The Reindeer Handler

An electronic magazine dedicated to health, and promotion of reindeer husbandry.

Edition #3 May 2021

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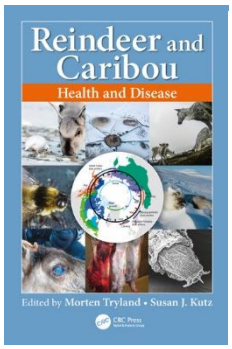

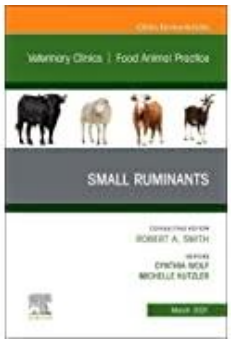

The Reindeer Handler

Edition #3

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Regular features

In This Issue

The following pages were provided with permission by Dr. Isaac Bott

Dr Bott is an accomplished veterinarian and CEO of Mountain West Animal Hospital in Provo Utah. Dr Bott has pioneered work for reindeer artificial insemination and is a contributing author in the veterinary book, “Small Ruminants, an Issue of Veterinary Clinics of North America: Food Animal Practice (Volume 37-1) (The Clinics; Veterinary Medicine, Volume 37-1)

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Thank you so much Dr. Bott for submitting your hard work for our reindeer community, the work, hours and dedication are truly appreciated Please remember to support and follow Dr. Bott at http://www.docbott.com or on Facebook @ DocBott

Please see the above-mentioned book at Amazon or other book sellers

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Reindeer Veterinary Care for Small Ruminant Practitioners

N. Isaac Bott, DVM

KEYWORDS

• Antlers • Artificial insemination • Caribou • Cervid *Rangifer* • Theriogenology

KEY POINTS

- Nutritional needs of reindeer greatly differ between summer and winter—as intermediate feeders, they alternate between consuming lush nutritive vegetation and carbohydrate-rich lichens, respectively.
- Pharmacologic considerations and anatomic features of reindeer largely resemble those applied to sheep and goats.
- Reindeer bulls during the breeding season are exceptionally sensitive to anesthetics, and practitioners should avoid procedures whenever possible until the rut has ended.
- Antler development and growth occur independently from gonadal activity in reindeer.
- Reindeer steers continue to grow normal-sized antlers but frequently encounter abnormalities, such as antleromas, incomplete velvet removal, and failure to shed or cast.
- The average standing estrus time reported in reindeer ranges between 1 hour and 3 hours, one of the shortest durations described in ruminant species.
- The unique and variable gestational lengths in *Rangifer* species are theorized as synchronized adaptations for optimal predation safety and plant phenology.
- Transrectal ultrasonography is a modality frequently utilized for fetal viability but limited until 20 weeks of gestation.
- Reindeer cannot be housed adjacent to goats and sheep due to contracting potentially fatal diseases, such as malignant catarrhal fever.

Video content accompanies this article at http://www.vetfood.theclinics.com.

INTRODUCTION

Reindeer (*Rangifer tarandus tarandus*) and caribou (*Rangifer tarandus granti*) are members of the same species, which is further subdivided into 2 main groups, with 7 extant subspecies, all with a circumboreal and circumarctic distribution.[1,2] Although caribou

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appeared in North America by crossing the Bering land bridge centuries ago, reindeer first arrived in Alaska in 1892. They were imported by boat from Siberia to establish them as a foundation for red meat production.[3]

Reindeer have been domesticated for centuries. They provide an economic mainstay for many native populations. In northern latitudes, they are kept primarily for meat production. Studies have shown that meat from reindeer is more tender compared with beef aged for the same period.[4,5] In the lower 48 states, they areused primarily for seasonal exhibition and for zoologic displays. An organization of reindeer owners, called the Reindeer Owners and Breeders Association, is an active group of reindeer farmers in North America who meet regularly and share informationregarding reindeer ownership, government regulations, and overall reindeer health.

