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NORTH DAKOTA GAME AND FISH DEPARTMENT

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**OTHER ND
STATE AGENCY
CONTACT
NUMBERS:**

ND STATE HEALTH DEPARTMENT
(701) 328-2378 or
(800) 472-2180

ND BOARD OF ANIMAL HEALTH
(800) 242-7535

DISEASES

OF NORTH DAKOTA

FISH AND WILDLIFE

A FIELD GUIDE FOR OUTDOOR ENTHUSIASTS



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COVER PHOTO: CHRIS GRONDAHL

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For many years The North Dakota Game and Fish Department discussed putting together a brochure on wildlife diseases for use by anglers, hunters and trappers. Recently it was discovered that the just such a brochure had been produced by the provinces of western Canada. When asked, those responsible for producing the Canadian publication graciously allowed The North Dakota Game and Fish Department to use much of their work for this brochure. Credit for the original idea goes to many but especially to Dr.'s Gary Wobeser and Brett Elkin. Dr. Tyler Stitt, DVM-MHP&TM, with the Centre for Coastal Health and Canadian Cooperative Wildlife Health Centre, was the contracted original primary source for research and design, with contributions by Dr. Helen Schwantje, DVM, with the then British Columbia BC Ministry of Natural Resources Operations Environment. The original copyright for the publication is held by the British Columbia BC Ministry of Environment. Additions and modification made for use in North Dakota were provided by Chris Grondahl, Dr. Dan Grove, Dr. Bill Jensen, and Connie Schiff with The North Dakota Game and Fish Department.

➔ Can I still use the animal?



**YES - JUST
DOESN'T LOOK
NICE**

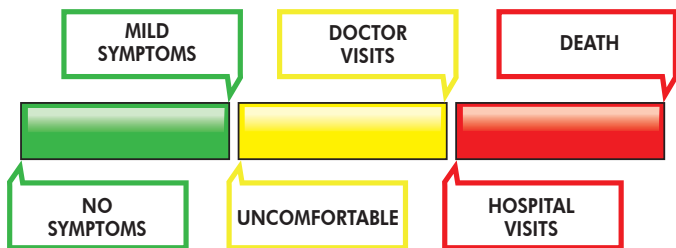


**YES - TAKE SAFETY
PRECAUTIONS**



**NO - CONTACT
AGENCIES LISTED ON
BACK COVER**

➔ How bad can it get?



➔ Safety Symbols



**WASH
HANDS**



**WEAR
GLOVES**



**WEAR
MASK**

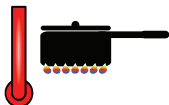
SAFE TO EAT:



YES



NO



COOK FOOD



FREEZE FOOD

SAFE FOR PETS:



YES



CAUTION

ANTHRAX

DANGER

Commonly infected wildlife



Is this animal infected?

- Living animals may be slow, weak, disoriented and dead within hours to days
- Dead animals bloat and decompose quickly
- There may be a bloody discharge from the mouth, nose and anus



Can I get it?

- **YES**
 - Through cuts, open sores and scratches
 - Inhaling spores from contaminated materials, such as dust and grass
 - Eating undercooked meat

How bad can it get?



⇒ Protect myself and others

- Animals suspected of having anthrax:
 - **DO NOT TOUCH or EAT!**
 - Wear a proper filter mask
 - Contact The North Dakota Game and Fish Department, State Department of Health, or the ND Board of Animal Health (numbers listed on back cover)



⇒ Symptoms in humans

- Cutaneous (skin) anthrax:
 - Most common type of anthrax infection in people
 - Small painless sore blister
 - Ulcer with a black center
- Inhalation (lungs) anthrax:
 - Fever, sore throat, general ill-feeling
 - Cough, shortness of breath, chest pain
 - Breathing difficulties, death
- Gastrointestinal (digestive) anthrax:
 - Fever, loss of appetite, vomiting, diarrhea, stomach pain

⇒ Safe for pets?

- **NO!** Carcasses should not be opened or cut into



⇒ What causes it?

- Toxins from the bacteria *Bacillus anthracis*
- Anthrax has been reported in plains bison from the prairies

BLACK SPOT



➤ **Commonly infected wildlife**



➤ **Is this animal infected?**

- Black spot disease appears as small, round, black cysts. Spots are commonly seen in skin of infected fish, but can also be embedded in flesh



RANDY HILTNER

➤ **Can I get it?**

- **NO**
 - Black spot is not known to infect humans

➤ **How bad can it get?**

RISK



No risk to humans.

➤ **Protect myself and others**

- Trim away infested tissue and cook thoroughly before eating

➤ **Symptoms in humans**

- None known

➤ **Safe for pets?**

- Yes
 - Remove infected tissue and cook thoroughly



➤ **What causes it?**

- A larvae *trematodes* causes this disease. *Trematodes* are parasitic flatworms that have suckers and hooks to attach themselves to host tissues

CHRONIC WASTING DISEASE (CWD)



Commonly infected wildlife



Is this animal infected?

- CWD is a slow-progressing disease
- Animals can appear healthy for many years before they show symptoms:
 - Lack of coordination and paralysis
 - Excess salivation, difficulty swallowing, unusual behavior and weight loss



Can I get it?

- No evidence at the present time that humans can get CWD

How bad can it get?



As of 2011, CWD has NOT been found to infect humans

➤ Protect myself and others

- Animals that have CWD should not be eaten
- Avoid eating brain and spinal cord from any cervid that has not been tested for CWD
- CWD has been found in deer in Unit 3F2 in southwestern North Dakota
- All emaciated deer, moose and elk should be tested for CWD
 - Contact The North Dakota Game and Fish Department at **(701) 328-6300**

➤ Symptoms in humans

- CWD is not known to infect people

➤ Safe for pets?

