Equine Herpesvirus Myeloencephalopathy Incident

Guidelines for State Animal Health Officials

Revised September 2015

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Introduction

On October 19, 2013, the American Association of Equine Practitioners Foundation (AAEP) and the United States Animal Health Association (USAHA) Committee on Infectious Diseases of Horses (IDOHC) sponsored an Equine Herpesvirus-1 (EHV-1) Workshop. The workshop identified a need for regulatory consensus on case definition, outbreak definition, quarantine parameters, diagnostic testing and biosecurity practices for Equine Herpesvirus Myeloencephalopathy incidents. USAHA IDOHC established an EHV-1 subcommittee to develop a consensus document related to the EHV-1 regulatory mitigation.

The EHV-1 Subcommittee members include:

1. Sara Ahola- Colorado Dept. of Agriculture
2. Rory Carolan – USDA-APHIS-VS-SPRS
3. Ann Dwyer- American Association of Equine Practitioners
4. Katie Flynn- California Dept. of Food and Agriculture (Subcommittee chair)
5. Rusty Ford- Kentucky Dept. of Agriculture
6. Kent Fowler- California Dept. of Food and Agriculture
7. Carl Heckendorf- Colorado Dept. of Agriculture
8. Mike Herrin- Oklahoma Dept. of Agriculture
9. R.J. Layher/ Cliff Williamson- American Horse Council
10. Eileen Ostlund- USDA-APHIS-VS-NVSL
11. Angela Pelzel-McCluskey- USDA-APHIS-VS-SPRS
12. Keith Roehr- Colorado Dept. of Agriculture
13. Mike Short- Florida Dept. of Agriculture
14. Andy Schwartz- Texas Animal Health Commission
15. Peter Timoney- Gluck Equine Research Center
16. Josie Traub- Dargatz- USDA-APHIS-VS-CEAH and Colorado State University

During Equine Herpesvirus Myeloencephalopathy (EHM) incidents, the state animal health officials' (SAHO) goal is to prevent the spread of the disease agent, specifically Equine Herpesvirus- 1. Science-based disease control protocols, adapted to the specific incident control disease spread while ensuring compliance and minimizing the impact on equine movement. There is no single protocol that can be applied to all EHM incidents as there are multiple factors that must be considered when determining the optimal disease containment response. This guidance document provides SAHOs, with science and field experience based control guidance to be considered during an EHM incident. This guidance document is an evolving document.

Questions or concerns regarding this document can be directed to the chair or vice chair of the Committee on Infectious Diseases of Horses. For committee chair or vice chair contact information visit: http://www.usaha.org/Committees.aspx

DEFINITIONS

Assumption: The definitions are intended to be utilized during an EHM incident. The document is based on diagnosis or suspicion of an Equine Herpesvirus Myeloencephalopathy (EHM) case.

EHM Incident: Detection of one or more confirmed cases of EHM, and where there is confirmation of disease agent spread or evidence of potential for disease transmission from an EHM confirmed case to additional horses in a population.

Index Definitions:

1. **Confirmed Index EHM Case:** A horse displaying signs of central nervous system (CNS) dysfunction, including but not limited to hindlimb incoordination, weakness, recumbency or urinary bladder atony, with evidence of Equine Herpesvirus -1 infection based on virus isolation and /or PCR testing of nasopharyngeal/nasal swab or blood (buffy coat) specimens. If the horse dies or is euthanized, the case can be confirmed based on histological evidence and detection and/or demonstration of EHV-1 in CNS tissues collected at necropsy.

2. **Suspect Index EHM Case:** Highly suggestive EHM case, defined as a horse displaying signs of central nervous system (CNS) dysfunction, including but not limited to hindlimb incoordination, weakness, recumbency or urinary bladder atony which may or may not have been preceded by fever, respiratory signs or abortion in other horses on the premises.

3. **Index EHM Premises:** The premises on which the index EHM case has occurred.

4. **Index Point of Exposure:** Initial site of exposure to EHV-1 for the confirmed index EHM case and/or suspect index EHM case as determined by an epidemiologic investigation. In cases of presumed reactivation of latent virus, an index point of exposure does not exist.

Subsequent Definitions:

1. **Exposed horse:** A horse with direct or indirect contact with the EHM confirmed index case on the index premises within the 14 days preceding the onset of neurologic signs or a horse that potentially had direct or indirect contact with horses at the point of exposure of the index case within the preceding 14 days.

2. **Suspect EHV-1 case:** An exposed horse that shows no neurologic signs but displays some of the clinical signs consistent with EHV-1 infection; these may include fever (rectal temperature greater than 101.5 degrees Fahrenheit), limb edema, abortion or nasal discharge during the 14 days after initial exposure to a confirmed EHM case.

3. **Confirmed EHV-1 case:** A suspect EHV-1 case that shows no neurologic signs but has laboratory evidence of Equine Herpesvirus-1 by virus isolation and /or PCR testing of nasopharyngeal/ nasal swab or blood (buffy coat) specimens along with clinical signs consistent with EHV-1 infection, such as fever, limb edema, abortion or nasal discharge. Note: Seroconversion or 4-fold or greater increase in titer in the serum neutralization test using paired sera confirms EHV-1 infection for the purposes of the case definition; the test is

not recommended however, during an incident as it is not a timely means of arriving at a diagnosis.

4. **Suspect EHM case:** An exposed horse displaying signs suggestive of EHM central nervous system (CNS) dysfunction, including but not limited to hindlimb incoordination, weakness, recumbency or urinary bladder atony during the 14 days prior to the index EHM case developing clinical signs and/or 14 days after the last potential exposure to the confirmed EHM case.

5. **Confirmed EHM case:** A suspect EHM case which is positive for Equine Herpesvirus -1 by virus isolation and /or PCR testing of nasopharyngeal/nasal swab or blood (buffy coat) specimens along with clinical signs consistent with EHM. If the horse dies or is euthanatized, the presence of histological lesions and/or demonstration of EHV-1 in the CNS tissues collected at necropsy is confirmatory of a diagnosis.

6. ***Non-clinical EHV-1 exposed horse:*** An exposed horse that does not exhibit clinical signs (afebrile, non-neurologic) but is test positive for EHV-1 by virus isolation and/or PCR testing of nasopharyngeal/nasal swab or blood (buffy coat) specimens. Such an individual should not be considered a case unless it develops clinical signs compatible with EHV-1 infection. Furthermore, there is a lack of consensus among regulatory veterinarians on the appropriateness of testing these non-clinical exposed horses.

7. **EHM Premises:** A premises where a confirmed or suspect case of EHM currently resides or a premises where an EHM case resided within the preceding 14 days.

DIAGNOSTIC TESTING

Serologic Testing

Due to the likelihood of widespread exposure to EHV-1 and the common practice of vaccination of the general equine population against this virus infection, serologic testing at a single point in time is uninformative and of very limited diagnostic value. The serologic test readily available in the United States is the virus neutralization test (VNT); some other countries however, have a preference for the complement fixation test (CFT). Serologic testing, namely using the VNT, which demonstrates seroconversion or a four-fold or greater increase in serum antibody titers between samples collected 10- 21 days apart, provides presumptive evidence of recent EHV-1 infection assuming EHV-1 vaccination has not taken place just prior to or during that time period. Neutralizing antibodies do not distinguish between EHV-1 and EHV-4 infections. However, type specific ELISA tests based on a portion of the glycoprotein G of each virus have been developed. The CFT and ELISA type specific antibody detection tests are not currently available at diagnostic laboratories in North America.

Virus Detection

Virus isolation is considered the gold standard for confirmatory laboratory diagnosis of EHV-1, infection, although the time required to obtain a positive result limits its value for outbreak management. Virus identification of EHV-1 by isolation from nasal or nasopharyngeal swabs or buffy coat samples is confirmatory evidence of a diagnosis of EHM in a horse with compatible clinical signs.

The polymerase chain reaction (PCR) has become the diagnostic test of choice due to its high analytical sensitivity and specificity and rapid turn-around time. Positive PCR results can be obtained when virus isolation is negative due to sub-detectable levels of infectious virus, inactivated virus or presence of viral nucleic acid. PCR tests carried out simultaneously on both nasal secretions and buffy coat samples are optimal in assessing the state of infectivity of the horse. Quantitation of genomic DNA level allows veterinarians to indirectly assess the potential for transmission posed by an animal nasally shedding EHV-1. The buffy coat findings can also give an estimate of the level of viremia. Although viremia is an essential component in the pathogenesis of EHM, some studies have failed to show that the level of viremia can be correlated with level of risk for EHM. While real-time PCR results indicate the presence or absence of viral DNA in the specimen tested, they do not correlate with the clinical presentation and cannot be used to predict clinical outcome. The lack of standardization of test methods between laboratories and the lack of standardized use of quality assurance controls amongst laboratories remain an ongoing challenge in test interpretation.

Recently, antiviral drugs have been used by some for the treatment of EHM cases. Currently, there is ongoing research regarding the use of antiviral drugs for treatment of neurologic cases and even prevention of EHV-1 infection in exposed horses. Theoretically, use of antivirals could alter viral shedding and thereby have an impact on test results. However, at this time there is not enough science based literature available to determine the impact of the use of antiviral drugs on the level and duration of viremia and nasal shedding of virus. Still, it should be considered during the evaluation of test results.

Types of PCR tests

- Conventional/Standard PCR: The amplified DNA is detected at the end of the test procedure. This test is of more limited sensitivity and is non-quantitative.
- Nested PCR: Two sets of primers are used in two successive PCRs. The amplified DNA fragments are used in a second PCR for identification. It is a very sensitive assay but is associated with the risk of cross-contamination between samples.
- Real Time PCR: the amplified DNA is detected as the reaction progresses. More sensitive, specific, rapid and reliable than conventional PCR. This test allows for determination of load of viral nucleic acid in the sample being tested.

