

# **Can I eat the meat?**

- Meat from an infected animal is suitable for human consumption.
- Trim off affected parts.
- Severely infected animals may be in poor condition, reducing the quality of the meat.

# **Samples to collect**

1000

Scabs and surrounding area

# **PAPILLOMAS (Warts)**



Moose with numerous warts.

#### What causes warts?

- Warts in animals are caused by viruses similar to those that cause warts in people.
- · Papillomas are spread between animals by direct contact.

#### Where do warts occur?

- Warts are found on the skin of moose or caribou throughout Alaska.
- They are most common in animals younger than 2 years old.

#### What are the signs of warts?

- Affected animals are usually in good body condition.
- Warts are often found on the head but can occur on other parts of the body.
- In caribou and moose, the warts are dark lumps that vary in size from 1/3 to 6 inches. There may be only one or many and the surface may be rough or smooth.

# How can I protect myself?

· You cannot get warts from infected animals.

# **Can I eat the meat?**

- Meat from infected animals is suitable for human consumption.
- · Trim off parts containing warts.

# **Samples to collect**

· Warts

#### SAMSON HAIR LOSS OF FOXES/WOLVES



Patterns of hair loss in red foxes.

# What causes the samson condition in foxes and wolves?

 We believe the cause of this abnormal pelt condition is genetic. However, we are not 100% confident of that explanation. We have investigated and eliminated many other potential causes such as viruses, bacteria, and fungi. At this time, diagnosis is based on a visual examination of external condition. There is currently no biologic test to confirm the diagnosis.

## Where does the samson condition occur?

This pelt problem was common in foxes throughout the Interior during the early 1980s. There were also reports from other regions of Alaska. Some trappers reported that
more than 50% of the foxes they caught showed signs of the problem. The intensity of the problem has declined since the mid-1980s. However, there are still reports (in both foxes and wolves) every year.



# What are the signs of the samson condition?

- Furbearers have two types of hair shafts long spiky guard hairs and short soft underfur.
- · Samson foxes are missing some of the guard hairs.
- The pattern of hair loss is always the same on the right side and the left side of the fox's body.
- The severity of the problem can vary from small patches of missing hair on the hips to almost total absence of guard hairs on the body (see diagram).

#### How can I protect myself?

Humans are not susceptible to this condition.

#### **Can I eat the meat?**

Fox meat is not generally eaten by humans.

# **Samples to collect**

1000

 Submit unskinned fox (or wolf) carcasses or photos to your local ADF&G office.

#### MOOSE FLY



Bloody wounds on hind leg of moose due to fly bites.

# What causes small open wounds on the hind legs of moose?

 These wounds are caused by a biting fly commonly known as the "moose fly." Its scientific name is Haematobosca alcis. Moose flies are slightly smaller than a common housefly.

#### Where are the flies found?

- The flies are found wherever moose are found in Alaska.
- Apparently, the flies do not attack other members of the deer family (such as deer, elk, or caribou).

#### What are the signs of moose fly attacks?

 The flies bite the hindquarters of moose just above the hock. Hundreds of flies may attack a moose at one time. The numerous bites produce wet open sores, measuring up to 1 inch in diameter. The wounds are often bloody.

# How can I protect myself?

· The flies do not attack humans.

# Can I eat the meat?

 Neither the flies nor the wounds affect the edibility of the meat in any way. The meat is safe to eat.

13

# **Samples to collect**

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 Report observations or submit photos to your local ADF&G office.

#### WARBLES



Underside of caribou hide with several warbles.

#### What causes warbles?

- Warbles are parasitic larvae of the warble fly.
- Lifecycle: The adult fly lays eggs on the hairs of the caribou's legs and lower body. The eggs hatch into larvae. The larvae penetrate the skin, and travel under the skin to the caribou's back. The warbles grow there until early summer, when they break through the skin and drop to the ground.

# Where are warbles found?

 Warbles can be found on caribou throughout their range in Alaska.

#### What are the signs of warbles?

- · Caribou usually appear healthy, although animals with
- heavy infections may be weak.
- While laying their eggs, warble flies harass caribou and interfere with feeding.
- Warble fly larvae are found under the skin on the caribou's back.



- Larvae are yellowish-white, oval grubs about 1 inch long.
- · There is often swelling and fluid in nearby tissue.
- The number of warbles can range from 1 to over 1000 on each animal.

#### How can I protect myself?

You cannot be infected by warble flies or their larvae.

#### **Can I eat the meat?**

- Meat from affected animals is suitable for human consumption.
- Warbles in caribou reduce the quality of both hide and carcass.

# **Samples to collect**

· Larvae of the warble fly



15

Warble fly larva.



