

Second Edition

AAEVT's
Equine Manual for
Veterinary Technicians

Edited by **Sally DeNotta • Martha Mallicote**
Sheri Miller • Deborah Reeder



WILEY Blackwell

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Edited by

Sally DeNotta, DVM, PhD, DACVIM

*University of Florida College of Veterinary Medicine
Gainesville, FL, United States*

Martha Mallicote, DVM, MBA, DACVIM

*University of Florida College of Veterinary Medicine
Gainesville, FL, United States*

Sheri Miller, LVT, VTS-EVN

*Rood and Riddle Equine Hospital
Lexington, KY, United States*

Deborah Reeder, LVT, VTS-EVN (R)

*AAEVT Executive Director
Wimberley, TX, United States*

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Preface, 2nd Edition

Since its formation in 2004, the American Association of Equine Veterinary Technicians and Assistants (AAEVT) has many accomplishments to its name. The AAEVT created the first formal communication platform for technicians, assistants, and support staff in equine practice. This communication network is possibly our greatest and most important success and formed the basis for nearly everything that followed. The ability to share thoughts and ideas as well as discuss common problems and issues with peers was energizing. The flood of suggestions that we received when groups of technicians began to communicate was immense. We quickly had multiple avenues to pursue to satisfy the wants and needs of our growing membership. One common and recurring concern was the lack of a comprehensive textbook for our profession. Our desire to rectify that shortcoming is what led to the production of the 1st Edition of this manual in 2009.

For veterinary technology students, the amount of equine material presented in most programs is extremely limited. Most required textbooks contain only very brief overviews of equine procedures, if they have any equine content at all. This lack of formal education and resources leaves many aspiring equine technicians feeling unprepared and lacking the confidence to apply for positions in equine practice. This manual was created to help fill this void. It is intended to serve as a resource and a comprehensive overview of topics pertinent to the care and treatment of horses in both hospital and field settings. Authored by a diverse group of veterinarians and technicians from both academia and private practice, the breadth of topics included in this manual offers something for all members of the equine veterinary team. In addition, it has become the core text for preparing for the Academy of Equine Veterinary Nursing Technicians (AEVNT) entrance examination and is an excellent supplement for members enrolled in the AAEVT's Online Certificate Program. As advances are constantly taking place in veterinary medicine and equine care, we felt the need to update our original text by creating this new edition, which builds on the original work.

We are passionate about contributing to the equine veterinary profession by being educated, trained, and informed. We endeavor to utilize these skills at the highest level because the clients and the horses we serve deserve nothing less. From continuing education opportunities, to regional and national meetings, to mentorship and fellowship, the AAEVT strives to fulfill our mission statement: "To promote the health and welfare of the horse through the education and professional enrichment of the equine veterinary technician, assistant and staff." At over 1000 members strong, we are a home to and an advocate for the entire veterinary team. We hope you enjoy this new edition of AAEVT's Equine Manual for Veterinary Technicians.

We would like to acknowledge and thank the many contributors to this manual, without whom this outstanding resource would not be as robust and complete. We want to also acknowledge those accredited technician training programs that are striving to incorporate equine courses into their programs. We thank Merryl LeRoux, with Wiley Publishing, for her patience and encouragement.

Sally DeNotta, DVM, PhD, DACVIM
Martha Mallicote, DVM, MBA, DACVIM
Sheri Miller, LVT, VTS-EVN
Deborah Reeder, LVT, VTS-EVN (R)

Preface, 1st Edition

The American Association of Equine Veterinary Technicians (AAEVT) took its first breath four short years ago and is now 1200 members strong, with enthusiasm and energy far surpassing the anticipation of the American Association of Equine Practitioners' (AAEP) Task Force, which gave substance to the vision of Deb Reeder, RVT. She served on the task force and became the first president and executive director of the association, supported by an executive board of committed technicians and veterinary assistants, who saw the need for an organization that was dedicated to providing a means of continuing education for, and communication among, all who were employed in the field of equine veterinary medicine.

In keeping with its mission “to promote the health and welfare of the horse through the education and professional enrichment of the equine veterinary technician and assistant,” the AAEVT proposed the creation of a reference specifically directed toward the tasks of these individuals. No other reference of this type and magnitude, which addresses the role of the technician or assistant in equine veterinary medicine in the United States, is available. The differences in the practice of equine veterinary medicine between the United Kingdom and the United States make a similar reference published in England less than ideal for individuals employed in this field in the United States.