- Animals that have CWD should **NOT** be fed to pets



➤ What causes it?

- An abnormal protein called a prion
- Other prion diseases include:
 - BSE (or Mad Cow Disease) in cattle
 - CJD (Creutzfeldt-Jakob Disease) in people
 - Scrapie in sheep

DIPHYLLOBOTHRIASIS

(Broad Fish Tapeworm)

CAUTION

Commonly infected wildlife



Is this animal infected?

- Many species of freshwater fish and salmon can be infected
- Affected animals have worms that may be coiled in muscles, or in cysts within internal organs
- Worms vary in length (from 1/8" - 1/2")



CRAIG BANNER, OREGON DEPARTMENT OF FISH AND WILDLIFE

Can I get it?

• YES

- By consuming raw or undercooked fish
- People can develop mature tapeworms in their intestines

How bad can it get?

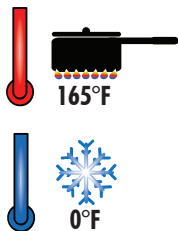
RISK



Medications can kill and remove the worms.

➔ Protect myself and others

- Kill the worms!
 - Cook fish to 165°F for 5 minutes or
 - Freeze at 0°F for 24 hours



➔ Symptoms in humans

- Most people have no or mild symptoms:
 - Fatigue
 - Diarrhea
 - Dizziness
 - Weight loss
 - Vomiting
 - Itchy anus
- Massive infection may cause:
 - Numbness of extremities
- Additional symptoms may include:
 - Loss of appetite
 - Paleness
 - Shortness of breath
 - Weakness
 - Confusion

➔ Safe for pets?

- **NOT RAW!**
 - Cook or freeze first
 - These worms can survive and grow in dog intestines



➔ What causes it?

- A tapeworm called *Diphyllobothrium*
- Commonly known as broad fish tapeworm
- It can grow to 30 feet in length in human intestines

EPIZOOTIC HEMORRHAGIC DISEASE (EHD)



Commonly infected wildlife



Is this animal infected?

- Infection is seasonal and occurs if the right weather conditions are present for biting flies in the genus *Culicoides* to reproduce
- Groups of dead deer may be found in late summer or early fall near water sources with no apparent signs
- Clinical signs in deer are variable



MIKE ANDERSON

Can I get it?

- **NO**
 - Epizootic Hemorrhagic Disease is not known to cause disease in people

How bad can it get?

RISK



Humans are not infected by Epizootic Hemorrhagic Disease.

⇒ Protect myself and others

- The viruses that cause EHD do not infect people
- There is no risk from handling or eating meat from infected deer
- Secondary bacterial infections that may develop in sick deer may make the meat unsuitable for consumption
- Caution should always be taken when handling any sick or dead animal as the animal may have a disease that may be zoonotic (a disease that humans can get from animals)
- If multiple dead deer are encountered in a given area, contact The North Dakota Game and Fish Department at **(701) 328-6300**

⇒ Symptoms in humans

- None

⇒ Safe for pets?

- Yes
 - Meat is generally safe for pets to consume if no secondary bacterial infections are present



⇒ What causes it?

- In North America there are two types of orbiviruses (*Reoviridae*) that cause EHD. There are two subtypes of epizootic hemorrhagic disease virus (EHDV 1 and 2) and five subtypes of bluetongue virus (BTV 2, 10, 11, 13 and 17)

FISH ROUNDWORM (*Anisakiasis*)

CAUTION

Commonly infected wildlife



Is this animal infected?

- Infected fish have worms that are:
 - Often free in the fish's body cavity
 - 1/16" - 1/8" long, less than 1/2" wide
 - White in color
 - Often in a coil shape



DR. MICHAEL L. KENT, CENTER FOR FISH DISEASE RESEARCH

Can I get it?

- **YES**
 - By consuming raw or undercooked fish

Caution: some people may develop allergic reactions after eating these worms

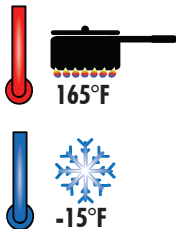
How bad can it get?



Beware: May require medical attention.

➔ Protect myself and others

- Gut and process fish immediately to stop worms from moving into the muscle
- Kill worms in the muscle:
 - Cook fish to 165°F for 10 minutes, or
 - Freeze at -15°F for seven days, especially when the fish will be prepared for sushi



➔ Symptoms in humans

- Occur within hours of eating infected fish
 - Severe stomach pain
 - Nausea and vomiting
- Worms may enter the intestine 1-2 weeks after infection
 - Surgical removal may be necessary if worms burrow into the intestinal wall
 - Worms are occasionally coughed up
- Seek medical advice if you become ill after eating raw or undercooked fish

➔ Safe for pets?

- Yes, if the fish is well cooked
- Worms cannot survive in pets for long



➔ What causes it?

- A roundworm called *Anisakis simplex*
- Commonly known as herring worm

GIANT LIVER FLUKE



Commonly infected wildlife



Is this animal infected?

- Animals rarely show external signs
- Livers may be swollen and lumpy (see photo)
- Purple-gray, flat, oval-shaped worms (fluke) may be seen in the liver
- Worms vary in size from 1/2"-1-1/4" wide and 1-1/4"-3-1/4" long
 - Some reports claim up to 4 inches long



Can I get it?

- **NO**
 - Liver flukes do **NOT** affect the meat

How bad can it get?