# LICE



Trichodectes canis louse from a wolf.

#### What causes lice?

- Lice are small wingless insects that are spread by direct contact between animals.
- There are two kinds of lice, biting lice and sucking lice.

# Where are lice found?

- There are many types of lice that are found on many different animals.
- Lice are very host specific and don't move from one type of animal to another.
- The dog louse, *Trichodectes canis*, is found on wolves from the Kenai Peninsula and also northwest of Palmer. Different species of lice are also occasionally found on ducks and grizzly bears throughout the state.

#### What are the signs of lice?

- Lice are small (1/16 to 1/4 inch), flat, wingless insects with bodies divided into three distinct sections.
- · Lice attach their very small eggs to the hairs of their host.

16

- Biting lice cause mild hair matting or loss.
- · Sucking lice pierce the skin and suck blood.
- Large numbers of lice may cause weakness from blood loss (and possibly death in young or sick animals).
- Sucking lice can also cause allergic reactions.

#### How can I protect myself?

- You cannot get lice from infected animals.
- · Lice may reduce the value of the animal pelt.

# **Can I eat the meat?**

 Meat from affected animals is suitable for human consumption.

17

#### **Samples to collect**

Whole lice

#### NOSE BOTS



Caribou throat with two nose bots.

#### What causes nose bots?

- This condition is caused by the larvae of the bot fly.
- Lifecycle: The adult female bot fly deposits larvae in the nostrils of caribou. Nose bot larvae attach and grow in a cluster in the caribou's throat near the base of the tongue. The larvae are sneezed out in the spring.

#### Where are nose bots found?

 Nose bots can be found in caribou throughout their range in Alaska.

## What are the signs of nose bots?

- Caribou usually appear healthy.
- When laying their eggs, bot flies harass caribou and interfere with feeding.
- Nose bot larvae are found in the sinuses and airways at the back of the throat.
- The worm-like larvae are white when they begin to develop but grow to 3/4 to 1 1/2 inches in length over the winter and become yellowish-brown.

# How can I protect myself?

· You cannot be infected by nose bot flies or their larvae.

# Can I eat the meat?

 Meat from affected animals is suitable for human consumption.

# Samples to collect

· Larvae of the bot fly

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# LUMPY JAW



Abscessed caribou lower jaw.

#### What causes lumpy jaw?

- Lumpy jaw is caused by bacteria normally found in the mouths of healthy animals.
- The bacteria can enter through wounds in the mouth, which can be caused by coarse feed or when teeth break through the gums during development.

#### Where does lumpy jaw occur?

- Lumpy jaw can be found in ungulates such as sheep, caribou and moose throughout their range in Alaska.
- The disease does not spread between animals.

#### What are the signs of lumpy jaw?

- Infection of the jaw bone itself causes firm swellings that can be quite large.
- Swellings containing thick yellow pus (abscesses) can also be found around the mouth and jaw.
- Lumpy jaw may interfere with the animal's ability to eat.

 Other than the swelling on the jaw, animals may appear healthy.

# How can I protect myself?

- · You cannot get lumpy jaw from infected animals.
- Be careful not to cut into pus-filled swellings. If this happens, pus can be spread and contaminate other parts of the carcass.

# **Can I eat the meat?**

- · Parts containing abscesses should not be eaten.
- The remainder of the carcass is suitable for human consumption.

#### **Samples to collect**

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Lower jaw and surrounding tissue

# ALVEOLAR HYDATID DISEASE



Liver from healthy rodent (right) and rodent with Echinococcus multilocularis (left).

#### What causes alveolar hydatid disease?

- Alveolar hydatid disease is caused by a tapeworm known as Echinococcus multilocularis.
- Lifecycle: The adult tapeworm lives in the intestines of foxes (primarily arctic fox, but also red fox and wolf). The adult tapeworms lay eggs. The eggs are passed to the environment in the fox feces. The eggs contaminate vegetation where the feces falls. Rodents (mice, voles, lemmings) eat the vegetation and also ingest the eggs. The eggs develop into larvae in the gut cavity of the rodent. The larvae are enclosed inside of cysts which form large grape-like clusters in the gut cavity. A fox eats the rodent and also ingests the larvae. The cycle is complete when the larvae mature into adults and release eggs in the intestine of the fox.
- Dogs can also harbor the adult stage of the tapeworm in their intestine. Humans can develop larval cysts in the gut cavity if they ingest eggs shed in fox or dog feces.

# Where does alveolar hydatid disease occur?

 This disease is limited to the western coastal portions of Alaska and islands such as St. Lawrence Island.