Because of the spectrum of topics included in this manual, its use in the classroom is preordained. Veterinary technician programs will find it the ideal supplemental reference text for those students pursuing a career in equine practice. The list of authors is lengthy and drawn from both academia and practice, with multiple board-certified veterinary specialists and credentialed technicians included.

This manual is a salute to the vast number of faithful trusted assistants who have literally shouldered much of the day-to-day responsibility for work that includes client communications, preparation for the day's wide variety of tasks, patient care and handling, paperwork, and, last but not least, care and feeding of the equine clinician! It is my honor and privilege to write this preface and to give recognition to the patient, tireless, hardworking, and caring individuals who have made veterinary medicine not only fun for many like myself but also possible.

Thank you.

Midge Leitch, VMD, DAVCS
September 1, 2008

Acknowledgments, 2nd Edition

Sheri and I, as two of the original editors, wanted to keep the Acknowledgment of the First Edition, because this 2nd Edition would never be a reality if it were not for all those who carried our vision to today. One person who is dearly missed while working through this 2nd Edition is Dr. Midge Leitch. Our utmost appreciation and professional kudos and thanks go out to Dr. Sally DeNotta and Dr. Martha Mallicote who stuck with this project against all odds.

Deborah Reeder, LVT, VTS-EVN (R)
Sheri Miller, LVT, VTS-EVN

Acknowledgments, 1st Edition

This resource is dedicated to all the equine veterinary technicians, assistants, support staff, and students, who dedicate themselves day in and day out to this wonderful profession. The equine veterinary industry is indebted to you for your tireless, caring, attention to each patient, your compassion with each client, your commitment to education, and for providing the absolute highest standard of veterinary nursing care and medical treatment. Without you, equine veterinary care and this profession would not be where they are today and their future not nearly so bright.

I want to acknowledge first of all the equine technicians in the state of Texas, who fought for many years for official recognition of our profession. And to that special group (Joni, Kristi, Linda, Debbie, Ky, Lisa, Charly to name a few) who gave birth to the vision of an association for equine technicians and assistants and whose dedication and friendship have inspired me to turn that vision into a reality, I am forever indebted.

I would like to acknowledge my colleagues on the Executive Organizing Committee of the AA EVT, who eventually became its first board of directors: Sheri Miller, LVT, DeeAnn Wilfong, CVT, Kelly Fleming, CPA, Mandy Walton, LVT, and Jane Tyrie and Paul Vrotsos, CVT. Each of you has contributed to the path of the AA EVT, its foundation, its vision, and its future. I applaud you for the many hours you volunteered to steer this association, the commitment you made (unaware of the time it would require!), and the incredible contribution you have made to the equine veterinary profession. I know you are not done; you are here continuing to contribute and will be the mentors for those that follow in our footsteps.

I also acknowledge the AAEP Board of Directors, David Foley, Executive Director and the staff, and the AA EVT Task Force members and original Advisory Council: Drs. Rick Lessor, Brad Jackman, Midge Leitch, Susan White, Dana Zimmer, Reynolds Cowles, and Bob Magnus for their support, guidance, and wisdom.

The AA EVT would like to acknowledge and thank the many contributors to this manual, without whom this outstanding resource for equine technicians, assistants, support staff, and the many aspiring students would not have become a reality. We want to also acknowledge those programs accredited by the American Veterinary Medical Association (AVMA) that are striving to incorporate equine courses into their programs. Here is your long-awaited textbook. We thank Erica Judisch, Editor for Blackwell Publishing, for her patient guidance and encouragement. We made it!

I thank the other editors as well, for their tireless reviews, soliciting of authors, and organization of this manual. When DeeAnn Wilfong and I met with Wiley-Blackwell to discuss the idea of creating and publishing this manual, I am sure we had no idea of the magnitude of the task ahead of us; we simply believed that such a reference was dearly needed. With everyone's support, commitment, and teamwork, the words, the chapters, the illustrations, and the charts are now bound by the glue of that vision.

