

Management and Medical Aspects of Reindeer Farming: Examining the Basics

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INTRODUCTION

Understanding the basic behavior and biology of reindeer (*Rangifer tarandus*) is important when addressing medical problems presented by this unique species. For centuries, reindeer have existed in the Old World as domestic or semidomestic animals. Caribou, or wild reindeer as they are termed, represent the free-ranging form of the same species.

A reindeer's natural diet during winter is typically lichens (*Lichenes spp.*) and grasses (*Gramineae spp.*). During summer they eat various grasses, marsh plants, and birch (*Betula spp.*) and willow (*Salix spp.*) leaves. They have been known to eat mushrooms and even small mammals and bird eggs on rare occasions. A number of commercial diets are also available. Quality Texture (Ralston Purina), a roughage-grain combination, has been fed exclusively to several generations of reindeer at the University of Alaska Fairbanks (UAF) with good results.

Most farmed reindeer are fed diets formulated using local feedstuffs to reduce expense. Protein content should generally range about 12%. For example, a diet used at UAF incorporates barley grain, brome grass, beet pulp, oat grain, soybean meal, molasses, minerals and vitamins. Reindeer diets may be altered as the availability and costs of feedstuffs change. It must be remembered that any rapid change in diet can lead to a multitude of digestive problems. The use of probiotics is indicated during periods of stress or diet change.

When they are in their natural environment, reindeer breed in early fall (September and October) and give birth in mid-spring (late April and early May) for a seven-month gestation period. Some females will conceive as calves, but they typically do poorly in future years and do not serve well as mothers.

Reindeer remain fertile for 10 to 15 years; serum progesterone levels can be used to determine pregnancy. Pregnant females have mean serum progesterone levels of ≥ 5.6 ng/ml from October through to parturition in April. Non-pregnant females have a maximum serum progesterone level of 3.2 ng/ml in December with levels dropping below 1 ng/ml by February and March. A critical level of ≤ 3.5 ng/ml in December or January may be used to evaluate breeding success. Bulls can breed 20 to 30 females depending on the number of bulls and females in a group. Reindeer have been known to live more than 20 years, however, the useful life span for a female in a herd is about 10 years.

The adult males, females, and calves grow antlers in early summer. The males drop their hard antlers during the winter; the yearlings, steers, and barren females drop them in the spring; and pregnant cows drop them shortly after giving birth in late spring.

Reindeer can survive and reproduce in warm climates when managed carefully, but they are more suited to moderate or cold climates. These northern ruminants can survive in extremely low temperatures with minimum nutrition during severe winters. Their winter coat consists of dense hollow guard, and fine under hairs that provide excellent insulation. Reindeer shed their winter coat each year in early summer.

Proper management is the single most important element in preventing medical problems in farmed reindeer. Good husbandry practices must include adequate nutrition, minimal stress, and a preventative medical plan. Reindeer can be successfully farmed with relative ease if these factors are considered.

Specific medical problems of reindeer should be handled much the same as in other ruminants, but proper thermoregulation and stress avoidance must also be considered. It may be difficult for the untrained observer to determine if a reindeer has a medical problem until the condition is serious. In this situation, monitoring the blood parameters is a useful diagnostic tool. Normal blood parameters for reindeer are presented in Table 1.

INFECTIOUS DISEASES

A number of infectious diseases have been reported in reindeer. In many cases, serologic evidence of exposure to various disease agents was found, but the actual potential of the agent to produce disease in reindeer is unknown. The veterinarian should consider all possible causes of disease since little is known of a reindeer's full spectrum of disease susceptibilities.

Bacterial Diseases

Brucellosis — Brucellosis, caused by *Brucella suis* biovar 4, is endemic in most reindeer herds in Alaska and Northern Canada. Before establishing a new farming herd, reindeer should always be tested. Testing should be serologically for brucellosis using at least the *Brucella* buffered antigen (BBA) and standard plate (SP) tests.