Because reindeer are managed extensively, environmental factors have a significant impact on fecundity. Current evidence suggests that management of these factors—of which reproduction, nutrition, herd health, and herd composition seem to be the most important—will enable the productivity of reindeer herds to be markedly improved. A recent move toward a more intense production of reindeer, using traditional agricultural methods, requires intensified management and a thorough understanding of reindeer management.

A review of both female and male reproductive management is presented as a guide for practicing veterinarians to understand and apply in clinical practice the peculiarities of this species. This article also discusses restraint, examination, anesthesia, and common problems that a small ruminant practitioner likely encounters when treat-ing this species.

RESTRAINT

Most reindeer in the lower 48 states are accustomed to handling and are comfort- able with a halter and lead rope. Restraint devices are a simple crush design and arelined with soft material (ie, foam, carpet, or vinyl) to provide comfort and minimize trauma to antlers in velvet[6] (Fig. 1). These devices typically do not have a headcatch. Physical restraint of the head is attained by cautious grasping of the antlersor halter (Fig. 2). With this type of restraint, venipuncture can be accomplished from the jugular, cephalic, or lateral saphenous veins with relative ease. Hoof trims, vac- cinations, and physical examinations can be performed easily while an animal is in the crush. A systematic approach to the physical examination always should be fol- lowed (Box 1).

NUTRITION

Pluralities of deer species are classified as browsers, meaning that they are highly selective of food and travel tremendous distances in search of a specific diet. Only approximately a quarter of all deer species are true grazers.[7] Reindeer are unique in that they do not fall into either category but are classified as intermediate feeders, meaning they switch naturally between browsing and grazing, which usually depends on the seasonal availability of their preferred food.[8] For example, during summer, their diet consists of green vegetation with high nutritive value. Alternatively, in the winter, their diet is dominated by lichens. Lichens are rich in digestible carbohydrates but low in protein and essential minerals. Timothy grass (*Phleum pratense*) is used commonly to make hay and silage. Slender wheat grass (*Elymus trachycaulus*) is highly palatable and also often is used for supplemental feeding of reindeer in North America.[9] The digestive system of reindeer is poor at accommodating large quantities of fibrous forage. Pelleted or mixed dry feeds are fed primarily as part of a total mixed ration.

Fig. 1. An example of a functional reindeer squeeze or crush properly restraining an adult male reindeer.

Cereal grains, primarily barley and oats, are the main ingredient in most reindeer mixed feeds. Occasionally corn is used in some rations.[10] These rations vary greatly regarding crude protein and carbohydrate fractions as well as mineral content. A pelleted ration developed in Oregon is included for reference (Fig. 3).

ANESTHESIA

Often anesthesia is required in the field where animals cannot be intubated and maintained on an inhalant anesthetic. Wherever possible, the animals should be placed in sternal recumbency, the head elevated, and the oral cavity pointing toward the ground to minimize complications that also occur in other ruminant species.

Pharmacologic agents and doses used in reindeer are similar to those in other small ruminant species. Specific drug doses for reindeer and caribou have been published.[11] Commonly used a_2-adrenoceptor agents include xylazine and dexmedetomidine. Reversal agents, such as atipamezole, commonly are used.

Cyclohexamines, such as ketamine and tiletamine, also are used in conjunction with a_2-adrenoceptor agents. Ketamine is preferred by practitioners, because tiletamine is associated with extended recovery times due to its longer elimination half-life. A preparation of butorphanol-azaperone-medetomidine is available commercially in the United States through ZooPharm (ZooPharm, https://www.zoopharm.com, Laramie, WY) and commonly is used with reindeer.[11]

Fig. 2. Proper antler and body restraint demonstrated.

Rutting male reindeer and caribou have an unacceptably high mortality rate under anesthesia. Avoiding anesthesia wherever possible in male reindeer is the best practice during the breeding season.[2]

ANTLERS

Antlers are the fastest growing tissue and the only example of the regeneration of an entire organ in mammalian species.[12] Reindeer and caribou are unique among cervids because both sexes bear antlers. This suggests that antler development is largely

Box 1
Systematic approach to the physical examination in reindeer

- Examine antlers.
  - As a safety precaution, first take note of the size and position of antlers, including all points and tips.
  - Growing antlers are palpably warmer than mature antlers.
  - Inspect antler base and skin around pedicles.
- Examine eyes, ears, nose, mouth, and teeth.
- Auscult heart, lungs, and abdomen.
- Examine tail, rectum, vulva, or scrotum and take rectal temperature.
- Visually inspect legs and hooves.