Deborah Reeder, LVT, VTS-EVN (R)
AAEVT Executive Director

List of Contributors

Tanya Balaam-Morgan, DVM, DABVP

Sierra Valley Large Animal Veterinary Services
Chilcoot, CA, United States

Bonnie S Barr, VMD DACVIM

Rood and Riddle Equine Hospital
Lexington, KY, United States

Gail Broussard

Texas A&M University College of Veterinary
Medicine
College Station, TX, United States

Jennifer L Davis, DVM, PhD, DACVIM (LA), DACVCP

Virginia-Maryland College of Veterinary
Medicine
Virginia Tech
Blacksburg, VA, United States

Karen Davison, PhD

Land O'Lakes, Inc.
Purina Animal Nutrition Center
Gray Summit, MO, United States

Sally DeNotta, DVM, PhD, Dipl. ACVIM

University of Florida College of Veterinary
Medicine
Gainesville, FL, United States

Elizabeth Elzer, VMD, DACVS-LA

Rood and Riddle Equine Hospital
Saratoga Springs, NY, United States

Kira Epstein, DVM, DACVS-LA, DACVECC-LA

College of Veterinary Medicine
University of Georgia
Athens, GA, United States

Kari Farley, RVT, CERP

Circle Oak Equine Rehabilitation
Petaluma, CA, United States

Mary Beth Gordon, PhD

Land O'Lakes, Inc.
Purina Animal Nutrition Center
Gray Summit, MO, United States

Jamie DeFazio Guiberson, CVT, VTS-EVN

University of Pennsylvania
New Bolton Center
Kennett Square, PA, United States

Kelsey A Hart, DVM, PhD, DACVIM (LAIM)

College Of Veterinary Medicine
University of Georgia
Athens, GA, United States

Elizabeth Hinton

Texas A&M University Veterinary Teaching
College Station, TX

Amanda M. House, DVM, DACVIM

College of Veterinary Medicine
University of Florida
Gainesville, FL, United States

Laura Javicas, VMD, DACVIM

Internal Medicine
Rhinebeck Equine
Rhinebeck, NY, United States

Audrey Kelleman, DVM, DACT

College of Veterinary Medicine
University of Florida
Gainesville, FL, United States

Nicole LaGrange, RVT, BA
Dechra Veterinary
Overland Park, KS, United States

Martha Mallicote, DVM, MBA, DACVIM
University of Florida College of Veterinary
Medicine
Gainesville, FL, United States

Sheri Miller, LVT, VTS-EVN
Rood and Riddle Equine Hospital
Lexington, KY, United States

Alison J. Morton, DVM, MSpVM, DACVS-LA,
DACVSMR-Equine, CERP
College of Veterinary Medicine
University of Florida
Gainesville, FL, United States

Maggie Nolin, DVM, MAB
IDEXX Laboratories
Westbrook, ME, United States

Luisito S. Pablo, DVM, MS, DACVAA
College of Veterinary Medicine
University of Florida
Gainesville, FL, United States

Gemma Pearson, BVMS, Cert AVP(EM) MScR PhD
CCAB MRCVS
Royal (Dick) School of Veterinary Studies
The University of Edinburgh
United Kingdom

Michael Porter, DVM, PhD, DACVIM
PHD Veterinary Services
Newberry, FL, United States

Nicole Bone Reybuck, BS LVT
NLR Consulting
St. Joseph, MI

Deborah Reeder, LVT, VTS-EVN (R)
AAEVT Executive Director
Wimberley, TX, United States

Laura M. Riggs, DVM, PhD, DACVS-LA,
DACVSMR (Equine)
School of Veterinary Medicine
Louisiana State University
Baton Rouge, LA, United States

Tracy Sheffield, BS, LVT, CVPM
T & L Veterinary Business Consulting
Wimberley, TX, United States

Kimberly D. Trolinger-Meadows, DVM, CERP,
CVA, CVMMP
College of Veterinary Medicine
University of Florida
Gainesville, FL, United States

Kelly R. Vineyard, MS, PhD
Equine Technical Solutions
Purina Animal Nutrition
Gray Summit, MO, United States

Andrea Whittle, BS, LVT
Internal Medicine Technician
Rood and Riddle Equine Hospital, KY,
United States

Carissa Wickens, PhD, PAS
Department of Animal Sciences
University of Florida
Gainesville, FL, United States

Stevie Badger Willett, LVT, VTS (EVN)
Faculty in Veterinary Technology
Dallas College, Cedar Valley Campus
Lancaster, TX