The major impacts of brucellosis in reindeer are abortion and sterility. Retained placentas,

Table 1. Normal Blood Values for Reindeer.

Hemoglobin (g/dl)	15.1 ± 4.0
Red Blood Cells (x 10 ⁶)	9.5 ± 1.5
Packed Cell Volume (%)	45.0 ± 5.0
White Blood Cells (x 10 ³)	7.8 ± 2.0
Neutrophils (%)	45.0 ± 10.0
Lymphocytes (%)	40.0 ± 10.0
Monocytes (%)	3.0 ± 2.0
Eosinophils (%)	5.0 ± 5.0
Basophils (%)	3.0 ± 2.0
Plasma Protein (g/dl)	7.5 ± 1.0
Fibrinogen (mg/dl)	300.0 - 500.0
Glucose (mg/dl)	101.0 ± 22.0
Blood Urea Nitrogen (mg/dl)	35.0 ± 6.0
Uric Acid (mg/dl)	0.36 ± 0.07
Total Bilirubin (mg/dl)	0.31 ± 0.09
Cholesterol (mg/dl)	68.0 ± 12.0
Calcium (mg/dl)	9.8 ± 0.8
Inorganic Phosphate (mg/dl)	6.8 ± 0.9
Sodium (mEq/l)	145.0 ± 8.0
Potassium (mEq/l)	5.0 ± 0.8
Magnesium (mg/dl)	2.1 ± 0.3

swollen joints, enlarged testicles and abscesses are signs of possible infection. It is believed that brucellosis is primarily spread through contact with infective uterine discharges following abortion.

Abortion in reindeer usually occurs one-to-two-months before normal calving. Calves may be born alive but are weak and die within a few days. Other calves, born to infected females, can survive but remain infected as carriers of the disease. Typically, females abort the first calf following infection. Although they may

abort the next year, they can produce viable calves in future years. Some of these calves can be asymptomatic, serologic negative carriers of the disease.

Reindeer transported from endemic herds should not be mixed with other reindeer until they have completed one reproductive cycle and are seronegative on repeated testing. The UAF reindeer management program has developed and uses a killed homologous vaccine for reindeer within Alaska. The vaccination status of reindeer being

exported from Alaska should be determined before initial testing and transporting.

Brucellosis is a reportable disease. Good communication should be established between state and federal regulatory veterinarians to insure that farmed herds are not quarantined or animals destroyed unnecessarily. Routine testing is recommended in newly established herds.

Tuberculosis — Tuberculosis is another reportable disease that is a concern to deer owners and regulatory veterinarians. While tuberculosis has never been diagnosed in Alaska reindeer, testing is required before they are exported to most destinations. A negative test within 60 days is usually required for those animals being shipped. A negative yearly herd test may be required depending on local regulations. The single cervical test using intradermic tuberculin (PPD Bovis) is the commonly used procedure. Regulations and testing procedures change constantly, so regulatory veterinarians should be consulted to determine current procedures and regulations.

Johne's Disease — Johne's disease, or *Mycobacterium paratuberculosis* infection, causes chronic debilitating enteritis. Its symptoms are chronic or intermittent diarrhea and emaciation. Johne's disease is usually found in reindeer that are in close association with contaminated cattle or livestock facilities. Although no diagnostic tests or treatments have been developed specifically for reindeer, control methods recommended for cattle should be followed.

Miscellaneous Diseases — Various other bacterial diseases found in domestic ruminants have also been found in reindeer. Clostridial diseases have been diagnosed in reindeer during summer months or when their diets change. Vaccinating the animal with killed, multivalent, bacterin-toxoid combinations is inexpensive, safe, and recommended.

Tetanus has been diagnosed clinically in reindeer that have had antler trauma and wound contamination. For wounds, an antitoxin can be used. Tetanus toxoid can be administered in high risk situations.

Reindeer have a high incidence of bacterial peritonitis. The primary cause is unknown. Various organisms have been isolated on culture with *Actinomyces* (*Corynebacterium*) *pyogenes* being the most common. Peritonitis is especially prevalent in areas where *Setaria* sp., the abdominal worm, are common. Routine

treatment with ivermectin greatly reduces the incidence of peritonitis in those areas.