RIV	Name	(PR) Product
		PU51, SANTA REINDEER PLT
	Ext.Reference	5097714
	GR BARLEY	14.171
	GR CORN FINE	4.500
	GR GRAIN SCRNINGS.	13.000
	SUNCRD ALFALFA ML	10.000
	WHEAT MIDDLINGS	50.000
	DEHULLED SOYMEAL.....	1.179
	SUPER-BIND BG	0.500
	CAL CARB FINE325BK	1.700
	MONO-DICALPHOS VIB	0.200
	FAT,YELO GR MIXER	0.600
	MOLASSES AT COND	4.000
	SELENIUM PX{.06%}	0.050
	TM PMX	0.050
	VIT PMX	0.050
		100.000
	DRY MATTER	87.492 %
	PROTEIN	14.000 %
	FAT EE	2.656 %
	FIBER MAX	9.816 %
	ADF	12.679 %
	CALCIUM	1.038 %
	PHOSPHORUS	0.768 %
	MAGNESIUM	0.306 %
	POTASSIUM	1.147 %
	COBALT TT	0.750 PPM
	COPPER TT	24.014 PPM
	IODINE TT	0.860 PPM
	MN TT	121.487 PPM
	SE AD	0.301 PPM
	ZINC TT	124.118 PPM
	VIT A AD	7.500 KIU/LB
	VIT D3 AD	2.500 KIU/LB
	VIT E AD	20.000 IU/LB

Fig. 3. A list of ingredients in a reindeer pellet commonly used in Oregon, Utah, and Washington State. Product values (PR) are given as percentage.

independent of gonadal activity.[13] The presence of antlers is used as a taxonomic feature for the genus *Rangifer*.[2]

Antlers are a good indicator of overall health of the animal. Heavy parasite loads have been shown to cause antler asymmetry. Chronic lameness and limb amputation also have been shown to affect the antler contralateral to the affected limb, resulting in asymmetric growth.[12]

Female antler growth is driven largely by estrogen.[14] Female antler cycles have been experimentally controlled by estradiol implantation. Removal of estradiol implants after 4 months cause antler shedding.[15] Cows shed their antlers between the months of February and April.[15]

In bulls, the sequential activation of the reproductive system, and antler growth, starts with an almost simultaneous elevation of luteinizing hormone and with follicle-stimulating hormone in April.[16] Male antler growth occurs at the rapid rate of 3 cm to 5 cm of new growth per day. Antlers begin to develop in late winter and continue growing through the end of July. A spike in testosterone initiates velvet rubbing and shedding.[2,12,16] Male reindeer cast their antlers typically during the first week of December.[17]

Antler development and casting in castrates has some interesting characteristics not found in other species. Unlike many other deer species, reindeer steers continue to grow massive antlers after castration (Fig. 4). Steers occasionally experience incomplete velvet removal and delayed antler shedding. Subcutaneous implants containing estradiol benzoate (10 mg) and progesterone (100 mg) (Synovex-C, Zoetis, Parsippany, NJ) commonly are placed at the base of the ear of castrates during October. Two pellets are inserted in each animal.[2] After administration, steers then rub velvet and cast their antlers similarly to intact male reindeer. Subsequent antler cy-cles then continue without interruption.[2]

Veterinarians frequently are sought to treat antler injuries. Reindeer steers sporadically develop large, multinodular, hyperplastic fibropapillomatous growths that resemble perruques in other castrated deer species (Fig. 5). The etiology of these lesions is unclear, but they may be associated with papilloma virus infection.[18] Such lesions are treated with surgical excision and usually are curative.[17] These velvet accumulations often occur in the lower portion of the antler, near the shovel and proximal portions of brow tines. Adequate cauteriza- tion and hemostasis are required because of the highly vascular nature of this tissue.