# What are the signs of alveolar hydatid disease?

- Infected dogs and foxes show no outward signs of disease.
- Infected rodents may appear bloated due to the large larval cysts in their gut cavity.
- If the gut cavity of an infected rodent is opened, the large grape-like clusters will be easily observed.

#### How can I protect myself?

- Humans are susceptible to this parasite.
- The larval stage of the parasite which is found in rodents poses no threat to humans.
- Humans should wear gloves when cleaning up dog feces or handling harnesses, and wash hands thoroughly afterwards.
- Worm dogs regularly.
- Dispose of dog feces to avoid contact with parasite eggs.

# **Can I eat the meat?**

 Neither rodent meat nor fox meat is typically eaten by humans.

# **Samples to collect**

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- Dog feces can be submitted to a veterinary lab for a parasite examination.
- Rodents that appear to be infected can be submitted to ADF&G.

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# LIVER TAPEWORM CYSTS



Taenia hydatigena cyst.

#### What causes liver tapeworm cysts?

- This condition is caused by the larvae of the tapeworm Taenia hydatigena.
- Lifecycle: The tapeworm needs two hosts: a carnivore (e.g., wolf or dog) and an herbivore (e.g., caribou). The adult tapeworm grows and lays eggs in the intestines of the carnivore. Eggs come out in the carnivore's droppings and contaminate plants that are eaten by the herbivore. The eggs hatch into larvae that travel to the herbivore's liver where they form cysts. Carnivores become infected when they eat liver containing cysts.

#### Where do liver tapeworm cysts occur?

- The adult tapeworm occurs in the intestine of carnivores (wolves, lynx, dogs and cats) without causing any harm.
- The larval stage of this tapeworm can occur in caribou, moose, elk, Sitka black-tailed deer and Dall sheep.
- In Alaska Taenia hydatigena occurs commonly in caribou and moose.

#### What are the signs of liver tapeworm cysts?

- Carnivores (e.g., wolves) and herbivores (e.g., caribou) usually appear healthy.
- In the herbivore intermediate host, the larvae form small cysts which may appear like a small circular "window" on the surface of the liver. There also may be white, star-like scars on the surface of the liver.

# How can I protect myself?

- You cannot be infected by the cysts of *T. hydatigena* that occur in moose or caribou.
- Cysts can easily be removed from the liver during butchering.

# **Can I eat the meat?**

- Meat from infected animals is suitable for human consumption.
- · Cooking will kill the parasite.
- Dogs can be infected with tapeworms if they eat the liver cysts.
- · Do not feed infected parts to dogs.

# **Samples to collect**

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Cysts or affected liver tissue

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# TULAREMIA



Spleen from healthy snowshoe hare (right) and hare with tularemia (left).

#### What causes tularemia?

- Tularemia is caused by a bacterium known as Francisella tularensis.
- There are two major cycles of this disease. The first occurs on land. Snowshoe hares are the primary host. The disease is spread from an infected hare to a susceptible hare by means of ticks. Ticks are only present on hares from May through September. The disease essentially disappears from October through April.
- The second cycle occurs in water. Beaver and muskrats are the primary hosts. Infected animals die in a slough, pond or lake. As the carcass decomposes, large numbers of bacteria are released into the water. Susceptible animals are exposed when they drink or swim in the water.

# Where does tularemia occur?

In Alaska, this disease is most common in the Interior.

# What are the signs of tularemia?

- In the latter stages of disease, hares become very slow.
- Tularemia causes some internal organs (such as the spleen and liver) to become enlarged. Sometimes, white spots may also be seen on these organs.

#### How can I protect myself?

- There is no need to worry about the ticks which transmit the disease between hares. These ticks do not attach to humans.
- Wear rubber gloves when gutting hares, muskrats and beavers during warm weather months.
- Dogs and cats can die from tularemia. Infected hares are easy for dogs and cats to catch. Pets are infected when they eat the internal organs of infected hares. This disease is one reason why pets should not be allowed to roam free.

# **Can I eat the meat?**

 Normal cooking temperatures kill bacteria in the meat. Therefore, it is safe to eat. However, human exposure typically occurs while gutting a hare.

#### **Samples to collect**

 You can submit an entire hare, muskrat or beaver carcass (or just the spleen and liver) to ADF&G.

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# CYSTIC HYDATID DISEASE



Two hydatid cysts in moose lungs.

#### What causes hydatid disease?

- Cystic hydatid disease is caused by the larvae of the tapeworm *Echinococcus granulosus*.
- Lifecycle: The tapeworm needs two hosts: a carnivore (e.g., wolf or dog) and a herbivore (e.g., caribou). The adult tapeworm grows and lays eggs in the intestines of the carnivore. The eggs come out in the carnivore's droppings and contaminate plants which are eaten by the herbivore. The eggs hatch into larvae that travel to the herbivore's lungs where they form cysts. Carnivores become infected when they eat lungs that contain cysts.