J. Kathleen Young, PhD.
Kentucky Equine Research
Lenexa, KS, United States

Courtney Ziegler, RVT, CERP
Equitec Consulting Ltd.
Beiseker, AB, Canada

Medical Acronyms and Abbreviations

Deborah Reeder, Sheri Miller, and Jamie Guiberson

Acronym/Abbreviation	Description
AAEP	American Association of Equine Practitioners
AAEVT	American Association of Equine Veterinary Technicians
ab, Ab	antibody
ACTH	adrenocorticotrophic hormone
ag, Ag	antigen
AGID	agar immunodiffusion
AI	artificial insemination
ALP	alkaline phosphatase
APHIS	Animal and Plant Health Inspection Service (USDA)
AST	aspartate aminotransferase
Ax	anesthesia
BID	twice a day
BAR	bright, alert, responsive
BP	blood pressure
bpm	beats per minute
BEVA	British Equine Veterinary Association
BLK	butorphanol, lidocaine, ketamine
BUN	blood urea nitrogen
BW	body weight
Bx	biopsy
C-1, C-2 . . .	the cervical vertebrae
<i>C. diff.</i>	<i>Clostridium difficile</i>
<i>C. perf.</i>	<i>Clostridium perfringens</i>
CAT scan or CT	computerized axial tomography; computed tomography
CBC	complete blood count
CC	cranial to caudal <i>or</i> caudal to cranial
CEM	contagious equine metritis

Acronym/Abbreviation	Description
CF or CFT	complement fixation; complement fixation test
CK	creatine kinase
CL	corpus luteum
CN1, CN2, . . .	the cranial nerves
CNS	central nervous system
COPD	chronic obstructive pulmonary disease
CPK	creatine phosphokinase
CRT	capillary refill time
CSF	cerebrospinal fluid
CV	cardiovascular
CVP	central venous pressure
CVT	Certified Veterinary Technician
DDFT	deep digital flexor tendon
DDSP	dorsal displacement of the soft palate
DEA	Drug Enforcement Administration
DIRT	distal intermediate ridge of the tibia
DIT	distal intertarsal joint
DJD	degenerative joint disease
DLPMO	dorsolateral to palmar/plantar medial oblique
DMPLO	dorsomedial to palmar/plantar lateral oblique
DMSO	dimethyl sulfoxide
DNA	deoxyribonucleic acid
DP	dorsal to palmar/plantar
DSS	dioctyl sodium sulfosuccinate
DV	dorsal to ventral
DVM	Doctor of Veterinary Medicine
Dx	diagnosis
ECF	extracellular fluid
ECG	equine chorionic gonadotrophin
ECG	electrocardiogram
EDTA	ethylenediaminetetraacetic acid
EE	equine encephalomyelitis
EEE	eastern equine encephalomyelitis
EHV	equine herpes virus
EIA	equine infectious anemia
EIPH	exercise-induced pulmonary hemorrhage
ELISA	enzyme-linked immunosorbent assay
EMG	electromyogram
EPM	equine protozoal myeloencephalitis

Acronym/Abbreviation	Description
ET	embryo transfer
EVA	equine viral arteritis
Ex	examination
FEI	Federation Equestre International
FFD	focal film distance
FLASH	Fast Localized Abdominal Sonography of the Horse
FSH	follicle-stimulating hormone
fx	fracture
GG	guaifenesin
GGT	gamma-glutamyl transferase
GI	gastrointestinal
GKX	guaifenesin, ketamine, xylazine
GnRH	gonadotropin-releasing hormone
HA	hyaluronic acid
Hb or Hgb	hemoglobin concentration
HBOT	hyperbaric oxygen treatment
HCG	human chorionic gonadotropin
Hct	hematocrit
HR	heart rate
HYPP	hyperkalemic periodic paralysis
IBP	invasive blood pressure
ICO	instrument count only
ID	intra-dermal
IgG	immunoglobulin G
IM	intramuscular
IN	intranasal
INGT	indwelling nasogastric tube
IV	intravenous
kV	kilovolt
LDH	lactate dehydrogenase
LH	luteinizing hormone
LRS	lactated Ringer's solution
LVT	licensed veterinary technician
mA	milliamperes
MAC	minimum alveolar concentration
MAP	mean arterial pressure
MCH	mean corpuscular hemoglobin
MCHC	mean corpuscular hemoglobin concentration
MCII/MTII	second metacarpal or metatarsal bone (splint bone)