➤ **Protect myself and others**

- The meat of infected animals can be eaten, **BUT**
 - Discard infected liver
 - Infected liver is unappetizing

➤ **Symptoms in humans**

- None – people are not at risk

➤ **Safe for pets?**

- Yes



➤ **What causes it?**

- A flatworm (fluke) called *Fascioloides magna*

HYDATID DISEASE

CAUTION

Commonly infected wildlife



Is this animal infected?

- Adult worms live and grow in infected dog and wild canine (wolf and coyote) intestines
- Infected cervids often have large fluid-filled cysts in lungs or liver – these cysts are **NOT** infectious to people



Can I get it?

- **YES**
 - Dogs and wild canines eat cysts of cervid lungs and liver, and worms mature
 - The worms release eggs in dog and wild canine feces, and eggs stick to their fur
 - The shed eggs can infect people

How bad can it get?



Gets worse with time and depends on organ affected.

⇒ Protect myself and others

- When handling live canines, their feces, pelts or carcasses:
 - Wear disposable gloves
 - Practice good hygiene
 - **WASH YOUR HANDS!**
 - Disinfect your work space



⇒ Symptoms in humans

- Severity of symptoms depends on if and where the juvenile worms form cysts:
 - Brain – death
 - Lungs – breathing difficulties
 - Abdomen – liver damage
- Consult your doctor if you have health concerns after handling wolf or coyote carcasses

⇒ Safe for pets?

- **NO**
 - Cysts found in cervids can infect pet dogs
 - Once infected, pet dogs can be a source of infection to you and your family



DO NOT ALLOW dogs access to lungs and liver from cervids

⇒ What causes it?

- The tapeworms *Echinococcus granulosus* and *Echinococcus multilocularis*

LEPTOSPIROSIS

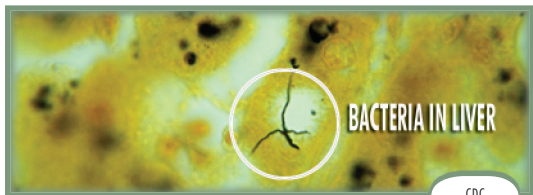
CAUTION

Commonly infected wildlife



Is this animal infected?

- Infection is considered uncommon
- Most infected animals have no symptoms



Can I get it?

• YES

- Contact with:
 - Urine or tissues of infected animals
 - Water, soil or vegetation contaminated by infected urine
- Consumption of:
 - Food or drinking water contaminated by infected urine

How bad can it get?



Can be fatal if not treated immediately.

➔ Protect myself and others

- When handling rodents (including beavers) and raccoons:
 - Wear disposable gloves
 - Wash your hands afterward
- Clean cuts or wounds with soap and warm water
- Wear boots when wading in water



➔ Symptoms in humans

- Most people will not have symptoms
- If symptoms do occur, they can include:
 - High fever, severe headache, chills, muscle aches and vomiting
- Other symptoms can include:
 - Jaundice (yellow skin and eyes)
 - Red eyes
 - Abdominal pain, diarrhea, rash
- If untreated, symptoms can include:
 - Kidney damage, liver failure, breathing problems, headache, stiff neck
- Fatalities are rare

➔ Safe for pets?

- In severe cases, pets can die from leptospirosis
- Pets can also transfer the bacteria to humans
- Talk to your veterinarian about vaccines



➔ What causes it?

- Bacteria called *Leptospira*

LYMPHOCYSTIS



⇒ Commonly infected wildlife



⇒ Is this animal infected?

- Fish infected by this virus exhibit cauliflower-like growths on skin, fins and occasionally gills



CHRIS GRONDAHL

⇒ Can I get it?

- **NO**
 - The disease poses no known health hazards to humans

⇒ How bad can it get?

RISK



Humans are not at risk for lymphocystis.

➤ **Protect myself and others**

- Consume fish fillets like any other by properly cleaning, preparing and cooking

➤ **Symptoms in humans**

- None – people are not at risk

➤ **Safe for pets?**

- Yes
 - No known health risk



➤ **What causes it?**

- A virus called *lymphocystivirus*

MOOSE MEASLES



Commonly infected wildlife



Is this animal infected?

- Adult worms live and grow in the intestines of infected carnivores
- Infected herbivores will have small white cysts, usually in muscle and connective tissue
- Animal may have few or many cysts



Can I get it?

- **NO**
 - The cysts contain juvenile worms that do **NOT** infect people

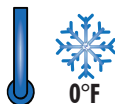
How bad can it get?



No risk to humans.

➤ Protect myself and others

- The meat of infected animals can be eaten
- Cysts can be trimmed out or killed by:
 - Normal cooking temperatures or freezing
- Cysts can look unappetizing
 - Affected meat may be more acceptable if processed as ground meat



➤ Symptoms in humans

- None – people are not at risk

➤ Safe for pets?

- **NOT RAW!**
 - Cysts in fresh, unfrozen meat can infect pet dogs
 - Freeze meat to kill cysts



➤ What causes it?

- The tapeworm *Taenia ovis krabbei*

ORF (*Contagious Ecthyma*)

CAUTION

➤ **Commonly infected wildlife**



➤ **Is this animal infected?**

- Infected animals have obvious single or multiple crusty lumps, usually on their lips
- Young animals are more likely to be affected and may have difficulty nursing
- Lesions can also occur on:
 - Face
 - Inside mouth
 - Udder
 - Above hooves

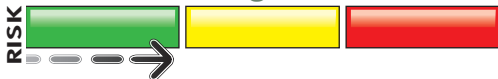


DR. HELEN SCHWANTJE, B.C. MINISTRY OF ENVIRONMENT

➤ **Can I get it?**

- **YES**
 - By contacting affected skin, especially if you have cuts on your skin

➤ **How bad can it get?**



May require medical attention and treatment.