Keratitis is common in reindeer held in dusty, dirty pens. If afflicted, the cornea appears cloudy white with a ring of inflammation close to the limbus. Ulceration can occur. The causative agent of keratitis in reindeer is unknown, but a subconjunctival injection of 200,000 units of procaine penicillin G mixed with 1 mg of triamcinolone acetonide results in almost a 100% recovery.

Viral Diseases

Bovine Respiratory Viruses — Serologic evidence of three of the bovine respiratory viruses (IBR, BVD, and PI-3) have been found in reindeer in their natural habitat and in farmed herds. The significance of these findings is not known, but limited experimental exposure of reindeer to BVD virus produced minimal lesions and seroconversion. Under stress, these viruses may cause disease. Reindeer have been vaccinated with killed vaccines without adverse effects.

Foot-and-Mouth Disease — Foot-and-mouth disease has been reported in reindeer in countries where the disease is endemic or outbreaks have occurred. Infected cattle transmitted the disease. The lesions and course of the disease is comparable to that in other susceptible ruminants.

Rabies — Rabies, usually transmitted from infected foxes, has been noted in reindeer on their native ranges. Clinical signs include salivation, posterior paralysis, ataxia, and aggressive behavior. The incubation period can be several weeks. Reindeer that show signs of rabies, particularly in newly established herds obtained from rabies endemic areas, should be handled with caution and the heads submitted to an appropriate laboratory.

Malignant Catarrhal Fever — Malignant catarrhal fever (MCF) can cause high mortality in reindeer. Symptoms vary but include high fever, incoordination, nasal and ocular discharge, and diarrhea. Death usually occurs in three-to-seven days. There is no preventive vaccine. In North America, sheep are common carriers of the virus. It is good management to separate reindeer from other livestock species, particularly sheep.

Papillomatosis — Papillomas or fibropapillomas are benign tumors, probably of viral origin, that are observed on the skin of

reindeer. The tumors can appear as large, pedunculated masses up to 10 cm in diameter or as coalescing masses on the head and neck. They usually disappear after several weeks or months without any treatment. Pedunculated tumors may be surgically removed if they impair vision or otherwise cause irritation.

Parasitic Diseases — While parasites have a major impact on the well-being of herds, modern control methods have dramatically decreased that impact. A variety of parasitic organisms live in reindeer. A few of them are unique but, in general, information about life cycles and control methods used to manage parasitic diseases in domestic ruminants can be applied directly to reindeer.

Warbles and Nasal Bots — Warbles (*Hypoderma {Oedemagena} tarandi*) and nasal bots (*Cephenemyia trompe*) can severely infest reindeer. Up to 2,000 warble larvae have been counted on the back of one reindeer; numbers ranging from 500 to 1,000 are common. Herders describe finding groups of 35 to 40 reindeer dead in late May. The only visible lesions were massive warble infestations, extreme emaciation, tissue necrosis, and loss of skin from the back. Herders comment on the smaller size of calves that nurse heavily infested females; and that heavily infested yearlings are noticeably smaller than their lightly infested cohorts.

These parasites are easily controlled because during the winter portion of their life cycle they are only present under the skin or in the pharynx of reindeer. A dose of 200 ug/kg SQ Ivermectin administered between November and January is nearly 100% effective in eliminating these parasites in individual animals. The FDA has approved the drug for reindeer usage, with the stipulation there be a 56-day withdrawal period before the animals are slaughtered for human consumption. With proper treatment and monitoring, these parasites can easily be eradicated from a herd if no infested animals are in the immediate vicinity.

External Parasites — In most situations external parasites are not a major problem in reindeer. In some farming environments, though, *Sarcoptes* sp. and *Chorioptes* sp. mites, and *Cervohitrius tarandi* lice may become significant. Ticks are reported rarely. Ivermectin (200 ug/kg SQ) is recommended for most external parasites.