EHV-1 PCR Tests

The glycoprotein B gene PCR assay is often used as a screening test to detect EHV-1; a positive test indicates EHV-1 infection. However, this test cannot differentiate neuropathogenic (mutant) EHV-1 (G2254 genotype) strains from the non-neuropathogenic (wild type) EHV-1 (A2254 genotype) strains. Subsequent subtyping based on the DNA polymerase gene assay, which targets the single nucleotide polymorphism at position 2254 of the virus open reading frame 30 which encodes for the catalytic subunit of the DNA polymerase gene, can differentiate neuropathogenic (G_{2254}) and non-neuropathogenic ($_{A2254}$) virus strains. Some laboratories may only use the DNA polymerase gene assay for screening for EHV-1 infection.

Characteristics of an Ideal PCR Protocol

Consider these characteristics of PCR assays when choosing the most appropriate type of test to meet your needs and that are consistent with the reason for testing in your situation:

1. Sensitivity: Does the assay have a high sensitivity and specificity for the detection of EHV-1? Is strain typing necessary? Certain highly sensitive PCR assays can differentiate EHV-1 neuropathogenic (G_{2254}) from non-neuropathogenic (A_{2254}) strains in a sample.
2. Timeliness: Can the assay provide timely results necessary for confirmation of infection? Assay results can be available within 12 hours of sample receipt at some laboratories.
3. Quantitative Load: Can the assay provide quantitative results? Will quantitative results be useful in the epidemiologic investigation or disease control efforts? A quantitative PCR assay can provide quantitation of viral load.

Additional considerations when choosing an appropriate laboratory for sample testing:

1. Turn-around Time: Can the laboratory provide a rapid turnaround time? A laboratory which can provide timely reports to the practitioner is beneficial.
2. Laboratory Assistance: Does the laboratory provide readily available personnel to assist with interpretation of test results? A more detailed understanding of a positive or negative test result can assist in the implementation of appropriate biosecurity and infection control measures.
3. State Animal Health Official Acceptance: Will the state animal health official accept the results from the laboratory being considered for sample submission? Some animal health officials require that results be provided by specified laboratories and may require additional sample types to be collected and tested, such as collection and testing a

different source of sample from a previously tested horse, e.g. blood versus nasal swab or sampling of additional horses in the incident .

Recent EHV-1 PCR Ring Trial Study

Abstract from 2014 USAHA IDOHC Meeting, San Diego , CA
http://usaha.org/Committees/InfectiousDiseasesOfHorses.aspx

"In 2013, the USDA-APHIS National Veterinary Services Laboratory (NVSL) and American Association of Veterinary Laboratory Diagnosticians (AAVLD) conducted a joint inter-laboratory comparison (ring trial) of equine herpesvirus type 1 (nEHV-1) polymerase chain reaction (PCR) techniques in an effort to standardize testing methodology for equine herpesvirus myeloencephalopathy (EHM) carried out at state/university/provincial diagnostic facilities in North America.

A total of 28 state diagnostic facilities from the USA and Canada evaluated a ring test "panel" of field EHV isolates. The 28 participating laboratories used 38 different procedures (some laboratories tested by multiple procedures) based upon modifications of 10 peer-reviewed published methods for EHV-1 PCR. Two genes were utilized as PCR targets, the EHV-1 glycoprotein B gene, and the EHV-1 ORF 30, viral DNA polymerase gene. Glycoprotein B gene-based PCR assays, which are fundamentally designed as screening assays that detect wild-type (wt-EHV-1) and neuropathogenic (nEHV-1)strains, were used by 15 participating laboratories and had excellent diagnostic sensitivity for both wt-EHV-1 (100%; 30/30 samples identified correctly), and nEHV-1 (98.8%; 89/90 samples identified correctly), as well as excellent diagnostic specificity (98.3%; 59/60 non-EHV-1 samples identified correctly). As predicted, none of the glycoprotein B gene-based assays differentiated wt-EHV-1 from nEHV-1 and as such serve as excellent diagnostic tools to identify EHV-1 infected horses from non-EHV-1 infected horses but do not identify nEHV-1 specifically. ORF 30 (viral DNA polymerase) gene-based PCR assay had more variable results from testing of the ring trial samples. Three published ORF 30 A/G $_{2254}$ assays: 1) Allen et al, 2007, 2) Pusterla et al, 2009, and 3) Smith et al, 2012), which differentiate wt-EHV-1 from nEHV-1 by detecting the A_{2254} (wt-EHV-1) or G_{2254} (nEHV-1) polymorphism, were used by 21 participating laboratories. The three assays had diagnostic sensitivity (based upon correct identification of nEHV-1 samples) of 93.1% (67/72 samples, Allen 2007), 100% (36/36 samples, Pusterla 2009) and 94.4% (17/18 samples, Smith 2013). The diagnostic specificity (based upon correct identification of non-nEHV-1 samples) was 88.9% (64/72 samples, Allen 2007), 72.2% (26/36 samples, Pusterla 2009), and 100% (18/18 samples, Smith 2013)."

Appropriate use of PCR Testing for EHV-1

Since EHV-1 is considered to be endemic within most horse populations, random testing of normal horses for EHV-1 by PCR assay can and likely will detect horses positive for EHV-1; this may represent transient presence of virus; or viral levels that are not sufficient to pose a significant risk of transmission of infection. At this time, the clinical significance of a positive PCR result in an asymptomatic horse not involved in an EHM Incident is unknown, regardless of the test being employed or the laboratory performing the test. (NOTE: The clinical interpretation of test positive non-clinical horses that are part of an EHM incident investigation will be discussed later.)

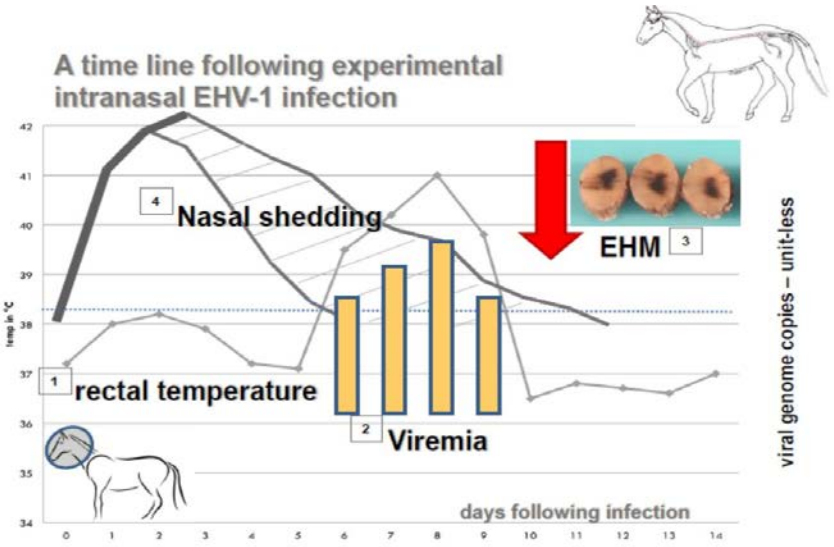
Horses with high fevers and/or other clinical signs including coughing or mild nasal discharge, or abortion, with or without neurologic signs, should be tested for EHV-1 by PCR, preferably by real time or nested PCR, if other possible causes for these signs are not apparent.

Necropsy of Suspect EHM Horses

A necropsy provides an important means of confirming the presence of EHV-1 neurologic disease. EHM is not a zoonotic disease but considering the potential for zoonotic diseases that can also result in neurologic signs in horses such as rabies it is important to use, appropriate biosafety measures during necropsy examination. There are documented cases of suspect EHM horses with negative EHV-1 test results on nasopharyngeal/nasal swab and buffy coat samples that were confirmed positive for EHV-1 related neurologic disease on necropsy examination. Therefore, necropsy examination of a horse with neurologic disease that dies or has to be euthanized is recommended. To ensure appropriate samples are taken at necropsy, individuals are reminded to alert the pathologist of the suspect EHM status of the case and provide the neurologic history on the laboratory submission forms. For detailed EHM suspect necropsy and sample collection protocols review the American Association of Equine Practitioners Guidance document at http://www.aaep.org/custdocs/EquineHerpesvirusFinal030513.pdf

Appropriate Timing of Sample Collection

Correct selection of horses for sampling within an affected group is vital to gain the best- quality information for the epidemiologic investigation and disease control efforts. Samples collected represent a point in time, as viral shedding changes over the course of the infection. Viral shedding from the respiratory tract of adult horses is detectable typically for less than 10 days and may be intermittent. The optimal window for nasal swab sampling is at the onset of clinical signs. In some situations, where initial testing was negative for EHV-1 but EHV infection is suspected as the cause of disease, repeat sampling within 2 to 4 days of onset of clinical signs may be warranted. The amount of EHV-1 DNA detected in nasal swabs varies from horse to horse and over the course of disease in a given animal and does not necessarily correlate with the severity of disease.



This figure illustrates findings of nasal shedding; rectal temperature; viremia, and the (potential) occurrence of EHM following an **experimental** intranasal infection with EHV-1. X-axis: time in days; infection on day=0; Y-axis: rectal temp.in °C; alternative Y-axis: unit-less scale for viral genome quantities; dotted line: fever cut-off (38.3°C-101.3°F). 1- rectal temperature curve is often bi-phasic. Secondary fever is associated with 'cell-associated viremia'; 2- cell-associated viremia, duration 3 – 5 days as determined by PCR; 3- clinical EHM usually follows viremia; 4- nasal shedding is high during the first 3 days and may be associated with a primary fever. Duration of nasal shedding varies significantly between horses, which is represented by the area between the 2 lines of nasal shedding.