➔ **Protect myself and others**

- Wear disposable gloves
- Practice good hygiene
 - Wash your hands
 - Wash your clothes
- Trim away affected tissue
- Avoid contact between affected tissue and edible meat



➔ **Symptoms in humans**

- Red skin lesion(s) on hands, arms or face
- Swollen, painful lymph nodes
- Mild fever
- Consult with your doctor for proper diagnosis and treatment
- Skin lesions usually go away within six weeks without scarring

➔ **Safe for pets?**

- Yes



➔ **What causes it?**

- A parapox virus that infects both wild and domestic sheep and goats

PAPILLOMAS (Warts)



Commonly infected wildlife



Is this animal infected?

- Infected animals have hairless growths on their skin
- These growths are:
 - Variable in color, texture, number and size (from a dime to a baseball)
 - Often found around eyes and neck, but may also be on the body or legs



Sarah Fagerland

Can I get it?

- **NO**
 - People cannot get this type of wart

How bad can it get?



RISK No risk to humans.

➔ **Protect myself and others**

- Trim away infected tissue – it is unappetizing and should not be eaten
 - Once infected tissue has been trimmed away, meat can be cooked and eaten



➔ **Symptoms in humans**

- None – people are not at risk

➔ **Safe for pets?**

- Yes
 - After trimming away infected tissue



➔ **What causes it?**

- A virus in the *Papillomavirus* group

PLAGUE

DANGER

Commonly infected wildlife



Is this animal infected?

- Disease outbreaks in wildlife are rare
- Signs during outbreaks in rodents include:
 - Swollen and/or rotting lymph nodes
 - Multiple red spots on skin/organs



Can I get it?

- **YES**
 - Being bitten by an infected rodent flea
 - Contact with abscesses on infected animals
 - Through bites and scratches
 - Inhaling infectious airborne droplets (rare)

How bad can it get?



Human infections are rare but can be severe.

➔ Protect myself and others

- Avoid rodents
- Prevent flea bites by wearing:
 - Long sleeved clothing and disposable gloves
- Do not consume infected animals
- Wear a proper filter mask
- Wash puncture wounds and scratches with soap and warm water



➔ Symptoms in humans

- Bubonic form (flea bite)
 - Fever and general illness
 - Swollen/painful/hot lymph nodes
 - Tissue swelling around flea bite
- Septicemic (in blood) or pneumonic (in lungs) form
 - Fever and signs of shock
 - Breathing problems, including cough
 - Excessive bleeding
 - Death
 - If you show symptoms, seek medical attention

WEAR GLOVES AND LONG-SLEEVED CLOTHING

➔ Safe for pets?

- **NO**
 - Carnivores may be infected when they eat infected tissues
 - Once infected, pets can potentially cause illness to humans



➔ What causes it?

- Bacteria called *Yersinia pestis*
 - It is primarily a flea-transmitted disease

RABIES

DANGER

Commonly infected wildlife



Is this animal infected?

- Rabies can occur in any mammal, e.g., bats and skunks
- Infected animals may be found dead, are weak, or show unusual behavior
 - Behavior changes are not always obvious

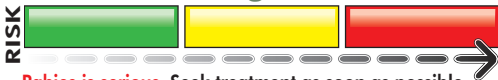


AB FISH AND WILDLIFE

Can I get it?

- **YES**
 - From the bite or scratch of an infected animal
 - From saliva of infected animals that touches your eyes, nose, mouth, or skin wounds

How bad can it get?



Rabies is serious. Seek treatment as soon as possible if bitten by a wild animal.

➔ Protect myself and others

- Any animal that shows unusual behavior should not be approached
 - **DO NOT TOUCH!**
 - Contact The North Dakota Game and Fish Department or State Department of Health (numbers listed on back cover)



➔ Symptoms in humans

- **RABIES IS FATAL** once symptoms appear
- Rabies can be prevented if treatment is given before symptoms appear
- Symptoms can take a long time to develop and may include:
 - Pain, tingling or itching near exposure site

IF BITTEN OR SCRATCHED BY A WILD ANIMAL:

- Clean and flush wound with soap and warm water
 - Seek medical attention immediately
- Report bites according to state and local guidelines

➔ Safe for pets?

- **NO**
 - Talk to your veterinarian about vaccines



➔ What causes it?

- A virus of the family *Rhabdoviridae*
- Rabies testing requires brain tissue – avoid head shots to kill suspect animals

RACCOON ROUNDWORM

(*Baylisascaris procyonis*)

CAUTION

EGGS ARE SPREAD THROUGH FECES

➤ Commonly infected wildlife



➤ Is this animal infected?

- This roundworm infects a high percentage of raccoons throughout North America.
- Infected raccoons often appear normal with no outward sign of infection
- The adult stage lives in the raccoon's intestine. Eggs are shed through feces
- Few other parasites are as indiscriminate in causing neurologic disease in wild, zoo, and domestic animals as well as human beings

➤ Can I get it?

• YES

- The worm releases eggs that are shed into the feces, and eggs stick to the fur.
- Shed eggs can infect people

➤ How bad can it get?



Raccoon roundworm is serious. **This disease can be fatal.**

➔ Protect myself and others

- When handling live raccoons, their feces, pelts or carcasses:
 - Wear disposable gloves
 - Practice good hygiene
 - **WASH YOUR HANDS!**
 - Disinfect your work space



➔ Symptoms in humans

- Severity of symptoms depends on number of eggs ingested, number of larvae entering the brain, and location and extent of larvae migration damage. This disease is rare in humans, but very serious if contracted
 - Symptoms include nausea, fatigue, loss of motor skills, damage to eyes and blindness. This disease can be **FATAL**

➔ Safe for pets?