#### Where does hydatid disease occur?

- The adult tapeworm occurs in the intestines of wolves and dogs.
- The larval form or cyst occurs in moose, caribou, bison, elk and deer, and can occur in humans.
- In Alaska cystic hydatid disease occurs commonly in moose and caribou.



# What are the signs of hydatid disease?

- Carnivores (e.g., wolves) and herbivores (e.g., moose) usually appear healthy.
- In moose and caribou, the cysts have thick walls and are filled with a clear watery liquid.
- Cysts are usually found in the lungs but can also occur in the liver or other organs.
- Cysts can be 3/4 to 4 inches in diameter, but most are 3/4 to 2 1/2 inches.
- The surrounding tissue is usually normal.

# How can I protect myself?

- You can be infected from tapeworm eggs found in the droppings of wolves and dogs.
- · Wear gloves when handling scats from wolves or foxes.
- The lung cysts in moose and caribou do not infect people.
- Worm dogs regularly, keep dog lots clean and dispose of dog feces to minimize exposure to eggs of this parasite. Also, use care when handling dog harnesses and other gear that may be contaminated with *Echinococcus* eggs.
- When skinning wolves and foxes, keep in mind that the eggs of this parasite can cling to the fur around their tail and anus.

# **Can I eat the meat?**

- Meat from infected animals is suitable for human consumption.
- · Do not eat any tissues or organs containing cysts.
- Dogs and wolves can be infected from eating cysts in organs of moose or caribou and spread the disease to people in their droppings.

29

· Do not feed infected parts to dogs.

# **Samples to collect**

Portions of tissue containing cysts

#### LUNGWORMS



Lung with dark infected areas. Inset: Enlarged adult worms in airway.

# What causes lungworm infections?

- A variety of roundworm parasites are known as "lungworms" (e.g., *Dictyocaulus, Protostrongylus* spp.).
- Lifecycle: Adult worms are found in the lungs where they lay eggs that hatch into larvae. The larvae are coughed up, swallowed, and passed in the animals' droppings. In some lungworms, the larvae are taken up by a snail or slug where they develop into an infective stage. The snails are then eaten by herbivores when feeding on plants. The larvae penetrate the animal's intestines and travel to the lungs where they develop into adult worms. Other lungworms do not need a snail or slug host. The larvae develop into the infective stage on plants that are then eaten by the herbivore.

#### Where do lungworm infections occur?

- Lungworms are found in bison, muskox, caribou, reindeer, and Dall sheep.
- In Alaska a number of different lungworms occur commonly in caribou and muskox.

# What are signs of a lungworm infection?

- Animals often appear healthy.
- Animals with severe infections may cough and have difficulty breathing, especially after running.
- They may be generally weak and thin and have a harsh, dull hair coat.
- When butchering, you may find adult worms or small round gray lumps of dead tissue up to 3/4 inch in diameter in the lungs.
- Lungworms are white, threadlike worms that range in size from 1/16 to 3 inches long.

# How can I protect myself?

You cannot become infected by lungworms.

# Can I eat the meat?

 Meat from infected animals is suitable for human consumption.

# Samples to collect

Adult worms and/or parts of lungs with cysts, droppings

#### MUSCLE TAPEWORM CYSTS



Moose meat with small Taenia krabbei cysts.

# What causes muscle tapeworm cysts?

- This condition is caused by the larvae of the tapeworm Taenia krabbei.
- Lifecycle: The tapeworm needs two hosts: a carnivore (e.g., wolf or dog) and an herbivore (e.g., caribou). The adult tapeworm grows and lays eggs in the intestines of the carnivore. Eggs come out in the carnivore's droppings and contaminate plants that are eaten by the herbivore. The eggs hatch into larvae that travel in the blood to other parts of the herbivore's body where they form cysts in the muscle. Carnivores become infected when they eat meat with cysts.

#### Where do muscle tapeworm cysts occur?

- The adult tapeworm occurs in wolves, lynx, bears and dogs without causing any harm.
- The larval stage occurs as cysts most commonly in caribou and moose.

# What are the signs of muscle tapeworm cysts?

- · Animals will usually appear healthy.
- In the herbivore host, cysts are an oblong, semi-clear, fluid-filled sac with a white spot 'head' at one end.
- Cysts generally occur in both muscle and the heart but may also occur in unusual sites.
- Surrounding tissues are usually normal.

# How can I protect myself?

- You cannot be infected by the cysts of T. krabbei.
- Cysts can be easily removed during butchering.