Graph courtesy of Dr. Lutz Goerhrig, extracted from 2nd Edition of Equine Neurology.

Recommended Horses to Test during an EHM Incident

1. **Suspect Index EHM Horses:** A horse displaying signs of central nervous system (CNS) dysfunction, including but not limited to hindlimb incoordination, weakness, recumbency or urinary bladder atony which may or may not have been preceded by fever, respiratory signs or abortion in other horses or new neurologic horse.

2. **Suspect EHM Horses:** An exposed horse displaying signs suggestive of EHM central nervous system (CNS) dysfunction including, but not limited to hindlimb incoordination, weakness, recumbency or urinary bladder atony during the 14 days prior to the index EHM case developing clinical signs and/or 14 days after last potential exposure to a confirmed EHM case.

3. **Suspect EHV-1 Horses:** An exposed horse that does not show neurologic signs, but displays clinical signs consistent with EHV-1 infection without neurologic signs such as fever (rectal temperature greater than 101.5 degrees Fahrenheit), limb edema, abortion, or nasal discharge during the 14 days after initial exposure to a confirmed EHM case. Testing of these horses is recommended but not necessary as long as the index EHM case has been confirmed. Horses not tested will remain suspects and should NOT be included in the confirmed case count.

4. **Testing of Non-clinical EHV-1 Horses: A decision to test these horses for disease investigation or quarantine release purposes must be carefully considered.** Non-clinical horses can be subclinical shedders of EHV-1 virus. Specific recommendations regarding the risk these horses pose is lacking in the scientific literature. If performed, a planned

response to test-positive non-clinical horses should be established prior to testing such horses.

NOTE: There is no indication to test horses not epidemiologically linked to the disease investigation or generally as a part of the quarantine procedure.

Factors Impacting Decision to Test Exposed Horses

NOTE: If tests are planned, a plan of how to handle the results must be determined in advance.

1. **Testing of exposed horses may not be warranted if:**
    a. There is an ability to mitigate further exposure risk by immediate removal of the EHM horse or adequate isolation of the EHM horse at least 30 feet away from all other horses on the premises;
    b. There are no additional clinical cases detected during the 14 day period after initial exposure to the index EHM case. Thus no evidence of disease transmission; and,
    c. Epidemiologic investigation provides confidence in owner/ management monitoring of the situation through demonstration of twice daily body temperature logs, daily clinical assessments, and observance of strict isolation protocols for sick horses.

2. **Testing of exposed horses may be warranted if:**
    a. Premises management fails to adequately isolate the index EHM case within 12 hours of detection. This will result in continued exposure risk to horses on the premises;

    -OR-

    b. There are exposed horses on premises without adequate isolation from clinical horses. Testing may be necessary to determine disease risk;

    -OR-

    c. Epidemiologic investigation reveals evidence of poor compliance including but not limited to lack of twice daily body temperature monitoring of potentially exposed horses, failure to isolate sick horses, and/or continued sharing of equipment between sick and other horses.

EHV-1 PCR Test Interpretation of a Clinical Horse

- NOTE: A positive PCR test on a nasopharyngeal/nasal swab sample does NOT necessarily equate to presence of infective virus.
- **A positive EHV-1 result from a buffy coat sample** indicates viremia and an active infection.
- **A negative EHV-1 test result on a buffy coat sample** indicates the absence of detectable EHV-1 viremia at the time of sampling.
- **A positive EHV-1 test result from a nasal swab sample** should be interpreted as detection of EHV-1 DNA in the nasal secretions. EHV-1 DNA can be detected during and

subsequent to the period of shedding infective virus. Quantitative PCR (i.e. real-time PCR) may provide more information about the risk of virus transmission by the sampled horse.

- **A negative EHV-1 test result on a nasal swab** indicates the absence of detectable virus shedding at the time of sampling; provided appropriate sample collection, sample handling prior to shipment and sample shipping protocols were followed.

Recommended Protocols for Sample Collection

These are current recommendations:

1. Make contact with the laboratory where samples are to be submitted to obtain supplies (swabs and transport medium) and laboratory specific sampling and shipping protocols.
2. Wear disposable gloves and change these between each horse sampled
3. Be sure to avoid cross contamination by wearing a new pair of examination gloves to collect samples from each horse and perform hand hygiene between horses sampled. Barrier precautions such as wearing disposable gown or coveralls and boot/shoe covers should be observed. These should be changed when sampling horses of different disease status e.g. clinical cases versus potentially exposed horses.
4. If a chain over the nose or a twitch is used to restrain a horse, it must be washed and disinfected between horses.
5. Nasal swabs should be collected using Dacron tipped swab (Synthetic) with plastic shaft (Don't use wooden shaft or cotton tipped swabs)
6. Insert the swab at least 5 inches into the nasal passage and leave swab against the nasal mucosa for a minimum of 15 seconds before withdrawal.
7. Remove and place swab in a sterile tube (no anticoagulant or gel) or preferably in a tube with viral transport medium. To prevent over-dilution of the sample less than 2 ml of transport fluid should be utilized. Label sample according to laboratory instructions.
8. Collect 10ml of whole blood in EDTA (purple top tube) and label sample with animal name and date and time of collection. Do not send serum for PCR testing
9. Keep samples cool (refrigerator/ice pack) but not frozen and ship nasal swabs and whole blood samples overnight to laboratory.
10. Request PCR testing, preferably real time or nested PCR test, and also typing of the virus if positive for viral DNA.

QUARANTINE PLACEMENT

Overview

In dealing with Equine Herpesvirus Myeloencephalopathy (EHM) incidents, state animal health officials may issue quarantines to prevent the spread of the disease agent, specifically Equine Herpesvirus- 1. Science- based criteria for quarantine protocols adapted to the specific incident control disease spread while increasing compliance and minimizing the impact on equine movement. Historically, quarantine issuance is by the state veterinary authority or horse racing boards. However, in some EHM incidents voluntary quarantine actions are taken by private farms, public or private facilities, veterinary teaching hospitals and private practitioners for the purpose of controlling the disease.

There is no universal quarantine protocol that can be applied to all EHM incidents as there are multiple factors that must be considered when determining the optimal disease containment response. A disease transmission risk assessment is the critical first step in determining the necessity of a quarantine. Additionally, risk assessment identifies specific factors that will need to be addressed in establishing the quarantine(s) and biosecurity measures on operations with exposed horses.

Before implementing a quarantine, the criteria for quarantine release need to be established. To ensure compliance and to determine the effectiveness of disease control measures, the quarantine-issuing authority employee should arrange for a regulatory authority or their designee to monitor the situation through periodic on-site visits to the premises. Disease transmission, as evidenced by newly identified clinical cases, would warrant modification of the quarantine-site biosecurity protocols. Additionally, if spread occurs beyond the initial quarantine sites, then other regulatory authorities may need to be contacted and the quarantine may need to be extended or applied to additional sites.

Impact of Quarantine on the Equine Industry

Equine industry and individual compliance and cooperation is essential if EHM is to be successfully controlled. The potential impact of any quarantine on the equine industry or individuals needs to be balanced with the goal of disease containment. Issuance of an extended quarantine period on multiple premises with a low risk of disease development may be considered an excessive burden and may be unnecessary for effective disease containment. Situational awareness and science-based disease prevention guidance from animal health officials will garner increased confidence among industry stakeholders and will serve to increase compliance and implementation of voluntary disease control measures.

Issuance of a Quarantine

The scope of any premises based quarantine that is to be implemented should be based on the results of the risk assessment following the identification of a suspect or confirmed index EHM case(s). It may include any of the following scenarios: 1) only the index suspect or confirmed index EHM horse is quarantined; 2) the index suspect or confirmed index EHM horse and horses with high risk of exposure on index EHM premises are quarantined; 3) all horses on the EHM index premises are quarantine, or 4) entire index premises and horses with high risk of exposure

that are located on other than the index premises are quarantined. The scope of the quarantine should be based on the results of the risk assessment.

EHV-1 Risk Assessment for Purposes of Determining Scope of Quarantine

EHV-1 is spread by direct horse to horse contact as well as indirectly by virus-contaminated fomites and personnel. The most common route of exposure is through the respiratory tract via aerosolized droplets from the respiratory tract secretions of a positive, shedding horse. Infection can also occur by oral or nasal exposure to virus contaminated surfaces. Examples include hands, clothing, and equipment such as wipe rags, buckets, water sources, feeders, stall surfaces and tack. Clinically affected horses should be assumed to be contagious, particularly with respect to respiratory secretions, for at least 14 days. Aborted fetuses, fetal membranes, and placental fluids also contain large quantities of infective virus and thus pose a particularly high disease transmission risk.

An assessment is critical in order to identify current disease agent transmission risk factors on an affected premises. Identifying the risks for disease agent transmission can assist in determining the required quarantine protocols.

1. **STEP 1: Assessment of Risk Associated with the Index EHM Case:** At the time of the initial testing, the contagious nature of the index EHM horse should be evaluated in terms of potential for shedding EHV-1 and potential spread of virus from this horse to other horses (exposure risk to other horses).
    a. **Potential to Shed EHV-1**: A PCR test result from a horse's nasopharyngeal/nasal swab that the laboratory indicates correlates with a high viral load categorizes that horse as a high risk for transmission of EHV-1 to other horses. A clinical EHV-1 or EHM horse with this finding would pose a significant risk of virus shedding into the environment.

    b. **Assessment of the Potential of an EHM Horse to Expose Other Horses:** A clinical EHV-1 or EHM case which remains on the premises poses significant risk of exposure to other equids on the property as it continues to shed virus. A clinical EHM horse that is euthanized, appropriately removed, or isolated at onset of neurologic signs represents less disease exposure risk to the herd as the source of virus has been removed. Appropriate isolation includes restricted access to other horses (no horses within 30 feet), avoiding the sharing of equipment or personnel and utilization of protective barrier precautions. A clinical EHM case that is down and thrashing in a stall poses a significant virus transmission risk as it requires additional personnel for its management compared to a non-neurologic horse and has the potential for hyperventilation; all of which may result in a potentially higher risk of contamination of the environment. Direct or indirect contact between horses, treatment personnel or fomites increases the potential exposure of other horses to EHV-1.