- **NO**



➔ What causes it?

- The roundworm is called *Baylisascaris procyonis*, found primarily in raccoons, but can infect more than 90 species of mammals and birds in North America

RINGWORM

CAUTION

Commonly infected wildlife



Is this animal infected?

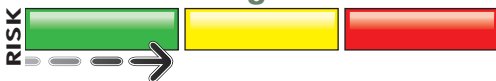
- Infected animals have areas of thickened skin with hair loss on the head or legs
- Skin may be red
- Hair easily breaks away
- Lesions can be itchy



Can I get it?

- **YES**
 - By touching the skin and hair of infected animals

How bad can it get?



May require medical attention.

➤ Protect myself and others

- Wear disposable gloves
- Wash hands
- Disinfect work space
- Avoid contact between affected skin/hair and edible meat
- **WARNING:**
 - Once infected, you can transmit ringworm to your family



➤ Symptoms in humans

- Skin lesions are:
 - Red, circular, and spread outward
 - Vary from dry and scaly to moist and crusty
 - Often have a central healed area surrounded by a “ring” of infection
 - Can be itchy

➤ Safe for pets?

- **NO**
 - Once infected, pets can be a source of infection to humans



➤ What causes it?

- Fungi that grow in soil, on humans and animals (e.g., *Microsporium canis*,

NOTE: Some types of ringworm may be less contagious than others

SANDY FLESH (*Myofibrogranuloma*)

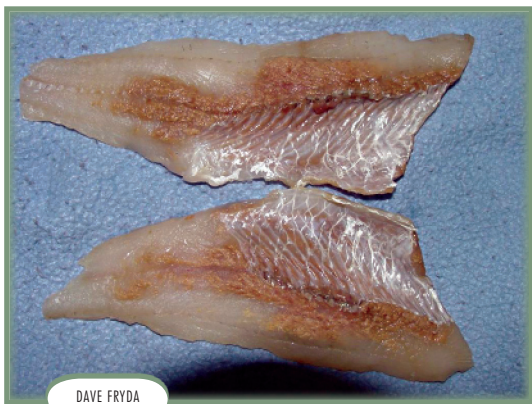


Commonly infected wildlife



Is this animal infected?

- Fish flesh affected by this disease appear coarse and brown, similar to fish fillets that have been freezer burned



DAVE FRYDA

Can I get it?

- **NO**
 - There is no known transfer to humans

How bad can it get?



No known transfer to humans.

⇒ Protect myself and others

- Although there is no known link between *myofibrogranuloma* in fish and muscular dystrophy in humans, the cause of sandy flesh is not known, and it is recommended that you do not eat infected fish

⇒ Symptoms in humans

- None known

⇒ Safe for pets?

- **NO**
 - Since the link between this disease and other animals is not understood, consumption by pets is not recommended



⇒ What causes it?

- Similar to muscular dystrophy in humans, the cause of this disease affecting muscle tissue is not known

SARCOCYSTIS (Rice Breast)

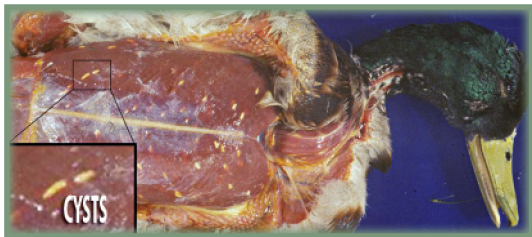


Commonly infected wildlife



Is this animal infected?

- Affected birds have cream-colored cysts longer than they are wide in breast, heart and leg muscle
 - Cysts resemble rice grains and can be 1/4" long
 - Cysts feel gritty when cut with a knife



Can I get it?

- NO**

How bad can it get?

RISK



No known risk to humans.

➤ Protect myself and others

- Scientists recommend that people and pets do not eat heavily infected meat
- Heavily-infected carcasses are unappetizing
- Parasites can be killed by cooking



➤ Symptoms in humans

- No known risk to humans

➤ Safe for pets?

- **NOT RAW!**
 - Carnivores shed eggs in their feces, which then become infectious to birds
 - Pets may play a role in transmission of sarcocystis to birds



➤ What causes it?

- Protozoan parasite called *Sarcocystis rileyi*
- Sarcocystis is found around the world in many types of animals, including deer, moose, elk and domestic livestock

SARCOPTIC MANGE



Commonly infected wildlife



Is the animal infected?

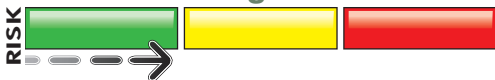
- Infected animals show varying degrees of hair loss, usually on the legs and tail, but over most of the body in severe cases
- Some animals may have thickened skin
- Badly infected animals are in poor body condition
 - Animal may be weak and fearless of humans



Can I get it?

- **YES**, but the risk appears to be low
 - Infections are rare and short-lived

How bad can it get?



Itchy, but rare and short lived; can be treated.

➔ Protect myself and others

- Wear disposable gloves
- Disinfect work space after skinning/handling infected animals
- Wash hands
- Wear long-sleeved clothing
- Shower and wash clothing after handling wildlife



➔ Symptoms in humans

- Skin redness and rashes may be extremely irritating
- It can be treated – seek medical attention to:
 - Ensure it is not human mange (which can be more difficult to treat)
 - Treat infection so you don't transmit it to your pets

➔ Safe for pets?

- **NO**
 - This is a skin disease of pet dogs and wild canines
 - Mange can be transferred to pets from infected animals by direct contact



➔ What causes it?