# **Can I eat the meat?**

 Meat from infected animals, even when dried and uncooked, is suitable for human consumption.

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- · Cooking will kill the parasite.
- Dogs can be infected with tapeworms if they eat the muscle cysts.
- Do not feed infected parts to dogs.

# Samples to collect

Portions of muscle containing cysts

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# TRICHINOSIS



Bears and walruses are common hosts for trichinosis.

#### What causes trichinosis?

- Trichinosis is caused by a roundworm called *Trichinella* spiralis.
- Lifecycle: The larvae of the roundworm grows and mates in the intestines of the host animal. The females deposit larvae that travel in the blood to other parts of the body where they form cysts in the muscle. Animals become infected when they eat meat with cysts.

#### Where does trichinosis occur?

- Trichinosis occurs in bears (black, grizzly and polar bears), wolves, foxes (arctic and red), wolverine, lynx, walruses, seals, and ground squirrels.
- In Alaska, trichinosis is common in many species and locations.
- Humans and dogs can also get trichinosis by eating infected meat.

# What are the signs of trichinosis?

- · Animals may appear healthy.
- Trichinosis is hard to detect when butchering because there are few signs.
- Larvae form cysts usually in the muscles of the jaw, tongue, and diaphragm.
- · Cysts may not be visible to the naked eye.
- · Animals may have swollen intestines with small bruises.
- Affected muscles and associated lymph nodes (glands) can be soft and swollen.

#### How can I protect myself?

- You can get trichinosis by eating meat from infected animals that has not been thoroughly cooked.
- All bear and lynx meat should be considered possibly infected.

#### **Can I eat the meat?**

- People can get trichinosis by eating infected meat that has not been adequately cooked.
- Meat should be well cooked (internal temperature of meat should be at least 150° F).
- Freezing, smoking, drying, salting and microwaving may not kill the larvae.
- Do not feed infected parts to dogs.

#### **Samples to collect**

- Tongue and jaw muscles, diaphragm
- A large sample of muscle (at least 4 oz.) is required for analysis

#### SARCOCYSTOSIS ("ricebreast" of ducks)



Sarcocysts in breast muscle of duck.

#### What causes sarcocystosis?

- Sarcocystosis is caused by the cyst stage of a singlecelled parasite.
- Lifecycle: The parasite needs a waterfowl host and a carnivore host. The parasite multiplies in the waterfowl forming cysts in the muscles. The carnivore becomes infected when it eats meat from a duck with cysts. The parasite reproduces in the carnivore's intestine without harming the carnivore. It comes out in the carnivore's droppings and contaminates vegetation, which is eaten by ducks.

# Where does sarcocystosis occur?

 Sarcocystosis occurs in many species of ducks throughout Alaska.

#### What are the signs of sarcocystosis?

- · Waterfowl and carnivore hosts usually appear healthy.
- When butchering infected ducks, cysts may be observed in the breast muscle.
- Cysts may look like grains of rice (whitish streaks) running in the direction of the muscle fibers.

#### How can I protect myself?

 Humans cannot be infected by the cysts of Sarcocystis spp. in meat.

# **Can I eat the meat?**

- Meat from an infected duck is suitable for human consumption.
- · Cooking will kill the parasite.
- · Do not feed infected meat to dogs.

# **Samples to collect**

· Breast muscle of ducks.

37

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# RABIES



Rabid foxes often lose natural fear of humans. Avoid contact.

#### What causes rabies?

 Rabies is caused by a virus spread in the saliva of infected animals.

#### Where does rabies occur?

- All warm-blooded mammals can be infected.
- In Alaska, rabies occurs most often in arctic fox and red fox from the North coast, West coast and Alaska Peninsula.
- Rabies has also been found in dogs, red foxes, wolves, caribou, and polar bears.
- Humans can also get rabies.

#### What are the signs of rabies?

- Rabid animals often lose their fear of humans and may become vicious and attack for no reason.
- They may have a dropped jaw and appear to be "foaming at the mouth."
- Rabid animals may appear weak or paralyzed.

 They also sometimes chew rocks, dog chains, and other non-food items.

#### How can I protect myself?

- You can get rabies if you are bitten or licked by an infected animal or if saliva from an infected animal comes into contact with your skin, eyes, nose, lips, cuts or scratches.
- Rabies can be fatal for humans and signs may be undetectable for weeks or months.
- · Do not go near an animal that you think has rabies.
- Any person exposed to an animal that may have rables should immediately contact the local nursing station or hospital.
- Report any animals suspected of having rabies to the nearest ADF&G biologist or the Virology/Rabies Unit in Fairbanks (474-7017).
- If you must kill an animal that you think has rabies, do not shoot it in the head.
- Have your dog vaccinated against rabies.
- There are also vaccines against rabies for humans. If you are in a high-risk area or profession (e.g., trapping), contact your health aide or hospital about getting a rabies vaccination.