    A Quarantine Risk Assessment Chart assists in determining level of risk posed by the index case (See Appendix). A quarantine restricted to the index horse may be sufficient, if the index horse poses a low risk of viral shedding and/or is appropriately isolated from other horses on the premises. A more extensive

premises level quarantine may be warranted if the index horse demonstrates a high level of viral shedding and has extensive direct and/or indirect contact with horses on the Index EHM premises.

2. **STEP 2: Assessment of Exposure Risk within the Herd**: At the time of initial confirmation of the index EHM case, the rest of the herd should be classified according to the degree of exposure and their ability to transmit virus within the herd. Animals exposed to a large amount of the virus are more likely to succumb to infection and/or pose a transmission risk to other horses on the premises. These higher risk animals may warrant quarantine and monitoring for fever or other clinical signs consistent with EHV-1 infection.

    a. **Degree of Exposure to Index Case:** An exposed horse is one which is likely to have had direct or indirect contact with an EHM case on the index premises or during shared transport within the previous 14 days. Highest risk animals are those with direct nose to nose contact with the EHM case during the peak shedding period which is defined as the 7-day period before or after the onset of clinical signs. Moderate risk horses are those stabled within 30 feet of the clinical case or those, equipment, or personnel with direct contact with the index EHM case. Animals on the premises with limited indirect or direct exposure to the index horse would be considered a low/negligible risk for exposure and may not warrant any quarantine action. Determining the level of exposure assists in deciding the scope of the quarantine to be applied. (See Appendix: Exposure Risk Assessment)

    b. **Degree of Biosecurity in Place Prior to and at Time of Detection of Index Case:** Disease risk cannot be completely eliminated at most equine premises, as equine premises are seldom managed as a closed facility. An evaluation of current management practices will help identify potential biosecurity risks to be addressed in the quarantine. Areas to be evaluated include management practices, horse stalls, isolation area, wash stalls, commingling areas, equipment handling, transport vehicles, and hay and other feed storage facilities. Premises with minimal biosecurity protocols in place are more likely to have disease transmission and thus warrant a more restrictive quarantine than a premises with a high level of biosecurity practices. Movement of personnel such as veterinarians, farriers, visitors, feed and bedding deliverers, and stall cleaners between areas where horses are housed constitute a potential risk of disease agent transmission. Therefore, the potential spread of EHV-1 due to these movements should be evaluated. A Biosecurity Risk Assessment determines the level of risk posed by current biosecurity practices on the premises. (See Appendix: Sample Assessment Form)

    c. **Degree of Disease Agent Transmission:** As the disease incident progresses, the situation should be evaluated to determine the level of disease agent transmission. Exposed horses on the premises may succumb to disease and present an additional disease transmission risk. Evaluate subsequent cases to determine potential time of exposure. Modify existing quarantine protocols if

disease spread is evidenced by new cases with clinical disease after quarantine placement.

d. **Assessment of Transmission via Testing at Onset of Investigation**: In general, testing of exposed non-clinical horses during an investigation of an EHM Incident***;*** there is a lack of consensus among regulatory veterinarians on the appropriateness of testing these non-clinical exposed horses. If testing of exposed non-clinical horses is being considered, then the response to a positive test result should be decided before initiating the testing. Non-clinical EHV-1 infected horses based on nasal swab and/or buffy coat testing, currently represent a non-quantifiable but potential risk of transmitting virus to horses to which they are exposed. This is arguably more important if the viral DNA detected is of the neuropathogenic (G_{2254}) genotype. As a precaution to minimize the risk of virus spread in any given EHM incident, non-clinical exposed EHV-1 test positive horses should be isolated from non-clinical test negative and untested exposed horses.

QUARANTINE RELEASE

Overview

During Equine Herpesvirus Myeloencephalopathy (EHM) incidents, the quarantine issuing authority (typically the state animal health officials or horse racing authority) issue quarantines and subsequent releases to help prevent the spread of disease agents. However, in some EHM incidents, voluntary quarantine actions are taken by private farms, public or private entities, veterinary teaching hospitals, horse racing authorities or private practitioners. Criteria for implementing a quarantine and for quarantine release should be established and each incident assessed based on predetermined guidelines. It must be emphasized that there is no single quarantine release protocol that is applicable to all EHM incidents. When striving for optimal disease containment, multiple factors must be considered based on the risk assessment performed when placing the quarantine.

Clinically affected horses should be assumed to be contagious, particularly via the respiratory route, for at least 14 days. Minimal monitoring or quarantine of exposed horses should be for a minimum of 14 days after removal and isolation of the EHM horse. Quarantines can be amended to release subpopulations of animals earlier if epidemiologic investigation, biosecurity assessment and/or, the results of diagnostic testing deem the risk is minimal from the release of a horse or group of horses.

Assessment of the level of clinical disease and the potential for disease spread on the premises is critical in determining whether quarantine release is warranted. Release of the quarantine can be based on the clinical disease status of the horses on the premises and on the outcome of diagnostic testing.

21 Day Quarantine Release without Testing

Release of quarantine shall be based on limiting the potential for spread of the disease agent. Immediate removal or appropriate isolation of EHM case(s) decreases the risk of virus transmission and spread within the population at potential risk of exposure. Appropriate isolation includes restricted access to other horses (no horses within 30 feet), avoiding the sharing of equipment or personnel and utilization of protective barrier precautions. Diagnostic testing of nasopharyngeal/nasal swabs can help provide evidence of the risk of disease spread within an exposed population. However, financial constraints and the challenges of scientifically based interpretation of risk when dealing with a test positive non-clinical horses limit the benefits of diagnostic testing. Accordingly, quarantine release without testing can be an option and is based on the clinical disease status on the premises. Any additional horses developing clinical signs compatible with EHV-1 infection and diagnosed within the 14 days post isolation or removal of the index EHM case may be indicative of disease spread on the premises.

Quarantine release is recommended, if adequate biosecurity and monitoring has been maintained and if no new clinical cases (EHM or EHV-1 cases) are identified in the 21 days from the date of removal of the EHM case(s) or 21 days from the resolution of the last febrile case or the 21 days from the onset of clinical signs in the last neurologic horse on the premises. Monitoring of the exposed population for any clinical signs compatible with EHV-1 infection

includes twice daily temperature monitoring and direct observation for compatible clinical signs. Any horses subsequently displaying compatible clinical signs including but not limited to fever should be immediately isolated and it should be assumed this is a new EHV case unless diagnostic testing rules out EHV and another non-contagious cause of fever is found the countdown clock for quarantine release should begin again at 21 days.

Note, a 14 day quarantine release for exposed horses may be considered when there is immediate removal (within 12 hours) of the index EHM case and there is evidence of limited potential for disease agent spread due to adequate biosecurity and monitoring of horses.

Quarantine Release with Testing

Testing of clinical horses for release of quarantine may shorten the quarantine period. Testing only reflects the status of an individual horse on the day of sampling. Positive results could reflect reactivation of latent infection or recent exposure. A positive EHV-1 test results warrants further investigation to determine if further virus spread is occurring on a premises. If virus spread is evident, the quarantine should remain in place. Negative test results from nasal swab and buffy coat samples may warrant release of the quarantine. Exposed and clinical horses may be tested 14- 21 days from the resolution of the last febrile case or from the onset of signs in the last neurologic horse in assessing the infection status of a premises.

There is a lack of consensus among regulatory veterinarians on the appropriateness of testing exposed non-clinical horses. The interpretation of such results based on existing scientific risk assessments is problematic. This is because the non-clinical horses that test positive for EHV-1 on nasopharyngea/nasal swab and/or buffy coat, currently represent a non-quantifiable but potential risk of transmitting virus to other horses to which they are exposed particularly, if the viral DNA detected is of the neuropathogenic (G_{2254}) genotype.

As a precaution and to minimize the risk of disease spread in any given EHM incident, any EHV-1 test positive horse should be isolated from test negative and non-clinical exposed horses.

Utilization of Testing Results for Quarantine Modification or Release

1. Testing of Confirmed EHV-1 Clinical Horses: A confirmed EHM case or EHV-1 case with two subsequent PCR negative nasal swab and/or buffy coat samples obtained 7 days apart is considered to pose a minimal disease transmission risk, thus quarantine release is recommended. Note, a minimum of 14 days under quarantine is recommended.
2. Testing of Exposed Non- Clinical Horses: There is a lack of consensus among regulatory veterinarians on the appropriateness of testing these non-clinical exposed horses. Testing of exposed horses 14 to 21 days from the resolution of the last febrile case or from the onset of the last neurologic signs in a horse may be utilized to assess infection status among horses on the premises. Any virus positive horse(s) should be promptly removed from the group and isolated until confirmed negative on nasal swab and buffy coat PCR testing, or in the absence of testing, an adequate period in quarantine before release. As for the remaining animals in the exposed group, the clock has to be reset in terms of the period they are held in quarantine since one or more of them may have been exposed to the virus and may become a shedder.