- Parasitic mites called *Sarcoptes scabiei*
- Mites are related to spiders and ticks

SEROMA (Hydrocyst)



Commonly infected wildlife



Is the animal infected?

- Yellow or reddish clear fluid under skin or within muscle
- Can be large (football-sized), and contain more than a gallon of fluid
 - Often present between front legs
 - Can cause animal difficulty in moving
 - Affected animals may be easier prey



AB FISH AND WILDLIFE

Can I get it?

- **NO**
 - Seromas are **NOT** infectious

How bad can it get?



⇒ Protect myself and others

- Trim away affected tissue – it is unappetizing and should not be eaten
 - Once affected tissue has been trimmed away, the meat can be cooked and eaten
 - Any meat surrounding a seroma is safe to eat
- **ALWAYS** practice good hygiene by washing hands after handling any wild animal



⇒ Symptoms in humans

- None – people are not at risk
- The fluid inside a seroma is not dangerous to human health

⇒ Safe for pets?

- Yes
 - After trimming away affected tissue



⇒ What causes it?

- Localized soft-tissue injury
 - Not caused by an infection
 - Does not contain “pus”
- Fluid (blood serum) seeps from tiny ruptured blood vessels in injured areas
 - Fluid accumulates, often under the skin, and drains away after some time

TRICHINELLOSIS

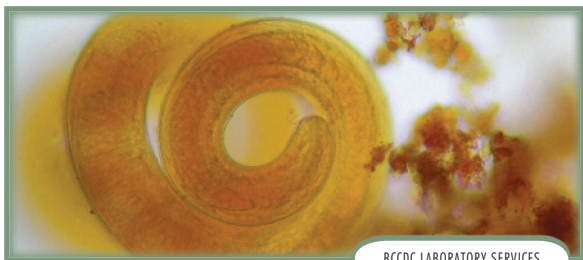
CAUTION

Commonly infected wildlife



Is this animal infected?

- Wild animals rarely show signs of disease
- Always assume mountain lion and bear meat is infected



BCCDC LABORATORY SERVICES

Can I get it?

- **YES**
 - By eating undercooked mountain lion or bear meat infected with the Trichinella worm
 - You cannot get it from an infected person

How bad can it get?



No symptoms or mild symptoms most common; **can be fatal.**

⇒ Protect myself and others

- DO NOT EAT RAW MEAT
- Kill the worms!
 - Cook meat thoroughly
 - **Heat to at least to 165°F**
- Worms are not killed by:
 - Smoking
 - Curing
 - Microwaving
 - Drying
 - Freezing



⇒ Symptoms in humans

- Variable, but may include:
 - Nausea or vomiting
 - Fatigue
 - Diarrhea
 - Aching joints
 - Fever
 - Eye swelling
 - Stomach pain
 - Muscle pain
- May be **FATAL** if worms interfere with the heart, diaphragm, lungs or brain
- Consult with your doctor if you have any of the above symptoms for up to eight weeks after eating mountain lion or wild bear meat

⇒ Safe for pets?

- **NOT RAW!**
 - Cook first



⇒ What causes it?

- A roundworm called *Trichinella*, found in muscles of infected animals

TUBERCULOSIS

CAUTION

Commonly infected animals



Is this animal infected?

- This is a rare, slowly progressing disease
- Infected animals may have no signs or be in poor body condition
- Small, multiple, round, gritty lumps in lymph nodes and on lungs and rib cage are typical



Can I get it?

- **YES**
 - Inhaling bacteria from open wounds, fluids from the mouth and nose, or feces of an infected animal
 - Directly through breaks in the skin (rare)

How bad can it get?



Gets worse with time; **fatal if untreated.**

➔ Protect myself and others

- If you see multiple pale (tan or yellow) rounded lumps on lungs, rib cage or internal organs in bison or cervids:
- **STOP HANDLING THE ANIMAL**
 - Wash your hands
 - Wear a proper filter mask
 - Contact The North Dakota Game and Fish Department, or State Department of Health (numbers listed on back cover)



➔ Symptoms in humans

- Depending on where lesions are located:
 - Lungs
 - Prolonged illness with fever, cough, night sweats, weight loss
 - Occasionally will cough up blood
 - Intestines
 - Stomach pain, diarrhea
- Symptoms get worse with time
- Untreated disease can be **FATAL, seek medical attention**
- Immunosuppressed people are at a higher risk

➔ Safe for pets?

- **NO**



➔ What causes it?

- Bacteria called *Mycobacterium bovis* in cattle, elk and deer and *Mycobacterium avium* in birds

TULAREMIA


 CAUTION

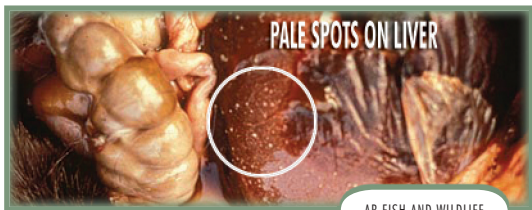
Commonly infected wildlife



Is this animal infected?

- Affected animals may outwardly appear in good body condition, yet are sick or near death
- An enlarged liver or spleen is common
- Tiny pale spots and thin white strands of material may be seen on organs

Can I get it?



AB FISH AND WILDLIFE

• YES

- Bites or scratches from infected wildlife
- Contact with meat, water, feces, urine or body parts of infected animals
- Breathing in dust from pelts and paws
- Can penetrate intact skin

How bad can it get?

RISK



Fever-like symptoms; early treatment reduces severity.