Fig. 4. Two castrated 8-year-old reindeer at Mountain West Animal Hospital.

Fig. 5. An antleroma in a 9-year-old castrated male reindeer.

MALE REPRODUCTIVE MANAGEMENT

Male reindeer have the largest antler to body size ratio among deer species.[19] As with other cervids, the male's body, antler size, and fighting ability determine access to receptive female reindeer.[20,21] The first sign of the pending rut is the cleaning of velvet from the antlers. Antler cleaning is triggered by rising levels of testosterone in late August. Complete removal of velvet occurs rapidly, often within a 12-hour period. Intense aggressive displays follow with territorial marking and sparring like other deer species. Rut behavior also includes a self-marking display of hunching and uri- nating on the hind limbs, termed trampling-urination (Video 1).[2] This is accompanied by distinctive vocalizations referred to as grunting or barking. Bulls are territorialand exhibit a scraping behavior that involves aggressively rubbing the nose on the ground, leaving scent from the nasal, preorbital, and forehead glands (Video 2). The rut generally lasts through late November (Fig. 6).

Voluntary food intake dramatically decreases at the onset of the rut. Male reindeer often display anorexia at the height of rut. Studies suggest that it is common for male reindeer to lose up to 23% of lean mass.[22] This body mass reduction occurred in all male reindeer over 2 years of age, regardless of social hierarchy.[2] Cautionary management is required for all male reindeer during the rut. Even the most docile bulls become extremely aggressive and cannot be trusted until the rut has ended (Fig. 7).

Many reindeer farmers elect to remove hard antlers after velvet is shed and sensation is lost. A reciprocating saw blade is used to remove antlers approximately 2 cm to 3 cm above the antler pedicle (Video 3). Although this lessens the ability of male reindeer to use antlers as a weapon, they often still resort to pawing and using their broad hooves in a threatening manner. Extreme caution always must be used by the veterinarian when working on intact bulls in rut.

Anesthetic unpredictability is reported in nearly all species of rutting males, but reindeer are particularly susceptible to the effects of cylohexamines (ketamine) and a_2-agonists (xylazine).[11] Deaths have been reported from a single 15-mg dose of xylazine.[2] Due to this high mortality, general anesthesia should be avoided in male reindeer during the breeding season.[2,11]

Historically, medroxyprogesterone acetate (Depo-Provera, Pharmacia and Upjohn Company, Kalamazoo, MI) has been used to calm male reindeer and reduce aggression during rut. Although it is not approved for use in reindeer, it often is administered

Fig. 6. A scrape made by a rutting male reindeer.

in a set of 2 injections (200–400 mg, intramuscularly [IM]) administered in August and October.[2] No specific studies have evaluated the long-term impact of this drug on spermatogenesis, fertility, semen quality, or subsequent breeding ability.

FEMALE REPRODUCTION MANAGEMENT

Reindeer are highly seasonal breeders. The breeding season coincides with the decreasing photoperiod in the fall. They are seasonally polyestrus, with an estrous cycle length of approximately 24 days ±3.4 days in North American reindeer.[23]

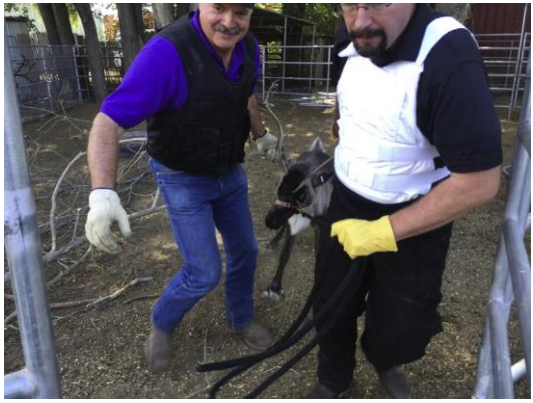

Fig. 7. A bulletproof vest is worn by the author when working with rutting male reindeer.