EHM INVESTIGATION GUIDELINES

Introduction

In preparation for an EHM investigation, review the biosecurity and diagnostic testing recommendations in previous sections of this document.
When conducting an EHM incident investigation it is helpful to first identify the five "W's": which, what, where, when, and why?

- **Which** is the suspect EHM horse? The age, breed, use, EHV-1 vaccination status and clinical signs are important details to record.
- **What** is the clinical presentation, the status of the diagnostic testing and physical examination? What is the disease agent? The diagnostic test results are essential in confirming an EHM diagnosis and determining the case designation category.
- **Where** is the EHM horse currently located and where has it recently been? The location of the index horse at time of diagnosis and all locations of the index horse for the two weeks prior to onset of clinical signs are critical components to the investigation.
- **When** did the initial clinical sign(s) appear? Determination of disease onset or exposure date is critical to evaluating risks to exposed horses.
- **Why** did this/these horse(s) succumb to the disease? Researchers are trying to determine why some horses become neurologic while others exposed to EHV-1 don't. Thus the epidemiologic investigation and data collection for all confirmed cases is critical.

Once the basic information on the index horse or the affected animals is obtained, the objective of the investigation is to identify the disease transmission risk factors on the premises, so that they can be targeted in any control and prevention plan. The most common transmission route is via the respiratory tract by aerosolized droplets of respiratory secretions. Infection is spread by direct horse-to-horse contact, as well as indirectly by contaminated surfaces or objects including personnel. Environmental transmission of the disease agent of primary concern during an outbreak can occur especially when horses are kept in close confinement. Environmental persistence of the EHV-1 virus is estimated to be less than 7 days under most conditions with a maximum environmental survival of 30 days. Once the EHM incident investigation identifies the risk factors for exposure, control measures must be implemented to 1.) Limit the extent of spread and possibly, severity of clinical disease on the premises and 2.) Limit the spread of disease to adjacent or exposed premises. See Appendix: EHM Case Investigation Form and Exposed/Trace Horse Investigation Form.

Outline of Investigator Responsibilities

1. Use laboratory testing to confirm diagnosis and when reporting on the investigation use case definitions to clearly communicate the status of the horses being investigated.
2. Conduct a case investigation to identify likely source of infection and potentially exposed horses.
3. Utilize case investigation form to document details about the index case and potential for exposed horses.
4. Utilize quarantine risk assessment to identify premises risk factors.
5. Utilize exposure risk assessment to classify individual horse exposure risk.

6. Utilize premises biosecurity assessment to identify biosecurity risks to be addressed in quarantine.
7. Be knowledgeable of relevant local, state or other authority jurisdictions and any reporting obligations.
8. Initiate control and prevention measures based on assessment to prevent spread of disease agent.
9. Provide general biosecurity recommendations to the exposed and quarantined premises.
10. Complete and report all information to appropriate authorities or designated points of contact for the incident (where should the report(s) be sent).
11. Identify and investigate trace-outs and trace-ins of exposed horses to determine appropriate regulatory action.
12. As appropriate, serve as a reference source for further information: distribute disease fact sheets to educate individuals or groups, refer to appropriate other resources or authorities.

GENERAL BIOSECURITY RECOMMENDATIONS FOR EHM EXPOSED AND QUARANTINED PREMISES

1. **Isolate any clinical cases as soon as they are identified**
    a. Isolation is critical to controlling disease. Ideally, at the onset of suspicion of a compatible clinical signs of Equine Herpes Virus -1 infection, isolate the affected horse a minimum of 30 feet from all other horses. Appropriate diagnostics should be utilized to determine cause of compatible clinical signs.
    b. Restrict designated personnel to work on positive or suspect cases. Ideally, these designated individuals should not handle any other horses on the property.
    c. Place a footwear disinfectant and hand sanitizer outside each isolation stall. Provide disposable gloves for designated personnel to wear when handling EHV-1 test positive or suspect EHV-1/EHM horses.
    d. Restrict access to the isolation area to essential personnel and the isolated animals.
    e. Handle isolated horses last; personnel handling isolated horses should not be handling other horses without changing clothes. Provide disposable coveralls for use if a change of clothes is not feasible when entering and exiting the isolation area.
    f. Clean and disinfect the stabling area where the EHV-1 test positive or suspect EHV-1/EHM horse has been.

2. **Quarantine**
    a. Quarantine of the premises means that there should be no horse movement on or off the premises.
    b. Post signage regarding quarantine and biosecurity measures in common areas, such as on the notice board outside the office, near restrooms and at entry areas to each barn.
    c. Communicate the current quarantine situation to all horse owners and trainers at the facility.
    d. Limit premises access to essential personnel and vehicles and monitor perimeter of the premises for non-authorized entries.

3. **Monitor all horses on premises**
    a. Obtain and record the body temperatures of all horses on the premises twice daily. Ideally obtain horse's body temperature first thing in the morning and last thing in the evening and before administering medications which may decrease the body temperature.
    b. Report a fever (any temperature of 101.5°F or greater) to a veterinarian for follow up collection of nasopharyngeal/nasal swabs and blood to test for EHV-1.
    c. Monitor all horses for clinical signs compatible with EHV-1 infection, which include ocular or nasal discharge, limb edema, abortion and neurologic signs such as unsteady gait, weakness, urine dribbling, lack of tail tone and recumbency. Report the observation of any of these signs to the veterinarian designated for follow up collection of nasopharyngeal/nasal swabs and blood sampling to test for EHV-1.

4. **Restrict human, pet and vehicle traffic from exposed-horse areas**
    a. Restrict personnel access to only those necessary for the care of the exposed horses.
    b. Do not permit dogs in horse areas. Dogs have the potential to carry the virus from one area to another on their hair or feet.
    c. Restrict vehicle traffic from entering horse stabling areas. Designate an area where vehicles should be parked away from the stable area.

5. **Limit direct horse-to-horse contact**
    a. Limit potential horse contact in common areas, such as wash stalls, aisle ways and arenas.
    b. Limit potential horse-to-horse contact when possible by closing upper stall doors or installing a physical barrier to restrict horses from extending their heads into the aisle ways.

6. **Limit stress to horses**
    a. An EHV-1 exposed horse may potentially be incubating the virus. With stress, an exposed horse has a higher likelihood of developing clinical disease and shedding a significant amount of virus from the respiratory tract.
    b. Any decision regarding management of exposed horses should balance the need to contain the disease agent spread with the stress that would occur based on management imposed on exposed horses. For example at race tracks exercise of exposed but non-clinical horses is allowed after all other horses have trained and been removed from the track since regular exercise of race horses is very important to their wellbeing.

7. **Eliminate sharing of equipment and personnel**
    a. Clean and disinfect all brushes, halters, cross ties, lead ropes and tack which have previously been shared.
    b. Avoid use of common halters, cross ties, lead ropes, wipe rags and tack. Use individual equipment for each horse; avoid sharing equipment.
    c. If equipment must be shared, clean and disinfect all equipment before and after each use.
    d. Avoid tying horses to fences or tie rails.
    e. Avoid possible viral contamination of water buckets by not allowing the hose to enter or contact the bucket when filling the bucket with water.

8. **Clean and Disinfect**
    a. Clean all barn, other stabling, trailer, or other equine contact surfaces thoroughly, removing all organic matter (dirt, nasal secretions, uneaten feed, manure, etc.) before applying a disinfectant. It is important to remember that organic material decreases the effectiveness of the disinfectant, especially if 10% bleach is used as the disinfectant.
    b. Clean all shared equipment and shared areas to remove dirt and manure before application of a disinfectant.

c. Completely clean and disinfect the stall surfaces of the known-infected horse and any equipment and objects that may be contaminated. Properly dispose of potentially contaminated materials generated by the cleaning and disinfection process.

9. Use footwear disinfectant and hand sanitizer

a. Encourage regular cleaning of foot baths and ensure use of boot bath upon entry and exit of infected animal stalls.
b. Routinely clean footbaths to avoid buildup of organic material, such as dirt and manure, which may inactivate the disinfectant.
c. Place foot baths and hand sanitizers at other strategic locations, throughout the barn areas and encourage their use.

NOTE:

Isolation of all mules away from horses may be an important strategy in EHV-1 disease control during an EHM incident. Recent scientific studies have investigated the role of mules as silent shedders of EHV-1 during an Equine Herpesvirus Myeloencephalopathy incident (EHM). During a 2011 EHV-1 disease investigation involving mules and horses in California, high viral nasal shedding and viremia was detected in some of the asymptomatic mules. It is important to note that the detection of EHV-1 in asymptomatic mule samples indicates their susceptibility to infection and their potential role in virus spread.

EHM INCIDENT COMMUNICATION

Overview

Equine Herpesvirus- 1 neurologic disease or equine herpesvirus myeloencephalopathy (EHM) is a topic about which a great deal of information/misinformation continues to be posted on websites, blogs, Facebook postings, Twitter and Instagram. With the increasing popularity of social media, the need for timely and accurate communication during any EHV-1 incident is critical. Stakeholders have recognized the need for accurate, clear, consistent information in order to make well informed decisions about equine health management. When factual information is lacking, misinformation can spread quickly creating unnecessary anxiety among equine owners and others in the industry. For successful communications during an EHM incident, media training for individuals involved in EHV-1 messaging is strongly recommended. Risk communications training provides insight into the key W's that need to be addressed in disease incident communications.

It is recommended that state animal health officials should establish a communication plan for an EHM incident well in advance of the incident. Appropriate contacts with industry, other state equine officials and federal resources should be made prior to the event of an incident. Drafting content for webpages, alerts and printed outreach materials prior to an incident will facilitate timely dissemination of accurate and useful information during the incident. State animal health officials should explore all modes of communication and utilize effective resources for communicating information.

To Whom to Communicate?