➔ Protect myself and others

- Take precautions, avoid tick bites!
 - Wear long-sleeved clothing
 - Use insect repellents
 - Inspect yourself for, and remove, all ticks
- Handle animals found dead near human water sources with caution and report to The North Dakota Game and Fish Department (numbers listed on back cover)
- When handling, dressing or skinning any wild animal:
 - Wear disposable gloves
 - Wash hands well afterward
- Cook beaver, hare and rabbit meat before eating it



➔ Symptoms in humans

- Symptoms appear up to 14 days after infection:
 - Fever, headache, chills, muscle pain
 - Swollen, painful lymph nodes
 - Ulcer at site of tick bite or animal contact
- Other symptoms can occur but are rare
- Seek medical attention. **CAN BE FATAL**

➔ Safe for pets?

- **NOT RAW!**
 - Dogs and cats can die from tularemia



➔ What causes it?

- Bacteria called *Francisella tularensis*

10 TOP TIPS

1. Cook All Meat

- Thoroughly cook game meat and fish to the recommended temperature of 165°F.
- Never eat raw or undercooked meat
- **CAUTION:** Freezing, microwaving or smoking **MAY NOT KILL** all bacteria, viruses or parasites

2. Wash Your Hands With Warm Water

- Use soap and warm water:
 - After handling game and fish
 - After using the bathroom
 - Before eating or handling food

3. Drink Safe Water

- Pack it in, or
- Boil it first, or
- Use an approved water purifier or filter

4. Safe Field Dressing

- Keep it **CLEAN, COOL AND SAFE** (page 52-53)
 - Protect meat from intestinal contents
 - Follow safe meat-handling practices

5. **Outdoor Toilet**

- Bury waste away from water
- Don't touch animal waste

6. **Not Your Kill? Leave It Alone!**

- Stay away from sick or dead animals **AND** contact The North Dakota Game and Fish Department or the State Department of Health (numbers listed on back cover). Avoid rodents where possible and use caution if trapping beavers or muskrats

7. **Keep Bugs Off**

- Wear long pants and long-sleeved shirts
- Wear light colored clothing
- Use insect repellents (with DEET)

8. **First Aid**

- Clean cuts or wounds with soap and warm water
- Consult your doctor, and explain that you had contact with wildlife

9. **Play It Safe**

- Wear reflective clothing
- Don't mix guns and alcohol
- Drive safely
- Use sunscreen

10. **Not Feeling Well?**

- Consult your doctor if you are ill and have recently eaten, or had contact with, wild animals or fish
- Tell your doctor about your recent activities with wildlife

SAFE FIELD DRESSING

➤ Things that spoil meat

- Poor shot or arrow placement
- Improper field-dressing or careless butchering
- Dragging a dressed carcass
- Hanging or aging the carcass for too long
- High temperatures during aging

➤ Why prevent meat spoilage?

- To reduce the risk of illness
- Properly dressed and aged meat tastes better

➤ Keep it CLEAN – Prevent bacterial contamination

- Water, mud, soil and leaves carry bacteria
 - Butcher the animal in cleanest area possible
 - Keep the carcass covered when transporting
- Prevent bacterial-related spoilage:
 - Wash your hands with warm water
 - Always use clean equipment and knives
 - Avoid contact between clothes and carcass
 - Clothes can carry bacteria
 - Wash clothes when you get home
 - Wear disposable gloves
- Wash equipment that cuts into intestines or abscesses before continuing to butcher

- Before you butcher the carcass, clean off hair, dirt and other debris

⇒ **Keep it COOL – Prevent bacterial growth**

- Spoilage results from bacterial growth
- Spoilage and disease are affected by **TIME AND TEMPERATURE**
- Field dress and skin the animal as soon as possible – fur may protect the carcass, but can also prevent proper cooling!
- The warmer the temperature, the faster the bacterial growth

⇒ **Keep it SAFE**

- Protect meat from intestinal contents; they contain bacteria and parasites
- Wash knives frequently
 - Trim contaminated meat
 - Cook well
- Label meat packages with the date to:
 - Select specific cuts for cooking
 - Freeze for up to 12 months for best quality
- When in the kitchen or campsite:
 - Clean hands, cooking utensils and surfaces
 - Separate raw meat from ready-to-eat foods
 - Cook to recommended temperatures to kill bacteria, viruses and parasites
 - Refrigerate promptly to slow bacterial growth

FOOD-BORNE DISEASES

➤ Fecal contamination

- Bacteria, viruses and parasites live and grow in the intestines of animals
- They can contaminate hands, meat and utensils and can cause illness if eaten
- This is sometimes called **FOOD POISONING**

➤ Examples

- Salmonella
- E. coli
- Toxoplasmosis
- Campylobacter

➤ How can I get sick?

- Eating raw or undercooked meat
- Improper food **PREPARATION AND COOKING**
- Contaminating cooked food with:
 - Raw or undercooked meat
 - Dirty hands and utensils
 - Dirty food preparation surfaces

Beware: Some food-borne diseases can be transmitted from person to person

Beware: Freezing may not kill all harmful bacteria, viruses or parasites

➔ How can I protect myself?

- Cook meat to recommended temperatures
- Wash your hands with soap and water
 - After using the bathroom
 - After handling carcasses, live animals or their feces
 - Before eating or handling food
- Properly store meat
 - Refrigerate
 - Freeze when storage for more than two days is required
 - Thaw meat in the fridge and not on the counter
 - Cook in a clean area
- Scrub surfaces, utensils and cooking equipment with soap and warm water before and after food preparation

➔ Not feeling well?

- Recognize common symptoms of food-borne disease:
 - Diarrhea
 - Nausea
 - Vomiting
 - Fever
 - Weakness
 - Stomach pain
- Contact your doctor if you become ill after eating raw or undercooked meat
- Tell your doctor what you hunted and ate

INSECT-BORNE DISEASES



➤ Ticks/insects that can carry disease

➤ Examples

- Lyme Disease
- Ehrlichiosis
- Babesiosis
- Rocky Mountain Spotted Fever (RMSF)
- West Nile Virus (WNV)

➤ How can I get sick?