Considerable variation has been reported in primiparous Norwegian reindeer, with an average estrous cycle length of 19.4 days±5.7 days.[24] Seasonal ovarian activity is initiated in late August. As in other ruminant species, a small transient rise in plasma progesterone, lasting 4 days to 9 days, precedes the first fertile estrous cycle. The detailed endocrine profiles of the estrous cycle in reindeer generally are in accordance with those found in sheep. Current research suggests that some female reindeer may experience 2 or more short cycles prior to the onset of full-length cycles.[2,15]

A peculiarity in reindeer is the relatively short length of standing estrus compared with that of other ruminants. Studies conducted at the University of Alaska revealed an average standing estrus time of 1 hour (range 1 hour to 3 hours).[23,24] Female reindeer continue to cycle well into spring (as late as April), having 6 cycles to 8 cycles through the winter. The transition into anestrus has been reported to occur with abrupt cessation of luteal activity or the formation of a persistent corpus luteum, which can persist into the next breeding season.[2]

As reported in other small ruminant species, the introduction of a bull prior to the initiation of estrous cycles significantly hastens the onset of ovarian activity by 2 weeks. This subsequently results in synchronicity of calving the following spring.[23]

Estrus synchronization, superovulation, and artificial insemination (AI) in reindeer requires special attention. Growing interest in the truncation of the breeding season and AI have largely focused on synchronizing estrus.[25] Among captive reindeer in Alaska, 2 injections of prostaglandin F_{2a} (15 mg, IM) (Lutalyse, Pharmacia and Upjohn Company, Kalamazoo, MI) administered 10 days apart resulted in luteolysis, and a single 15-mg injection at 6 weeks after conception terminated pregnancies.[2] Cloprostenol (0.25 mg, IM) also has been shown to induce luteolysis in reindeer calves and abortion in adult female reindeer.[26,27]

Attempts at AI in reindeer have been met with mixed results.[28,29] Most published reports provide little to no information on either the methods employed or the results obtained. As with AI in other species, it is a labor-intensive process. It requires the ability to collect and store semen as well as the ability to synchronize or recognize estrus in the female reindeer for appropriately timed insemination.[30] Frozen semen AI successes have been reported in only a handful of cases.[31,32] The use of an ovine controlled internal drug release (CIDR) device has been described in both 7-day and 14-day protocols, with timed AI occurring 44 hours to 60 hours after CIDR removal.[32,33] In 1 study, an injection of cloprostenol (250 mg, IM) administered at CIDR removal and a gonadotropin-releasing hormone injection (100 mg, IM) adminis-tered at the time of AI (44 hours post-CIDR removal) resulted in a 66% pregnancy rate.[32]

A challenge frequently encountered in reindeer transcervical AI is within the reindeer cervix. It anatomically resembles that of the ewe, thus hindering the ability to readily pass the inseminating tube successfully into the uterus.[28] Superovulation has been attempted with follicle-stimulating hormone and resulted in a poor embryo recovery rate of 20%.[34]

PREGNANCY DETECTION

Studies have been published on both Norwegian and Alaskan reindeer detailing the endocrinology of pregnancy. Progesterone concentrations show significant variability during pregnancy (range 2.4–14.28 ng/mL), both within and between individual animals. Progesterone levels reliably increase immediately after conception to mean levels of 5.89 ng/mL±0.09 ng/mL, where it remains until parturition.[2,23,35,36] This remains consistent with other species that are dependent on luteal progesterone

production throughout pregnancy. Studies show that the reindeer placenta does produce some progesterone; however, this contribution is not clearly evident in the progesterone profile.[37] As with other species, cyclic progesterone levels in nonpregnant female reindeer can overlap those found in pregnant female reindeer and thus make peripheral progesterone an unreliable method of pregnancy detection.[2]

Pregnancy-Specific Protein B

Pregnancy-specific protein B (PSPB) has been used to detect pregnancy successfully in populations of wild and domestic caribou and reindeer. PSPB appears in maternal plasma at 4.4 weeks (range 4 weeks to 5 weeks) after mating.[38,39] Blood samples should be collected 6 weeks after breeding. Due to exhibition demand during the holidays, reindeer owners in the United States typically postpone PSPB testing until late December.