Initial communication during an EHM incident starts with the index premises. To encourage cooperation of all parties at the onset of the incident, face-to-face meetings between the facility owner(s), event manager(s), any and horse owners/trainers on facilities with multiple horse owners such as boarding facilities or racetracks, practicing veterinarians and the state animal health official are highly recommended. Inclusion of the regulatory officials in the communication process helps to give the perspective of "we are in it together" for the welfare of the horse and the industry. All communication should target those impacted by the EHM incident, such as the individual horse owners, whose concern may be centered on how the disease occurrence affects their horse(s) and the economic impact from possible animal losses and restrictions on movement.

Once communications have taken place with the responsible person(s) on the index premises, information should be more widely disseminated to the equine industry at large to include but not limited to contacting the Equine Disease Communication Center (EDCC) (www.equinediseasecc.org). Delay in communications will allow time for rumors to develop and spread. It is recommended that state animal health officials develop a communication network for dissemination of equine disease alert information within their states. Some states have successfully used email lists to distribute and alert key equine industry representatives and equine practitioners in the state. Those alerted should in turn disseminate the information to their respective constituents. An email notification system ensures a reliable source is providing a consistent message for the state. In addition to email

alerts, state animal health webpages and social media sites can host the most current factual information. States with large event facilities should consider a notification system for event facilities including race tracks.

When to Communicate?

Timeliness of communication is critical. However, it is essential to first consider the need to communicate the information. For example, a single horse out on pasture that has never left the premises and has no potential to expose another horse may not warrant communication to the entire equine industry as there is minimal risk outside of the horse index premises. However, a horse displaying neurologic signs five days after exhibiting at a large national horse show with a history of a fever preceding the development of neurologic signs, that has been confirmed positive for EHV-1, presents a significant risk and warrants widespread dissemination of information on the status of the situation.

It is recommended that communications with the industry occur within 24 hours of the initial investigation and confirmation of the EHM case. States with experience in communicating EHM incidents have cautioned others that communicating about a suspect but not yet confirmed case of EHM may be premature as there are many differential diagnoses for a febrile horse exhibiting neurologic signs. Therefore, it is recommended that only confirmed case information be disseminated to the industry. Where a rampant rumor mill situation exists, state animal health official action to clearly communicate the status of the situation is necessary. The state animal health official may want to acknowledge that an investigation is ongoing but that no cases of EHM have as of yet been confirmed and indicate when further information will be made available.

What to Communicate?

The key to communication is providing factual information that addresses the concerns of the industry. Do not speculate. The outreach to affected premises should include specific biosecurity recommendations and quarantine parameters. Owners of all identified exposed horses should be provided a temperature monitoring log for tracking twice daily temperatures and any other clinical signs.

There are multiple different stakeholders in equine disease communication. Generally equine stakeholders want to know if a particular EHM incident can impact them. For example the individual horse owner is concerned about risk to his/her horse, the show manager is concerned about risk to their event, and the equine practitioner is concerned about risk to the health of the horses in their practice area. Each individual utilizes the information available to assess risk as it pertains to them and their role in an incident. The critical information state animal health official can provide to the stakeholders is how many horses are affected, the population of horses affected, potential exposures, and the measures implemented to limit the disease spread. This information can be in the form of social media alerts, webpage updates and printed outreach materials. State animal health officials are urged to place information on their department's website.

State animal health officials, the AAEP and the AHC have developed a plan for a National Equine Disease Communication Center to assist dissemination of factual current information at www.equinediseasecc.org. The EDCC has been designed to become the central "go-to" source for information about equine infectious diseases that pose a threat to the horse industry and the website is intended to be a central communication resource for the equine industry to provide current, factual information regarding ongoing outbreaks in all fifty states. Fund raising for the EDCC is underway at the time of completion of the fall 2015 version of this guideline and state animal health officials have been asked to send press releases to Dr. Nat White for inclusion on the "Disease Outbreak Alert" section of the EDCC website.

Outlined below are some recommendations for regulators for messaging content for webpages, alerts, and social media.

1. Recommended Website Content
    a. See Definitions section of guidance document for case definitions to be posted to the website.
    b. Compatible Clinical Signs: See Definitions Section of Guidance Document
    c. Resources:
        i. USDA Webpage: http://www.aphis.usda.gov/wps/portal/aphis/ourfocus/animalhealth?1dmy&urile=wcm%3apath%3a%2Faphis_content_library%2Fsa_our_focus%2Fsa_animal_health%2Fsa_animal_disease_information%2Fsa_equine_health%2Fsa_herpes_virus%2Fct_equine_herpes_virus_type_1
        ii. USDA Brochure: http://www.aphis.usda.gov/vs/nahss/equine/ehv/equine_herpesvirus_brochure_2009.pdf
        iii. AAEP Website
            1. Resources for Horse Owners: http://www.aaep.org/-i-101.html
            2. Resources for Veterinarians
                a. EHV Control Guidelines: http://www.aaep.org/custdocs/EquineHerpesvirusFinal030513.pdf?osCsid=9pjj4vii1q602nu8k2etnst3v3
                b. Gluck Equine Research Center
                    i. Bibliography of Source Materials: http://www2.ca.uky.edu/gluck/BiblioEHV1.asp
                c. UCDavis: How to set up an Isolation Unit: http://www.vetmed.ucdavis.edu/ceh/docs/IsoUnit-061611.pdf
        iv. Equine Disease Communication Center (EDCC)
            1. www.equinedisease.org
    d. Alert about New Cases: Posted Daily
        i. Sample Verbiage to Include When Posting on Website: Day one

1. On [X Date], a [X] year old, breed, sex, displaying mild/moderate/severe neurologic signs has been confirmed test positive for the non-neuropathogenic strain of Equine Herpesvirus-1. This strain of virus is most frequently responsible for respiratory disease in horses. A small percentage of horses infected with this strain of the virus can develop neurologic signs consistent with Equine Herpesvirus Myeloencephalopathy (EHM). The test positive horse has been quarantined and isolated in [X] County. Exposed horses have been quarantined and are being monitored twice daily for fever (temperature over 101.5^0 F) and other clinical signs. An epidemiological investigation has been initiated. State animal health officials will continue to monitor the situation.

ii. Sample Verbiage To Include when Posting on Website: Subsequent Days

1. No new cases have been detected. Epidemiologic investigation reveals no additional exposed horses beyond index premises.
2. An exposed [X] year old, breed, sex, displaying a fever of 101.5^0F has been confirmed positive for the non-neuropathogenic strain of Equine Herpesvirus-1. This horse had direct exposure to the index horse and has been isolated. Exposed horses continue to be monitored. Epidemiologic investigation reveals horses participated in a show at [X] premises on [X date]. (After discussion and notification of event management.) State animal health officials are contacting owners of potential exposed horses. All exposed horses should have temperatures taken twice daily and be observed for any clinical sign consistent with EHM. Any temperature over 101.5^0 F or compatible clinical signs should be reported to a veterinarian for investigation and diagnostic testing.
3. The test positive horse has been released from quarantine based on two negative test results. No additional horses have been detected. The investigation has been closed.

e. Historic EHM Incidents

i. Date and County

1. Index case: a [X] year old, breed, sex, displaying mild/moderate/severe neurologic signs was euthanized or recovered. Laboratory results confirmed the non-neuropathogenic (or neuropathogenic) strain of Equine Herpesvirus-1. [X] additional confirmed cases of EHM and [X] additional febrile horses confirmed test positive for the same strain of EHV-1. All horses are recovering or [X] horses were euthanized. No epidemiologic link to any previous incidents. Graphic Map of case premises locations would be helpful.

2. Recommended Incident Specific Outreach Materials
    a. Commonly Asked Questions to include in outreach materials.
        i. When did the outbreak begin?
        ii. Where can I get the most current information on the outbreak?
        iii. Where do I report a suspect case?
        iv. What type of horses (use of horses e.g. rodeo, show, race, pleasure etc.) are primarily affected?
        v. Is my horse at risk?
        vi. Has there been spread of the disease?
        vii. Are there movement restrictions?
        viii. When will updates be available?
    b. Outreach for Premises
        i. Recommended Biosecurity Practices for EHM Premises.

EHV-1 VACCINATION

Overview

Currently available vaccines against EHV-1 provide some protection against the respiratory and abortion forms of the disease but fail to protect against EHM.

During a presentation at the EHV workshop held at USAHA in 2013, a speaker indicated that there is scant scientific evidence of efficacy of any of the available vaccines against EHV- 1 neurologic disease. The critical event in the pathology of neurologic disease is endothelial vasculitis and thrombosis in the central nervous system. There is little evidence that vaccination with any available product prevents or decreases either event. Also mentioned were two peer reviewed publications that actually showed an association of recent or frequent vaccination of horses against EHV-1 with an increased risk for development of EHM during EHV-1 outbreaks.

Vaccination of competitive horses with EHV-1 products is common. Optimally data should be gathered in a consistent manner on vaccination status of horses and analyzed to further characterize safety and efficacy of available EHV-1 products in a field setting so that scientifically sound recommendations could be based on the data.

EHV-1 Vaccines Available

Several EHV-1 vaccines currently marketed in North America carry a label claim for the control of respiratory disease induced by EHV-1 and -4. These are multi-component inactivated vaccines specifically, Prestige® (Merck), Calvenza® (Boehringer Ingelheim Vetmedica) and Fluvac Innovator® (Zoetis) and the modified live vaccine Rhinomune® (Boehringer Ingelheim Vetmedica). Additionally, there are two EHV-1 vaccines licensed for the control of abortion and respiratory disease these vaccines are single-component inactivated vaccines, namely Pneumabort-K® (Zoetis) and Prodigy® (Merck).