Acronym/Abbreviation	Description
MCIII/MTIII	third metacarpal or metatarsal bone (cannon bone)
MCIV/MTIV	fourth metacarpal or metatarsal bone (splint bone)
MCV	mean corpuscular volume
MLK	morphine, lidocaine, ketamine
mm	mucous membranes
MRI	magnetic resonance imaging
NI	neonatal isoerythrolysis
NIBC	noninvasive blood pressure
NGT	nasogastric tube
NPO	nothing per os (nothing by mouth)
NS	normal saline
NSAID	nonsteroidal anti-inflammatory drug
O.D.	right eye
O.S.	left eye
O.U.	both eyes
OA	Osteoarthritis
OCD	osteochondrosis dissecans
P1	first phalanx (long pastern bone)
P2	second phalanx (short pastern bone)
P3	third phalanx (coffin bone)
PaO ₂	partial pressure of oxygen in arterial blood
PCV	packed cell volume
PHF	Potomac horse fever
PIT	proximal intertarsal joint
PO	per os (by mouth)
PPE	prepurchase examination
PPG	procaine penicillin g
PPN	partial parenteral nutrition
PR	per rectum
PRN	as needed
PSGAG	polysulfated glycosaminoglycan
q	each
QID	four times a day
q1h	every hour
QAR	quiet, alert, responsive
qd	every day
QNS	quantity not sufficient
qod	every other day
QS	quantum stasis or sufficit (as much as is sufficient)

Acronym/Abbreviation	Description
RBC	red blood cell
rDVM	referring Doctor of Veterinary Medicine
rVMD	referring Veterinary Medical Doctor
RJB	Robert Jones bandage
RR	respiratory rate
RV	rabies vaccine
RVT	Registered Veterinary Technician
SAA	serum amyloid A
SID	once a day
SPC	subpalpebral catheter
SPL	subpalpebral lavage
SQ	subcutaneously
SDFT	superficial digital flexor tendon
SDH	sorbitol dehydrogenase
SL	suspensory ligament
SMZ	sulfamethazine
sx	surgery
TAO	triple antibiotic ointment
TAT	tetanus antitoxin
TID	three times a day
TDL	therapeutic drug level
TMS	trimethoprim sulfadiazine
TMT	tarsometatarsal joint
TP	total protein
TPN	total parenteral nutrition
TPR	temperature, pulse, respiration
TS	total solids
TSH	thyroid stimulating hormone
TT	tetanus toxoid
TTW	transtracheal wash
Tx	treatment
VMD	Veterinary Medical Doctor
VEE	Venezuelan equine encephalomyelitis
VS	vesicular stomatitis
WB	western blot (test)
WBC	white blood cell
WEE	western equine encephalomyelitis
WNL	within normal limits

1

General Horse Management

Martha Mallicote

(Adapted from original chapter authored by Dana Zimmer)

CHAPTER MENU

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Facilities

Stable Management

The design of an equine facility should consider positioning of the stables to maximize the health of the horse and to provide easy access in case of an emergency. Stables should be designed to enhance ventilation to minimize respiratory disease. The average stall size is 12' × 12'. Foaling stalls and stallion stalls are even larger, up to 12' × 24'. The floor of all stalls should be designed to drain effectively and provide a nonslip walking surface. It is important that the surface not only be comfortable for standing and lying but also provide enough texture to allow easy standing. Each stall should be equipped with adequate water buckets (usually two) and a feed bucket. The water buckets should be washed daily and refilled frequently. Some farms with a large number of horses will choose to use automatic watering systems in which the horse will drink out of a small bowl of water that will continuously refill. Although this system is convenient, it does not allow monitoring of the horse's water consumption. The use of hay racks is controversial because they create an abnormal eating posture for the horse, increasing the amount of dust inhaled when eating hay. However, if a horse has a painful neck and cannot bend to eat off the floor, a hay rack or hay net is a good option. Hay nets and various devices are also used to slow hay consumption for horses that are on a limited-volume diet or require additional enrichment.

Grain should always be stored in a secured room to prevent any loose horses from accessing large quantities of it because grain overload can result in severe endotoxemia and death. Grain transported in wheel barrows should be secured in a safe place between feeding for the same reason.