Transrectal Ultrasonography

Given that reindeer are habituated to handling and restraint, transrectal ultrasonography has become a useful modality for pregnancy detection. Advantages of ultrasonography are the application in the field and its ability to produce immediate results. It also allows for fetal measurements and assessment.[40]

It is used routinely between 35 days and 60 days of gestation, although earlier detection is achievable.[41] Once week 20 of gestation is reached, it becomes increasingly difficult to detect the fetus because the gravid uterus is displaced ventrally and becomes unreachable for the ultrasound transducer (Video 4).

Antler Retention

Retention of antlers in pregnant reindeer cows long has been a technique of wildlife biologists to assess pregnancy status in wild caribou.[42] In reindeer, it is not always a reliable predictor of pregnancy. Antler retention into mid-April can be used to infer pregnancy, although the contrary is not true. A portion of pregnant female reindeer often cast their antlers prior to calving.[2,43,44]

Gestation Length and Parturition

Reindeer have short and highly synchronized mating and calving seasons. Reported gestation length is highly variable. Published gestations range from 198 days to 240 days.[2,45] It also has been hypothesized that part of this variability is due to the limited reliability of breeding observations and, therefore, inaccurate estimates of conception date. Nevertheless, an estimated 90% of female reindeer are bred in a 10-day to 21-day interval and calve in an equally synchronized manner.[46] Several studies have documented a negative correlation between gestation length and conception date.[47] Although the underlying mechanisms responsible for this gesta- tional plasticity and enhanced calving synchrony are not understood fully, it is assumed that the primary advantage of synchronized parturition is that fewer neo- nates are lost to predation.[48] Another hypothesis is that synchronicity of parturitionis correlated with optimal plant phenology.[45]

Twinning is unusual in domestic reindeer and caribou, with a plurality of twins not surviving birth.[49,50] Dystocias are uncommon in reindeer but do occasionally occur. As with other cervids and small ruminants, manual correction of the malpresentation can be accomplished easily by a skilled veterinarian (Video 5). Malpresentations in reindeer are the same as those described in sheep and goats. Successful caesarian sections have been performed in a field setting using a lumbar approach like that commonly used in sheep and goats. Muscular layers of the reindeer abdomen are

much thinner than other cervids, and closure is difficult without a surgical assistant aiding in apposition of the lateral abdomen.

REINDEER HEALTH

Respiratory Disease

Sick reindeer often separate themselves from the herd. Posturing with a hanging head and extended neck often indicates illness. Feed intake decreases and often the hair coat has a dull and unkempt appearance.[51]

Reindeer can adapt well to extreme climate variations. In summer, the normal respiratory rate of a reindeer at rest is 20 breaths per minute to 50 breaths per minute. During extremely cold winter months, this resting respiratory rate decreases to 8 breaths per minute to 16 breaths per minute. Stress, such as capture or restraint, may increase the respiratory rate to 100 breaths per minute to 180 breaths per min- ute.[52,53] As with other cervids and small ruminants, coughing occurs in the contextof a variety of respiratory diseases and is reported to be observed best in the morning.[54]

Parainfluenza virus type 3 (PIV3) is a viral disease that infects cattle and is known to infect reindeer also. A study of semidomesticated reindeer in Sweden revealed that PIV3 antibodies were present in 54% of animals.[55] Other pathogens, such as *Pasteurella*, can combine and induce a syndrome referred to as bovine respiratory disease complex in cattle.[54] Often, an intranasal infectious bovine rhinotracheitis virus–PIV3 cattle vaccine is administered prior to beginning the travel associated with the holiday display season.