Internal Parasites — Reindeer suffer from infestations of numerous internal parasites. Larvae of cysticerci tapeworms are often seen in

tongue, heart, liver, and muscles of reindeer. Echinococcosis has been reported in most reindeer herds that are in their natural environment. Dogs and predators should be kept away from infected carcasses and from reindeer pastures. This will curtail the spread of these types of parasites and prevent predation.

Nematodes of reindeer are numerous. Those of most importance are members of the superfamilies Trichostrongyloidea and Filarioidea which include gastrointestinal and lung species.

These nematodes are similar to those observed in domestic stock. The same control methods used for domestic ruminants should be used for reindeer. Cerebrospinal nematodiasis (*Elaphostrongylus rangiferi*), usually seen in Scandinavia, causes paralysis to the reindeer's hindquarters.

Protozoan parasites are also numerous. *Sarcocystis* organisms are routinely seen microscopically in the muscles of reindeer. Under most situations they are not a problem, but if massive infection occurs in young animals, the illness can be serious. Coccidiosis is seen in young reindeer under farm conditions, it can be controlled using standard preventative and therapeutic measures.

Besnoitia is reported to cause serious disease in reindeer and caribou that are kept in close confinement. Piroplasmiasis has been reported in the USSR.

CARE OF CALVES

Perhaps the most troublesome time for the reindeer farmer occurs during calving. Every effort must be made to assure calves obtain the first milk or colostrum that is rich in antibodies. If a calf is orphaned and unable to receive colostrum within the first few hours of life, antibodies should be administered intravenously. This is accomplished by collecting one unit (approximately one pint) of blood from a donor reindeer (preferably from the same farm), then separating and administering 50 to 100 ml of plasma intravenously. The plasma can also be given orally during the first 24 hours of life. This is a common procedure in equine medicine and most veterinarians are familiar with the technique.

Plasma may be harvested and stored frozen for immediate availability. The immune system of young animals is not fully functional until it is approximately three months old. Vaccines administered before then do little good but

antisera and antitoxins that provide passive immunity are effective at any time.

Both infectious and noninfectious diseases, usually specific to individual farms, must be dealt with. One of the most common infectious diseases encountered by reindeer calves is caused by pathogenic *Escherichia coli* bacteria (colibacillosis). Its symptom, in calves one-to-five-days old, is weakness which rapidly progresses to death. This disease is also seen in slightly older calves. Prevention includes administering a killed K99 *E. coli* vaccine to pregnant females in late fall. Oral antisera are available for newborn calves of mothers that were not vaccinated in the fall. If colibacillosis persists after the use of commercial vaccines, an autogenous vaccine can be made from a specific strain of *E. coli* taken on a farm. Reindeer calves may also be infected by several other disease agents including the bovine respiratory viruses. Vaccination programs should be tailored to specific farms and diseases known to be present in the general area. A calf that appears ill should receive immediate veterinary care.

Clean calving areas are very important. In most cases intrusions should be kept to a minimum to prevent the mother from rejecting her calf. Putting iodine on the navel, administering oral antibodies, etc. to healthy calves may cause more harm than good if mother and newborn have not bonded. Common sense and good judgement, based on experience or advice from those with experience, are important and often reap better results than following a rigid set of guidelines. Circular 72, which discusses the hand rearing of orphan calves, is helpful. It can be obtained from the Publications Office, Agricultural and Forestry Experiment Station, University of Alaska, Fairbanks, Alaska, 99775.

NONINFECTIOUS DISEASES

The medical care of reindeer usually involves treating noninfectious diseases. Good management is all important in preventing most causes of noninfectious disease. Traumatic injuries to reindeer are common when the animals are not accustomed to being handled, when they are housed in poorly designed or constructed holding facilities, and when people are not trained to properly handle them. These injuries are treated as they would be for domestic livestock, keeping in mind the potential for further injury if repeated restraint is required.