The grain should be stored in airtight containers to minimize rodent contamination. In warm climates, grain should also be stored in air-conditioned spaces to prevent the formation of mold. Consumption of moldy corn specifically can result in the severe neurologic condition *leukoencephalomalacia*, which is often fatal.

Hay should be stored in a separate building from the stable, when feasible. Studies have shown that stabling horses in close proximity to hay increases respiratory disease and it is also a fire hazard. Hay should be stored in an area where it can be stacked off the floor on pallets, kept dry from blowing rain, and have minimal sun exposure. To eliminate the chance of spontaneous combustion, hay must be properly cured before placing it in the barn. It is advisable to store tractors and other gasoline-powered equipment in a separate area to reduce fuel fumes and decrease the risk of fire.

Bedding should also be stored in a separate facility to minimize dust and reduce the risk of fire. Common types of bedding are wood shavings, straw, and occasionally shredded paper. Wood shavings from Black Walnut trees should never be used because they can cause severe laminitis. Shredded paper or cardboard has the least amount of dust and is preferred for horses with respiratory disease. Stalls are cleaned on a daily basis and the removal of all urine and feces is important, as accumulation of ammonia from poor sanitation is detrimental to the respiratory tract. Commercial products have been developed to absorb ammonia in excessively wet areas within the stall. Removal of manure waste should be considered in the design plans of any facility. The manure can be composted or taken off site to a disposal area. Careful manure management is essential to minimize the spread of diseases, control flies, and prevent the spread of intestinal parasites.

Equine Hospitals

Equine hospitals should be designed with all the basic principles previously stated plus consideration for the type of patients that it will house. For example, when treating critically ill neonates, it is helpful to have a divided stall in a climate-controlled environment. This type of stall will allow the mare to stay near to her sick foal but provide adequate space for nursing care. There should also be plenty of lighting and electrical outlets and a ready supply of oxygen. Stalls with fully padded walls and a hoist are helpful when caring for recumbent or neurologic horses. Most facilities will use a 2-ton hoist for lifting neurologic horses.

The stall floor and walls should be composed of a surface that can be fully disinfected between patients. Concrete walls and rubber floors are typically used in large animal hospital settings. If surface paints are used, they must be impervious and tolerant of disinfectant chemicals. Each stall should be fitted with a fluid hanger that can be used to hold at least 10–20 liters of intravenous fluid bags at a time (Figure 1.1).

Each hospital should have an area that is appropriate for evaluating patients. Stocks are ideal for managing critical patients. The stocks keep the horse stationary while multiple staff members concurrently attend to the horse. Rectal examinations and diagnostic procedures are safe and easy to accomplish in stocks. The floor should be nonslip and easy to disinfect. The workup area should be in a quiet area away from mainstream traffic yet convenient to supplies and diagnostic equipment (Figure 1.2).

Isolation Facilities

To minimize the risk of spreading contagious diseases, every hospital and farm should have an isolation area and a corresponding protocol (Figure 1.3). The common contagious equine diseases

Figure 1.1 Fluid hangers that swivel and a rope to raise and lower them as needed should be placed in the center of the stall.
Source: Courtesy of Dr. Dana Zimmer.



Figure 1.2 Stocks should be placed on a nonslip floor that can be disinfected. Notice the sides of the stocks can be raised or lowered or completely removed as needed to perform procedures. Source: Courtesy of Dr. Dana Zimmer.



are listed in Table 1.1. Contagious diseases can be spread between horses through contact with feces, aerosolization, or indirect contact with fomites such as water buckets, manure forks, contaminated tack or brushes, and personnel. It is important to be able to distinguish between contagious diseases and infectious diseases. A contagious disease is spread between horses and an infectious disease is caused by a specific agent such as a bacteria, virus, or parasite but is not at risk of direct transmission.



Figure 1.3 Isolation facility with a perimeter fence. Source: Courtesy of Dr. Dana Zimmer.

Table 1.1 Common contagious diseases.