Chronic Wasting Disease

The first chronic wasting disease (CWD) case identified in free ranging cervids outside of North America occurred in a wild Eurasian tundra reindeer (*Rangifer tarandus tarandus*) in Norway in 2016. This is the first known natural case docu- mented in reindeer.[56] The first case of CWD in North American reindeer was found in a captive reindeer herd in northern Illinois in 2018. Emerging knowledge that CWD occurs in reindeer will dramatically change the selling and interstate exhibition of reindeer in the intercontinental United States. There currently is no ev- idence that suggests CWD can cause clinical disease in humans. Further studiesare needed with respect to interspecies CWD transmission, including its zoonotic potential.[57,58]

Malignant Catarrhal Fever

Reindeer are susceptible to malignant catarrhal fever (ovine herpesvirus 2) with a clinical presentation, including generalized neurologic signs, oculonasal discharge, and sudden death. It is of paramount importance to not house reindeer near sheep and goats.[59–61]

Parasites

Captive reindeer seem to be particularly predisposed to acquiring parasitic infections. Northern facilities are especially prone to warble fly (*Hypoderma tarandi*) infestations. Ivermectin (Ivomec, Merial, Duluth, GA) is labeled for the treatment and control of warbles *(Oedemagena tarandi)* in reindeer (200 mg/kg, subcutaneously). Myiasis frequently occurs after antler velvet has been damaged. Other external parasites of concern are tick species (*Amblyomma, Dermacento*r, and *Ixodes* spp) and their associated pathogens. *Babesia* and *Anaplasmosis* cause a high rate of morbidity and mortality. Internal parasites of importance are the meningeal worm (*Dictyocaulus viviparus*) and

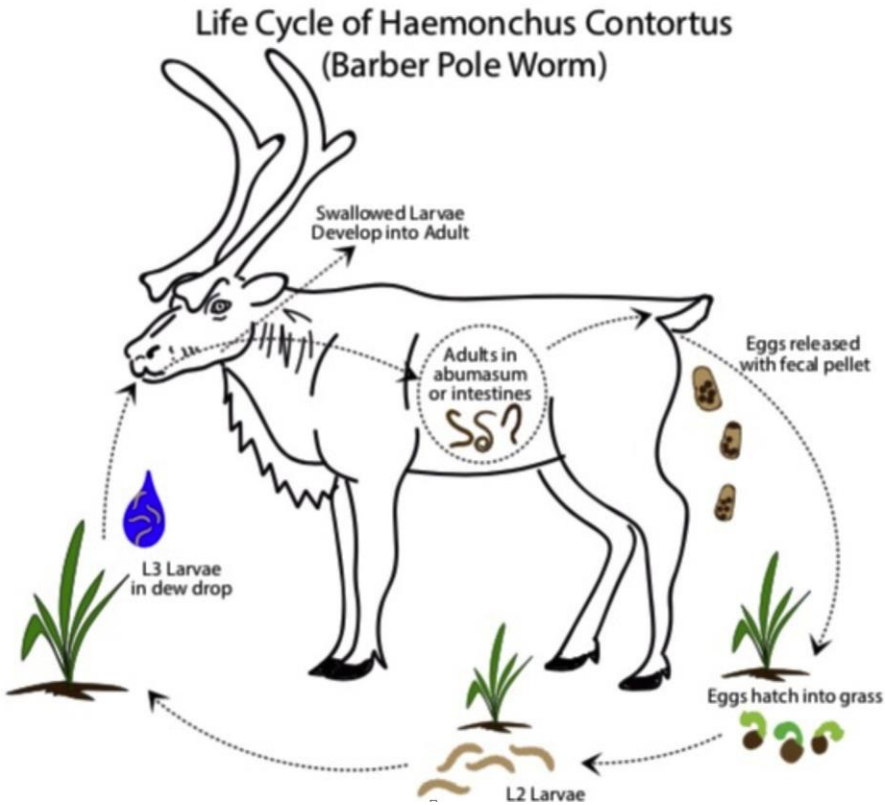

Fig. 8. The life cycle of *Haemonchus* in reindeer.

nematodes of which the barber pole worm (*Nematodirus* sp) seem to be of significant pathogenicity in reindeer (Fig. 8).[54]

CLINICS CARE POINTS

- Numerous environmental factors have a significant impact on success of reindeer fecundity and overall reproduction within the continental United States.
- Reindeer bulls in rut are exceptionally aggressive. Even the most docile of bulls cannot be trusted until the rut has ended.
- Reindeer bulls during the breeding season are exceptionally sensitive to anesthetics, and practitioners should postpone, where possible, all procedures until the rut has ended.
- Antler removal after velvet shedding often is performed in rutting bulls as a safety precaution for owners and practitioners.
- Reindeer steers continue to grow normal-sized antlers but frequently encounter abnormalities, such as antleromas, incomplete velvet removal, and failure to shed or cast.
- The average standing estrus time reported in reindeer ranges between 1 hour and 3 hours, one of the shortest durations described in ruminant species.
- A negative correlation exists between gestation length and conception date. The earlier in the breeding season a cow conceives, the longer her gestation length.