Experimental challenge studies indicate the amount of viral shedding of EHV-1 is reduced in horses vaccinated with inactivated vaccines that induce high serum titers of virus neutralizing (VN) antibody. Data indicates that, Calvenza®, Pneumabort-K® and Prodigy® stimulate higher levels of virus neutralizing antibody than do the multi-component vaccines that are labelled for control of respiratory disease. These studies also indicate that the potency for the vaccines marketed for the control of abortion appears to be related to their high antigenic mass. Research also indicates that the carboxypolymer adjuvant is likely to be an important contributor to the potency of Calvenza®, a vaccine of lower antigenic mass. The inactivated abortion vaccines, Pneumabort-K® and Prodigy®, have been shown to induce gamma interferon production which suggests activation of T-cell immune response.

There is no evidence that currently available vaccines can prevent naturally occurring Equine Herpesvirus Myeloencephalopathy (EHM) caused by EHV-1. However, one experimental challenge study indicated some benefit is associated with modified live vaccines compared to an inactivated EHV vaccine; however, only a small number of animals were included in each of the study groups. Further studies are warranted to determine the efficacy of any of the currently licensed EHV vaccines in the control of EHM.

In a presentation at the American Association of Equine Practitioners convention in 2013, a group of researchers indicated that three monthly immunizations with a high antigen load EHV-1 inactivated vaccine in aged mares (greater than 20 years of age) was associated with a reduction in severity of neurologic signs when both vaccinates and controls were challenged with a neuropathogenic strain of EHV-1. However, the difference was not statistically significant. The authors concluded a need for further work using a greater number of horses in the study.

Vaccination during an EHM Outbreak

It has been suggested that some EHV vaccines may assist in limiting the spread of EHV-1 in outbreak situations by limiting nasal shedding of EHV-1 and thus dissemination of virus. For this reason some experts hold the opinion that there may be an advantage to vaccinating in the face of an outbreak. If this approach is pursued, only afebrile and asymptomatic horses should be vaccinated and protection against clinical EHM should not be an expectation. The vaccines with the greatest ability to limit nasal shedding and viremia of the neurovirulent strain include the vaccines licensed for control of abortion (Pneumabort-K®; and Prodigy®).

It is important to note that there is some controversy associated with the practice of vaccination during an outbreak, as recent case control studies have shown that EHM may be associated with a history of frequent or recent vaccination.

For additional vaccination guidance see the American Association of Equine Practitioners EHV-1 Vaccination Guidance for Private Practitioners at visit http://www.aaep.org/info/vaccination-guidelines-265

APPENDIX

1. **Quarantine Risk Assessment**
2. **Exposure Risk Assessment**
3. **Premises Biosecurity Risk Assessment**
4. **Quarantine Release Assessment**
5. **EHM Case Investigation Form**
6. **EHV-1 Exposed/Trace Horse Investigation Form**
7. **Flow Charts**

QUARANTINE RISK ASSESSMENT

Assessment of management practices seven (7) days prior to and subsequent to identification of the index EHM case.

Level of Isolation of Infected Horses:

(Any yes answer is considered an increased risk)	Yes	No
Is it possible for the infected horse to have nose-to-nose contact with other horse(s)?		
Can the infected horse place its head into a common alleyway and make physical contact with humans, equipment or other horses?		
Are there openings in the stall sides between the infected horse stall and the stall next to him?		
Is the nearest horse stalled closer than 30 feet to infected horse(s)?		
Is there a horse in the stall(s) adjacent to the infected horse?		
Is there a horse in the stall(s) across the alley from the infected horse?		
Is the infected horse turned out into a pasture or paddock which other horses use?		
Do the same personnel handle healthy and infected horses?		

Sharing Equipment or Personnel

(Any yes answer indicates a potential means of EHV-1 spread)	Yes	No
Does any other horse have access to the infected horse's water bucket?		
Does any other horse have access to the infected horse's feed bucket?		
Does any other horse have access to the infected horse's halter or other tack?		
Does any other horse have access to the infected horse's grooming equipment?		
Does any other horse have access to personnel who have worked directly with the infected horse (to include but not limited to veterinarian, farrier, feed or delivery personnel and stall cleaners.)		
When watering horses, is the end of the hose submerged into the infected horse's water bucket?		
When feeding horses, does the common grain scoop make contact with the individual stall feed tubs?		

Protective Equipment

(Any no answer may lead to increases in disease spread)	Yes	No
Is a footwear disinfection required every time a person enters and exits an infected horse's area during the quarantine period?		
Is there minimal organic material in the footbath?		
Are footbaths changed at least daily or more frequently in high traffic areas?		
Are boot covers or boot disinfection required when handling infected horse?		
Are separate coveralls or clothes required when handling the infected horse?		
Are disposable waterproof gloves required when handling infected horse?		
Is everyone, including visitors, provided requirements or information regarding the biosecurity measures in place?		

Exposure Risk Assessment

Exposure Risk: Answers of *"Yes" signify increased risk of disease agent spread (Time period for assessment: 7 days prior to diagnosis of EHM and 7 days post diagnosis of EHM case.)*

Is the exposed horse showing clinical sign(s) of disease? _____

Did the exposed horse(s) have direct contact with an infected/ sick horse in the stabling area?___

Did the exposed horse(s) have direct contact with infected/ sick horse in any common area?_____

Did the exposed horse(s) have direct contact with infected/ sick horse in any exercise area? _____

Did the exposed horse(s) have contact with infected/ sick horse in any pastures or paddocks? ____

Did the exposed horse(s) have contact with equipment used on the infected/sick horse? _____

Did the exposed horse(s) have contact with people handling/feeding the infected/sick? _____

Did the exposed horse(s) have contact with infected/ sick horse during shipment to the premises?____

General Exposure Risk Quarantine Guidelines

Low-Exposure Risk Horse	No known exposure on index EHM case premises	Minimal risk; recommend monitoring for clinical signs.
Medium-Exposure Risk Horse	Potential exposure on index EHM case premises	Recommend monitoring body temperature of horse for fourteen (14) days
High-Exposure Risk Horse	Known direct contact with index EHM case	Recommend Quarantine and Isolation Monitoring and testing of any horse which develops fever or neurologic signs.

Premises Biosecurity Assessment

Disease risk cannot be completely eliminated from an equine premises as these premises are seldom closed to both new arriving horses or equine service providers. An evaluation of current management practices will help identify potential biosecurity risks which should be addressed in the quarantine.

Stalls

	Minimal Biosecurity Risk	Medium Biosecurity Risk	High Biosecurity Risk
Walls	Solid	Half walls	Bars
Material	Metal	Treated wood (non-porous)	Untreated wood (porous)

Isolation Area

Isolation Location	Available designated empty barn or paddock/pen/pasture isolated away from all other Owners stalls	One empty barn at the end of the barns	A few stalls available at one end of barn housing horses
Personnel Access	Isolation personnel access only	Limited access	No ability to restrict access
Vehicle Access	Restricted vehicle access with monitoring at entrance to premises and isolation stabling	Restricted vehicle access with no monitoring of entrance	No restrictions or monitoring of vehicle access

Feed and Water

Feed storage	Covered hay and sealed containers for feed kept in a separate secure stall	Secure storage stall with open feed bags and uncovered hay	Hay and open feed bags in uncovered barn aisle way
Water sources	Only individual water buckets in use	Stream or large water Source	Communal water area
Separation of Feed and Manure Handling Equipment	Complete separation of feed and manure handling equipment	Limited separation of feed and manure handling equipment	Feed, hay and manure handling equipment stored together

	Minimal Biosecurity Risk		Medium Biosecurity Risk		High Biosecurity Risk	
Wash Stall Area						
Horse-to-Horse Contact	No nose-to-nose contact possible		Limited duration or frequency of nose-to-nose contact possible		Nose-to- nose contact likely	
Equipment	No Sharing of Equipment		Restricted sharing of equipment (i.e., horses in same barn)		No restrictions - equipment is freely shared	
Hose Contact with Horse	Horse never makes direct contact with hose		Horse makes limited direct contact with hose		Horse has direct contact with hose	
Hose Placement	Hose is hung on wall after each use		Hose is sometimes hung after each use		Hose is left lying on the ground	
Fecal Material	Removed Immediately		Routinely removed throughout the day		Removed at the end of the month.	
Horse Commingling Areas						
Exercise Area	No shared exercise areas: All horses exercise independently		Shared exercise area with minimal possible direct horse-to-horse contact		Shared exercise area with direct horse-to-horse contact	
Pastures/ Paddocks Area	No shared pasture/ paddocks all horses in designated individual pasture/ paddock		Shared pasture/ paddocks with minimal direct horse-to-horse contact		Shared pasture/ paddocks with direct horse-to-horse contact	
Parking						
Trailer	Restricted trailer parking, monitored and separate from barn area and not accessible by visitors		Shared parking, but separate from visitor access		Unrestricted parking next to horse barns and accessible to visitors	
Visitor	Restricted visitor parking, monitored and separate from barn and trailer parking		Shared parking, but separate from trailer parking		Unrestricted Parking	
TOTALS						

QUARANTINE RELEASE ASSESSMENT

Index EHM Case Information:

Clinical Onset Date:

Date of Isolation or Removal from Premises:

General Quarantine Release Criteria:

Was the EHM case euthanized? ☐ yes ☐ no

Was the EHM case adequately isolated within 12 hours of detection of neurologic signs, from other horses on premises**?** ☐ yes ☐ no

If no should extend quarantine release time.

Quarantine Options (One or more yes responses may warrant quarantine release)

Has it been 21 days since onset date of last EHM case? ☐ yes ☐ no

Are there negative test results on exposed horses? ☐ yes ☐ no

Evaluation of Infected Premises Status

(If answer no to all questions, quarantine release is recommended at 21 days after last onset date of clinical signs of the last case.)