# **Can I eat the meat?**

- · Do not eat meat from an animal that has rabies.
- Do not feed the meat to dogs.

# Samples to collect

- Do not collect samples yourself.
- For foxes, double-bag the entire animal in strong plastic garbage bags and put in a leak-proof container. Contact the nearest Fish and Game office or the Virology Unit in Fairbanks. Frozen specimens are okay. For larger animals, do not cut into carcasses suspected of being rabid.
- Contact your nearest Fish and Game biologist. (See page 58.)

- (7)

11

# ABSCESSES



Abscesses and green pus in caribou muscle.

#### What causes abscesses?

 An abscess is a pocket of pus in an animal's tissue. It is usually caused when a wound becomes infected.

# Where do abscesses occur?

- They may occur in any species of animal.
- In Alaska, abscesses occur periodically in a variety of species.

#### What are the signs of an abscess?

- Animals usually appear healthy and may not show any signs of disease.
- Most abscesses are found while butchering.
- Abscesses can be found anywhere on or inside the body in muscle or other tissue.
- Usually, they are firm lumps of white fibrous tissue filled with thick white or green pus.

## How can I protect myself?

 Be careful not to cut into an abscess. If this happens, pus can be spread and contaminate other parts of the carcass.

# **Can I eat the meat?**

- Portions of meat containing abscesses should not be eaten.
- The rest of the carcass is suitable for human consumption.

# Samples to collect

Abscess and surrounding tissue



# BRUCELLOSIS



Swollen caribou "knee" joint due to brucellosis.

# What causes brucellosis?

 Brucellosis is a highly contagious disease caused by bacteria called *Brucella suis* type 4 in caribou and reindeer. It is spread in the afterbirth and fluids during calving.

#### Where does brucellosis occur?

- Brucella suis occurs naturally in caribou and reindeer and has also been seen in muskoxen and moose.
- Brucella is most common in the four arctic caribou herds (Western Arctic, Teshekpuk, Central Arctic and Porcupine herds). Predators such as bears and wolves are exposed when they feed on infected caribou.
- Humans can be infected by Brucella suis type 4.

#### What are the signs of brucellosis?

- Animals may appear healthy and not show any signs of disease.
- Brucellosis usually affects the reproductive organs and leg joints.

42

- Often, animals will have swollen leg joints causing limping or lameness (especially in the front legs).
- When butchering, you may find pus-filled swellings under the skin, in the meat or in the internal organs.
- The testicles or womb may be swollen.
- In people brucellosis often causes a high fever that frequently comes and goes.

#### How can I protect myself?

- You can get brucellosis through exposure to contaminated parts. The bacteria can enter through cuts or scratches in your skin or through your eyes, nose or mouth. You can also get brucellosis by eating infected meat that has not been fully cooked.
- · Do not cut into diseased parts.
- · Do not spill fluid from the womb onto the meat.
- Use extreme care when handling any fetal membranes or aborted tissues.
- Wash your hands, knives and clothes with hot soapy water after handling the animal.
- Report any animals suspected of having brucellosis to your nearest ADF&G biologist.

### **Can I eat the meat?**

- Meat from animals with brucellosis should be thoroughly cooked.
- Freezing, smoking, drying and pickling do not kill Brucella.
- Raw bone marrow from infected animals can contain the bacteria.
- Do not feed diseased parts to dogs.

#### **Samples to collect**

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Swollen joints and other infected areas

10

# EXERTIONAL MYOPATHY



Shoulder blade and leg of Dall sheep. Diminished muscles due to myopathy.

#### What causes exertional myopathy?

 Exertional myopathy is a muscle disease that can occur when wild animals are chased, handled or stressed.

#### Where does exertional myopathy occur?

- It is most commonly seen in ungulates (hoofed animals) like moose and caribou, but has been reported in a wide variety of wild animals and birds.
- · It can occur whenever animals are chased or handled.

#### What are the signs of exertional myopathy?

- · Animals may appear depressed, weak and stiff.
- The muscles, heart and kidney are usually affected but signs may be difficult to see.
- There may be differences in the color and textures of muscle groups.
- Early in the disease, affected muscles may look wet and have small bruises.



8

- · Later, the muscle becomes pale, dry, and very soft.
- · In severe cases, entire muscles may be torn.
- · The heart muscle may have pale areas or streaks.
- · Lungs are usually dark and wet.
- In bad cases, the bladder may contain red-brown urine and kidneys may be dark brown.