When reindeer antlers are traumatized during their rapid growth phase, they can become deformed and pockets of infection often develop. Feeders should be designed to insure that antlers do not rub on uprights, tops, or edges.

Foreign objects often will be ingested by reindeer. Pens should be kept free of trash, and visitors should be discouraged from feeding or throwing objects at the animals to gain their attention. Reindeer, kept in close confinement, will eat the coat of nearby animals. Large tricholiths have been found in the intestinal tract of some reindeer at necropsy.

Hoof care is minimal if reindeer have a reasonable-sized area in which to walk to assure normal wear. In wet or rocky areas bacteria can invade the foot resulting in typical foot rot. Again, prevention and treatment methods are the same as those used for domestic stock. In some situations laminitis has been observed in reindeer fed an exclusive diet of alfalfa. Diet change, hoof trimming, and the use of nonsteroidal anti-inflammatory drugs will usually result in recovery.

Various methods are used to castrate reindeer. Open surgical castration is the method used in Alaska on thousands of reindeer each year. Very few complications have been observed.

Reindeer can develop capture myopathy if overexertion, stress, or hyperthermic conditions exist. Usually these conditions are present when restraint and transport are attempted. It has been this author's experience that maintenance of fluid and electrolyte balance plus good nursing care are paramount in treating capture myopathy in reindeer. Recovery can be prolonged.

Gastric ulcers have been reported in Scandinavia after reindeer suffered severe handling stress. The finding of capture myopathy or gastric ulcers in reindeer is a strong indication that management practices must be modified.

MEDICAL MANAGEMENT

Restraint

Properly restraining reindeer for medical treatment is of utmost importance. Before deciding if medical treatment is warranted, weigh the seriousness of the medical problem in relation to the difficulties of restraint. Reindeer are relatively easy to domesticate and can be handled

with ease by knowledgeable people. Various padded chutes and crushes have been used successfully.

As a last resort, chemical immobilization can be used if facilities and people are not available for physical restraint. For moderate sedation, xylazine at a dose rate of 0.2 mg/kg IM can be used. Yohimbine (0.125 mg/kg IV) can be used to partially reverse the effects of xylazine. A combination of xylazine (0.2 mg/kg IM) and ketamine (5-8 mg/kg IM) can be used for general anesthesia.

RECOMMENDED READING

- DIETERICH R.A., (ed). 1981. *Alaskan wildlife diseases*. University of Alaska, Fairbanks. p. 524.
A compendium of the diseases of Alaskan wildlife with numerous references to diseases of reindeer.
- DIETERICH R.A. 1985. *An overview of Alaskan reindeer diseases and current control methods*. *Biology of deer production*, The Royal Society of New Zealand, Bulletin 22, pp. 97-100.
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A summary of methods and regulations used to transport reindeer by aircraft.
- DIETERICH R.A. AND J.K. MORTON. 1990. *Reindeer health aide manual*. 2nd ed. Agricultural and Forestry Experiment Station, Misc. Pub. 90-4. University of Alaska, Fairbanks. p. 85.
A manual written for reindeer herders that contains descriptions of basic anatomy, physiology, diseases, and treatments used in the field in Alaska.
- MCINTYRE, H.C.H., L.A. RENECKER AND M.C. SOUSA. in press. *Productivity and management of Reindeer populations, Seward Peninsula, Alaska*. In: *Wildlife Ranching: A Celebration of Diversity*. Proceedings of the 3rd International Wildlife Ranching Symposium, Pretoria, South Africa.
- SKJENNEBERG, S. AND L. SLAGSVOLD. 1979. *Reindeer husbandry and its ecological principles*. U. S. Department of Interior Bureau of Indian Affairs. Juneau, AK. p. 395.
A book on reindeer husbandry as practiced in Norway.
- ZHIGUNOV, P.S. 1968. *Reindeer husbandry*. U.S. Department of Commerce, Clearing-house for Federal Scientific and Technical Information, Springfield, VA. p. 348.
A translation of a Russian book on reindeer husbandry as practiced in the former Soviet Union.