- You get bitten by an infected tick, flea or mosquito

➤ How bad can it get?

- Symptoms can range from mild illness to hospitalization or death

➤ How can I protect myself?

- Prevent tick bites
 - Walk on cleared trails
 - Wear a hat, long sleeves and pants, and light-colored clothing
 - Tuck pant legs into socks or boots
 - Use insect repellents (with DEET) on clothing and exposed skin



- Inspect clothes, skin and pets for ticks
- Remove the whole tick by grasping as close to the tick's head as possible
- Slowly pull tick straight out
- Try not to squeeze the tick as you remove it
- Keep the tick, show it to your doctor

Beware: Mosquitoes are most active at dusk and dawn – take precautions!



➤ Prevent MOSQUITO bites

- Wear light-colored, long-sleeved clothing
- Use insect repellents (with DEET)
 - **NOTE:** DEET may not be safe for infants and children

➤ Not feeling well?

- Initial symptoms may be mild and include the following:
 - Fever
 - Nausea
 - Vomiting
 - Headache
 - Muscle pains
 - Fatigue
 - Chills
 - Sweats
 - Sore throat
 - Cough
 - Rash
- More serious conditions can develop, and include the sudden onset of:
 - Chest pain
 - Muscle pain
 - Stomach pain
 - Loss of appetite and/or weight
- Consult your doctor if you have any of these symptoms up to two months after exposure to ticks, fleas or mosquitoes

WATER-BORNE DISEASES

➤ Background

- Water (especially from streams, rivers, ponds and lakes) can contain harmful bacteria, viruses and parasites
- You may become ill after drinking water from these sources

➤ Examples

- Beaver Fever (*Giardiasis*)
- *Cryptosporidiosis*

➤ How can I get sick?

- Drinking water contaminated with animal or human feces

➤ How can I protect myself?

- Bring safe or bottled water
- Boil all stream, river and lake water at a rolling boil for at least 10 minutes before using for:
 - Drinking
 - Preparing food
 - Brushing your teeth

Beware: Chemical disinfection and filters may not kill all bacteria, viruses or parasites

- Avoid swallowing water when swimming in streams, rivers and lakes
- Protect water sources:
 - Bury waste far away from any water

➤ Not feeling well?

- Recognize common symptoms of water-borne disease:
 - Diarrhea
 - Nausea
 - Fatigue
 - Chills
- If you develop symptoms:
 - Drink plenty of safe water
 - Use oral rehydration salts
 - Contact your doctor as soon as possible
 - Tell your doctor that you may have swallowed contaminated water

Beware: Some water-borne diseases can be transmitted from person to person

ADDITIONAL DISEASES

➤ Abscesses

- Pus and bacteria-filled lumps found within animal tissues, usually during butchering
 - Most animals appear to be healthy
 - If there is only one abscess, trim away and discard affected meat
 - If multiple abscesses are found, it is safer not to eat the animal

NEVER cut into abscesses or eat meat containing abscesses

➤ Hantavirus

- A rare and potentially fatal virus of wild mice
- You may contract it by breathing virus carried on dust particles from mouse feces, dried urine or nesting materials
 - Rodent-proof your home or cabin
 - Avoid contact with rodents and their feces
 - Wear a protective mask when working in enclosed spaces where rodents live



➤ Bird Flu (Avian Influenza)

- Some forms of bird flu can be transmitted to people
- Contact local health services for public health updates
- Wild birds can carry bird flu but rarely get sick



- Practice proper hygiene when butchering birds – wear gloves and wash hands

Avoid handling sick or dead wild birds

➔ **Filarial Worms (*Dirofilaria*)**



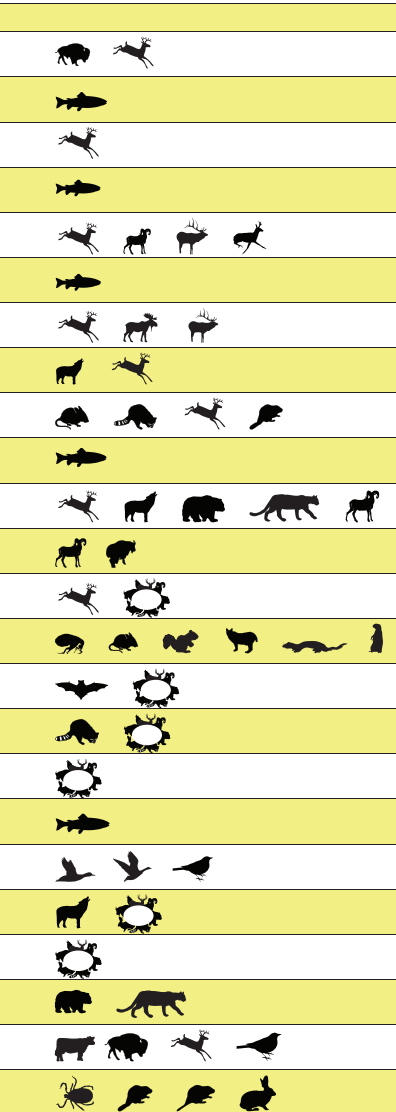
- Long, white and slender round-worms found under the skin of black bears
- Black flies spread these worms to new hosts
- Although rare, people bitten by an infected black fly can become ill
- Worms in bears **DO NOT** infect people

Filarial worms may be seen during the butchering of bears – always cook bear meat

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