# **Can I eat the meat?**

- Meat from affected animals is suitable for human consumption.
- Exertional myopathy may cause muscle changes that decrease the quality of the meat.

#### Samples to collect

- Portions of muscle from several different areas of the body, as well as sections of the heart and kidney.
- These samples should not be frozen. Keep cool and take to your nearest ADF&G biologist.

45

#### HOOFROT



Swollen caribou hoof with hoofrot.

#### What causes hoofrot?

- This disease is caused by the bacterium known as Spherophorous necrophorous.
- This bacterium is a normal inhabitant of the soil. It can also be found in the mouth and intestinal tract of many species of animals.
- The bacteria often enter a susceptible host through a break in the skin directly above the hoof.

#### Where does hoofrot occur?

- Caribou and reindeer are the most common hosts of hoofrot infection.
- This disease can occur in any caribou herd. During the late 1990s, it was observed in the Mulchatna and Western Arctic herds.
- Outbreaks of disease are most common and most severe during periods of extended rainy weather.

#### What are the signs of hoofrot?

- Abscesses form directly above the hoof. The hoof may swell 2 – 3 times its normal size. The abscess contains thick, foul-smelling pus.
- Infected caribou often limp.
- Abscesses may also be found in other locations, such as the liver, lungs or mouth.

#### How can I protect myself?

- People are theoretically susceptible to infection. However, there have never been any human cases of this disease reported in Alaska.
- Humans should avoid direct contact with pus-filled abscesses.
- If possible, wear rubber gloves when butchering a caribou with abscesses on the hooves.

# **Can I eat the meat?**

- The meat of caribou with hoofrot is safe to eat.
- Discard the infected leg. Cook the remainder of the meat thoroughly.

# **Samples to collect**

 Remove the lower leg at the first joint. Place it in a plastic bag and keep cool. Submit it to your local ADF&G office.

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# INJURIES



Broken ribs due to injury.

#### What causes injuries?

- Injuries are quite common in wild animals.
- Animals can often survive even with bad injuries such as broken bones.
- · There are four major causes of injuries in wild animals:

vehicle collisions, gunshot wounds, fighting with other animals of the same species, predation.

# What are the signs of injuries?

# **Collisions:**

 Most animals hit by vehicles are killed immediately, although some may survive.

#### **Gunshot Wounds:**

- Most animals that are wounded during hunting die from their wounds. Animals with "old" gunshot wounds are not often seen.
- Gunshot wounds, particularly those from low caliber weapons, may be difficult to see through the animal's hair. They are more visible on the flesh side of the hide.

# Fighting within a species:

 Serious injuries caused by fighting between animals of the same species are uncommon. Occasionally, dead animals are found with gore wounds (e.g., bison) or bite wounds (e.g., wolves) on the throat and neck.

# **Conflict between species (predation):**

- Wounds are usually found on the hind legs, neck and head and sometimes on the flank.
- There is usually a lot of blood that collects under the skin and extends for some distance in one direction from the wound.
- Teeth marks may not go all the way through the hide but there is usually a bruise or bleeding in the skin at the site.
- The animal may also have had a disease that allowed it to be more easily killed by a predator.
- Predators may also be injured while hunting for food.
   Wolves have been found with healed broken ribs and cracked skulls that they probably got when attacking large animals, such as moose.

# Can I eat the meat?

- Unless some other condition is present, meat from affected animals is suitable for human consumption.
- Any of these injuries might reduce meat quality.

# **Samples to collect**

Portions of affected tissues



# **BESNOITIOSIS (Bone Meal Disease)**



Hair loss and roughened skin on caribou muzzle. Sometimes called "sand paper caribou."

# What causes besnoitiosis?

- Besnoitiosis is caused by an intracellular parasite (Besnoitia tarandi).
- Lifecycle: The parasite needs both an herbivore (e.g., caribou or muskox) and a carnivore host. The parasite multiplies in the herbivore forming cysts that contain many spores. The carnivore becomes infected when it eats meat from a herbivore with cysts. The parasite comes out in the carnivore's droppings and contaminates plants that are eaten by herbivores.

# Where does besnoitiosis occur?

- Besnoitia may be able to infect a wide range of ungulates (hoofed animals).
- · It occurs in caribou, reindeer, and muskoxen.
- · In Alaska, besnoitiosis occurs commonly in caribou.

# What are the signs of besnoitiosis?

- Animals usually appear healthy.
- Heavily infected animals may lose hair on their lower legs and face, and skin may be thick.
- Besnoitiosis can be most easily identified when skinning the lower legs.
- Cysts are hard and feel like a slight roughness ("sand paper") over the bone and skin.
- Cysts appear as clear to white very small round lumps (like grains of corn meal) embedded in tissue."
- · Similar tiny cysts may be visible on the eye.