Affected body system	Infectious etiology
Gastrointestinal	<i>Salmonellosis</i>
	Rotavirus
	Equine coronavirus
	<i>Cryptosporidium</i>
Respiratory	Strangles (<i>Streptococcus equi equi</i>)
	Equine influenza
	Equine herpesvirus (EHV-1 and EHV-4)
	Equine viral arteritis
Neurologic	Equine herpesvirus (EHV-1)
Reproduction/Abortion	Equine herpesvirus
	Equine viral arteritis
	Leptospirosis
	Contagious equine metritis (CEM)
Dermatologic	Dermatophytosis (ringworm)
Blood	Equine infectious anemia (EIA)
	Piroplasmosis

In hospitalized settings, an isolation facility is required when dealing with horses that may have contagious diseases, for example Strangles (*Streptococcus equi equi*), neurologic equine herpesvirus (EHV), or *Salmonella*. These contagious diseases can cause serious illness and can spread to other patients within the hospital.

Research shows that horses at risk of developing *Salmonella* infections are those with colic, diarrhea, or who have had exploratory abdominal surgery. The criteria for housing horses in the isolation unit may vary between hospitals but usually include the combination of fever, diarrhea, and a low white blood cell count. Fecal cultures for *Salmonella* are used to confirm a positive case. Because the organism is intermittently shed, five fecal cultures collected 12–24 hours apart are required to rule out the disease.

The protocol for isolating horses that may have contracted the neurologic form of EHV is more challenging. This form of herpes can spread through nasal secretions so careful isolation procedures are required to prevent spread among hospital patients. If horses are coming from a location where a horse has tested positive for EHV, the horse in question should be isolated until testing is complete. Nasal swabs and blood samples are used to test for the presence of the virus. Likewise, if any horse has developed sudden onset of fever and neurologic signs, it is best practice to place the horse in isolation until EHV infection can be adequately ruled out. Common neurologic signs for EHV include ataxia, poor tail tone, poor anal tone, and urinary incontinence.

Isolation stalls should be self-contained with water and electricity and connected to an anteroom that serves as a boundary area for supplies and equipment. The stall walls and floor should be composed of a nonporous surface that is easy to clean and tolerant of chemicals. Typical isolation protocol requires the use of plastic booties, barrier clothing, and gloves (Figure 1.4). All materials are discarded after use. Foot baths should be strategically placed to dip feet at least twice between the contaminated area and the clean area. Handwashing stations should also be available in the anteroom area where isolation apparel is removed. Manure and stall waste should be disposed according to state regulations and in a way that also prevents possible transmission to other hospitalized patients. Each stall should have its own veterinary equipment, brushes, buckets, and stall-cleaning equipment.

The isolation stall and all of the equipment are disinfected between patients. All organic debris must be removed first and then the surface may be scrubbed with the appropriate disinfectant. Chlorine compounds (bleach) can be used by adding three-quarters cup of bleach to 1 gal of water. Bleach is inactivated in the presence of organic debris, so it is imperative that all the surfaces be cleaned first. Phenolic compounds are used in a hospital setting because they are effective against

Figure 1.4 Horses in isolation should be handled with gloves, barrier clothing, and plastic foot covers. Source: Courtesy of Dr. Dana Zimmel.



both rotavirus and *Salmonella* organisms. Iodophors and alcohol are commonly used for handwashing.

Restraint of Horses

Horses are trained to be handled routinely from the left side but can be restrained from either side if necessary for clinical reasons. A halter and lead rope should always be used when working with a horse. The lead rope should never be wrapped around the hand or arm of the handler. Some horses may resist to being tied and will panic. For this reason, horses should not be tied unless the handler is certain the horse has received appropriate training. A horse should always be tied with a cotton lead rope with no chain attached and a quick release knot in case the horse needs to be untied quickly. For veterinary procedures, it is best to hold the horse rather than tie them to a wall or post.

The most common methods of physical restraint include a lead shank with a nose chain, lip chain, and nose twitch. The lead shank with a nose chain is an appropriate method to lead horses that are fractious (Figure 1.5). A lip chain is a method of significant restraint and is commonly used to control young racehorse or stallions. The chain portion of the lead shank is placed under the upper lip of the horse. Constant steady pressure is applied, and the handler should never jerk the rope suddenly (Figure 1.6).

A nose twitch is a good method of restraint for veterinary procedures because it will temporarily immobilize the horse. There are several types of twitches: a metal style called a humane twitch and a wooden handle with either a chain or rope loop at the end. The humane twitch is useful for



Figure 1.5 A lead shank with a nose chain is used to control excitable horses. Source: Courtesy of Dr. Dana Zimmer.