- Peripheral progesterone concentration is an unreliable pregnancy detection method in reindeer due to frequent overlap of cyclic progesterone levels also observed in nonpregnant female reindeer. PSPB can be used after week 6 of gestation to confirm pregnancy.
- Transrectal ultrasonography is a modality frequently utilized to confirm pregnancy and assess fetal viability but is limited beyond 20 weeks of gestation.

DISCLOSURE

The author has nothing to disclose.

SUPPLEMENTARY DATA

Supplementary data related to this article can be found online at https://doi.org/10.1016/j.cvfa.2020.10.008.

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Snowman's Reindeer Farm Supplies for Calving Season:

- Nolvasan Teat Dip Con (Concentrate – use .5% solution – DO NOT USE FULL STRENGTH ON REINDEER) Super 7 spray can also be used to clean naval.
- Scissors – disinfect with full strength Nolvasan and put in ziploc baggie to keep sterilized
- Barvac 7 (Clostridium Perfringens Types C & D anti-toxin)
- Plasma from male in herd. Recommended: 1 pint blood for plasma from donor reindeer from same herd but not mother or father. 10-20 ml plasma needed for each calf. Can be kept for 6-12 months frozen.
- Supply of 3cc sterile plastic syringes with 20 gauge needles
- Bo-se – Selenium and Vitamin E SQ
- Vitamin B Complex – SQ
- Ningxia Red
- Ivermectin
- Oils: Gentle Baby, RC, Melrose, Myrrh, Thieves
- Paper Towels and Bath Towels
- Plastic baby bottles and Pritchard nipples
- Land O Lakes Lamb Replacer Formula available for order through TSC.

Emergency Supplies:

- Lamb Resuscitator
- Oxytocin for milk production and can also be used to assist with placenta delivery (vet)
- Nuflor Injectable for Pnuemonia (vet)
- Banamine (vet) Sarah: We already have this in stock

· Soft Rubber Catheter about 15 ¼” or longer, 3/8” to 5/8” in diameter (for tube possible feeding)
· 60 cc syringe with luer lock tip (no needle)
· Colostrum (or lamb replacer)

Snowman’s Reindeer Farm Disclaimer: The information shared is what we personally do to prepare for calving season at our farm. These are not medical directives intended for any purpose other than to share information. We only have one breeding cow and she is very calm during calving. The two photos provided are from 2020. The first is during labor where you can the feet sticking out. Her entire labor was only about 20 minutes. The second photo is of the actual birth. We use live video to monitor her. We are present during birth. She is not super attentive as a mom, so we make sure that she cleans the baby and works with it as soon as we see it is breathing. What you see here is Scott wearing nitril gloves as he helps clear babies face and stimulates breathing. He then moves the blanket and baby to mom for cleaning and nursing. We understand this is not the type of intervention that some breeders would engage in. We choose to be attentive and have a cow that is comfortable with us being there. We have only had 3 births at our farm. 2 of the 3 calves lived. The calf you see in the video died at 42 hours. He had ecoli issues.

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www.snowmansreindeer.com

https://www.cga.ct.gov/2012/FC/2012HB-05258-R000635-FC.htm

Connecticut Act Permitting ownership of Reindeer year round.

https://www,cgt,ct.gov/2009/rpt/2009-R-0170.htm

Connecticut State Regulations on importation of Reindeer

https://pethelpful.com/exotics-pets/exotic-pet-legal-state

legal ownership of “exotics” by state

remember to check out/join/support

https://www.thecavalrygroup.com/Pending-state-legislation-2021

https://humanewatch.org/orginization/