# How can I protect myself?

You cannot get besnoitiosis from infected animals.

# Can I eat the meat?



- Cook meat well.
- · Do not feed infected meat to dogs.

#### **Samples to collect**

Lower front leg or affected tissues

AT

## STARVATION-MALNUTRITION



Sections of leg bones from caribou, with gradually depleted fat from left to right.

#### What causes starvation-malnutrition?

- Starvation occurs when an animal is not able to get the amount of energy or nutrients from food that it needs.
- There may not be enough food available, or the animal may not be able to reach or get nutrients from food because of environmental factors (deep snow or a hard crust) or physical problems (injury, disease, parasites, poor teeth).

#### When does starvation-mainutrition occur?

- Starvation and malnutrition can affect any wildlife species and usually affects young, old, weak, or sick animals.
- It usually occurs in winter.

#### What are the signs of starvation-malnutrition?

- Animals may be weak with not much body fat.
- · The skin may appear loose with a dull, rough hair coat.
- Animals may have humped or sagging backs, sunken eyes, and small tucked up bellies.



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- The bones of the shoulders, ribs, back and hind end may stick out.
- When butchering, you may notice a lack of fat under the skin, around the heart, kidneys and other organs, and in the bone marrow (e.g., thigh bone).
- The marrow of a starving animal may be a red or yellow, jelly-like liquid. Bone marrow from a healthy animal is usually solid, white and waxy.
- Muscles and organs such as the liver may have shrivelled.
- The intestines and stomach may not contain much food or may be full of dry, poor quality food.

# **Can I eat the meat?**

- Meat from affected animals is suitable for human consumption.
- Starvation and malnutrition may decrease the quality of the meat.

#### **Samples to collect**

- Any long leg bone (e.g., femur) or jaw bone.
- The easiest way to tell if an animal has died of starvation is to measure the amount of fat in the marrow of the femur.

53

# GLOSSARY

**Bacteria** - one-celled microorganisms. Bacteria may be free-living, saprophytic (feed on dead or decaying organic matter) or pathogenic (cause disease).

Carnivore - an animal that eats meat, such as a wolf, bear, wolverine, fox, dog.

**Connective tissue -** a tissue that connects, supports, binds, or separates other tissues or organs.

Cyst - an abnormal membranous sac containing a liquid or semisolid substance.

**Diaphragm** - the muscular membrane dividing the chest and abdomen. Important in expanding the chest for breathing.

Fibrous - having, consisting of, or resembling fibers (threads).

Herbivore - an animal that eats plants, such as a caribou, moose, muskox, bison, Dall sheep, rabbit, ground squirrel.

Host - an organism whose body provides nourishment and shefter for another.

Larva - early stage in the life cycle of a parasite, usually wingless and worm-like and usually incapable of reproduction.

Lesion - wound; injury.



Lymph node - small oval or round gland that makes up part of the immune system that removes bacteria and foreign particles from the body.

Nutrient - substance necessary for life and growth.

Parasite - an organism that grows, feeds, and lives on or in another organism to whose survival it contributes nothing.

Spore - a reproductive cell.

Tissue - any group of specialized cells that make up part of a plant or animal (e.g., muscle tissue; connective tissue).

Ungulate - a hoofed mammal, such as a caribou, moose, muskox, bison, Dall sheep, goat.

Virus - simple sub-microscopic infectious agent that often causes disease in plants, animals and bacteria; unable to replicate without a host cell.



# DISEASE REPORT FORM

# • Reporting the occurrence of wildlife diseases is important.

Date	Species	Sex	Age	Location
	Caribou	F	Yearling	Lake Illiamna
2/12/00				
-			-	-
			4	
	-			
6				

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Make a note of diseased animals you see and report your observations to your local Fish and Game biologist.

Signs of disease, parasites or injury	Samples Collected
Swollen leg joints	1
-	
	3
THE PARTY &	

57

# CONTACTS

If you have questions about a diseased animal you have observed, call your local Fish and Game office.

**Anchorage** 267-2182

Barrow 852-3464

Bethel 543-2979

Cordova 424-3215

Douglas 465-4265

Delta Junction 895-4484

Dillingham 842-2334

Fairbanks 459-7213

Galena 656-1345

Glennallen 822-3461

Homer 235-8191 Ketchikan 225-2475

King Salmon 246-3340

Kodiak 486-1880

Kotzebue 442-3420

McGrath 524-3323

Nome 443-2271

Palmer 746-6300

Petersburg 772-3801

Sitka 747-5449

Soldotna 262-9368

**Tok** 883-2971

NOTES



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