Have the horse's temperatures been monitored since first case of disease was detected? ☐ yes ☐ no

Has a temperature log been maintained? (Review Log) ☐ yes ☐ no

Have any exposed horses had a fever (rectal temperature greater than 101.5 °F)? ☐ yes ☐ no

Have any exposed horses displayed any clinical signs compatible with EHV-1 infection? ☐ yes ☐ no

Has the EHM case had direct contact with any horses since confirmation of EHM? ☐ yes ☐ no

Testing for Quarantine Release:

(If answer yes to all questions, quarantine release is recommended.)

Were diagnostic samples obtained? ☐ yes ☐ no

Were samples obtained 14 days after removal of EHM case or ☐ yes ☐ no

21 days after onset date of last EHM case or resolution of last febrile case.

Were negative PCR results obtained for all samples tested? ☐ yes ☐ no

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Equine Herpesvirus Myeloencephalopathy Case Investigation Form

Investigator : Date:

Veterinary Contact Information:

Veterinarian _____ Contact phone _____

Clinic name _____

Owner Information

Last name _____ First name _____

Address: _____

City _____ State _____ Zip _____ County _____

Phone Number: _____ Email Address: _____

Point of Contact if Different than Owner: _____

Current Horse Location

Address _____

City _____ State _____ Zip _____ County _____

Type of Facility ☐ Private Residence ☐ Show Grounds ☐ Racetrack
☐ Boarding Facility ☐ Training Facility ☐ Breeding Facility

Premises Information

Barn Manager/ Trainer / Event Manager Name: _____

Contact Phone Number: _____

Contact Email Address: _____

Total Number of Horses on the premises _____

Total Number of Barns on the premises _____

Is there an isolation barn or area on the on the premises? ☐ yes ☐ no

Are all horses on premises owned by the same Individual? ☐ yes ☐ no

Describe Stall/ Barn Facility: (Panel fencing access to other horses, half boarded walls and bars access to other horses, stall is at the end with no other horses etc.) (Attach photos or google earth map)

Positive EHM Case Record

Name: _____Microchip/Brand:_____
Breed:_____Gender: Mare | Stallion | Gelding Age_____
Primary Use: _____
Level of Exercise at time of confirmation_____
Stabling ☐ Stall ☐ Paddock/Corral ☐ Pasture

Dates of EHV-1 Vaccination(s) _____ **Name of Product Administered**_____

Date of onset of initial clinical sign(s)?
Clinical Signs Observed in Affected Horse: Check all that apply and write date of onset

☐ Ataxia _____ ☐ Colic _____ ☐ Fever ____ °F _____
☐ Flaccid Tail _____ ☐ Hind Weakness_____ ☐ Incoordination _____
☐ Lethargy _____ ☐ Limb Edema _____ ☐ Nasal Discharge _____
☐ Recumbent _____ ☐ Dribbling Urine _____ ☐ Abortion _____
Other: _____

Was the horse euthanized? ☐ yes ☐ no If yes, what date? _____
Was the horse necropsied? ☐ yes ☐ no If yes, where? _____

Laboratory Results

Laboratory Name: Phone Number:

Date Collected	Sample Type	Type of Test	Strain Type Detected	Quantitative Result

Travel History: List all locations where the horse has been the **2 weeks** prior to onset of clinical symptoms?

Date of Travel	Reason For Travel (Event Name)	Destination City, State	Transportation Method

Comments:

Exposed Horse Information

Total Number of horses with clinical signs consistent with EHV-1:_____
Total Number of non-clinical EHV-1 test positive horses:_____

Are temperatures taken twice daily on all horses? ☐ yes ☐ no
Have any horses died over the last two weeks? ☐ yes ☐ no
If yes, provide number of dead horses and clinical presentation prior to death.

Are horses on a routine EHV-1 vaccination plan? ☐ yes ☐ no
Date of Last Vaccination **Product Administered**

Exposed Horses Demographics: (List any potentially exposed horse)

Name	Breed	Age	Sex	Date Clinical Onset	Fever/ Neuro/ None

List any horses which have left the premises over the last two weeks?

Date of Departure	Horse's Name & Description	Destination Premises Name & Contact Name	Destination Contact Phone Number	Destination Premises Location

Investigation Comments:

Quarantine Number Issue Date

Equine Herpesvirus Myeloencephalopathy Case Investigation Form

Investigator : Date:

Veterinary Contact Information:

Veterinarian _____ Contact phone _____

Clinic name _____

Owner Information

Last name _____ First name _____

Address: _____

City _____ State _____ Zip _____ County _____

Phone Number: _____ Email Address: _____

Point of Contact if Different than Owner: _____

Current Horse Location

Address _____

City _____ State _____ Zip _____ County _____

Type of Facility ☐ Private Residence ☐ Show Grounds ☐ Racetrack
☐ Boarding Facility ☐ Training Facility ☐ Breeding Facility

Premises Information

Barn Manager/ Trainer / Event Manager Name: _____

Contact Phone Number: _____

Contact Email Address: _____

Total Number of Horses on the premises _____

Total Number of Barns on the premises _____

Is there an isolation barn or area on the on the premises? ☐ yes ☐ no

Are all horses on premises owned by the same Individual? ☐ yes ☐ no

Describe Stall/ Barn Facility: (Panel fencing access to other horses, half boarded walls and bars access to other horses, stall is at the end with no other horses etc.) (Attach photos or google earth map)

Trace Horse Record

Name: _____Microchip/Brand:_____
Breed: _____Gender: Mare | Stallion | Gelding Age_____
Primary Use: _____
Level of Exercise at time of confirmation_____
Stabling □ Stall □ Paddock/Corral □ Pasture

Dates of EHV-1 Vaccination(s) _____ Name of Product Administered_____

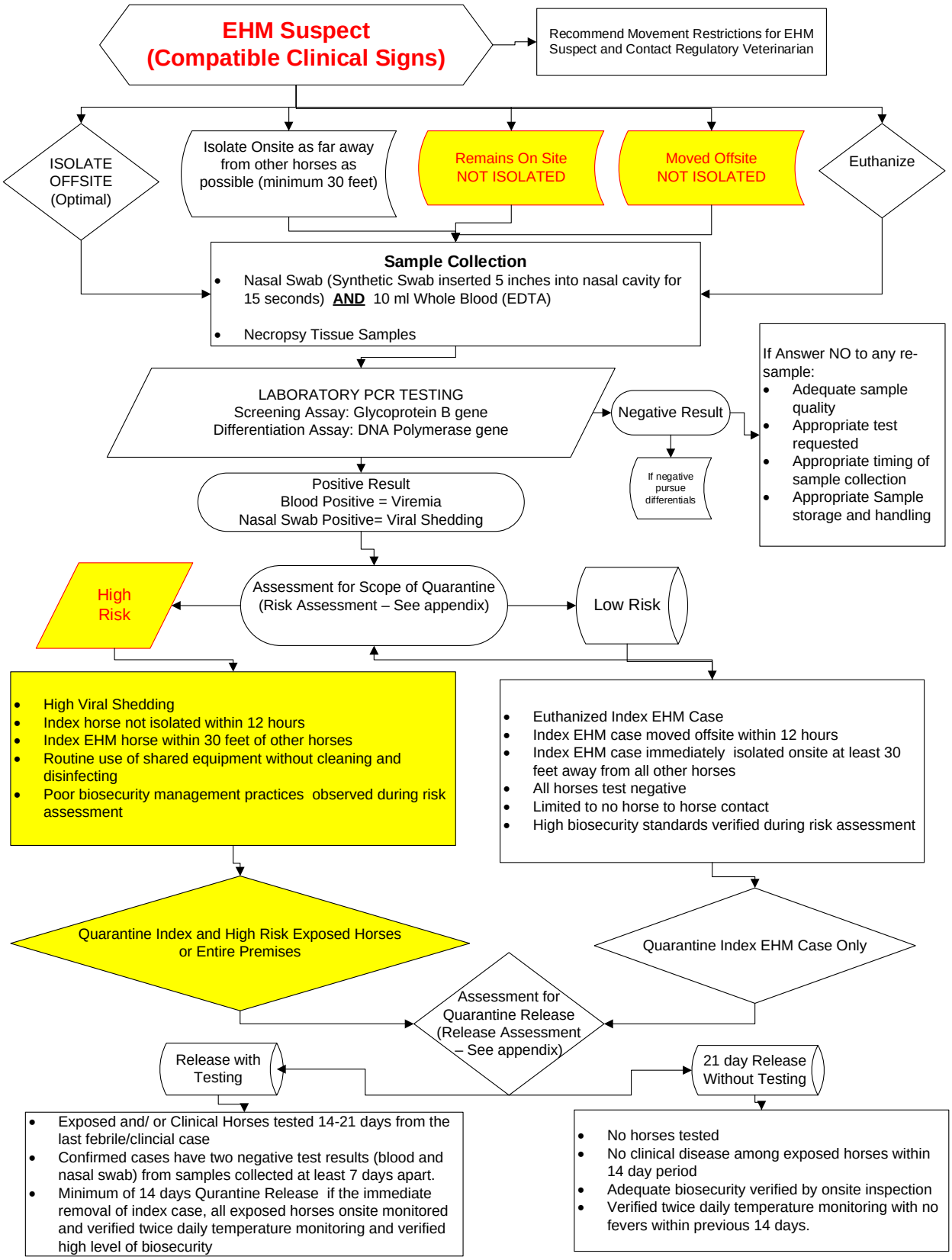
Any clinical sign(s)? Check all that apply and write date of onset

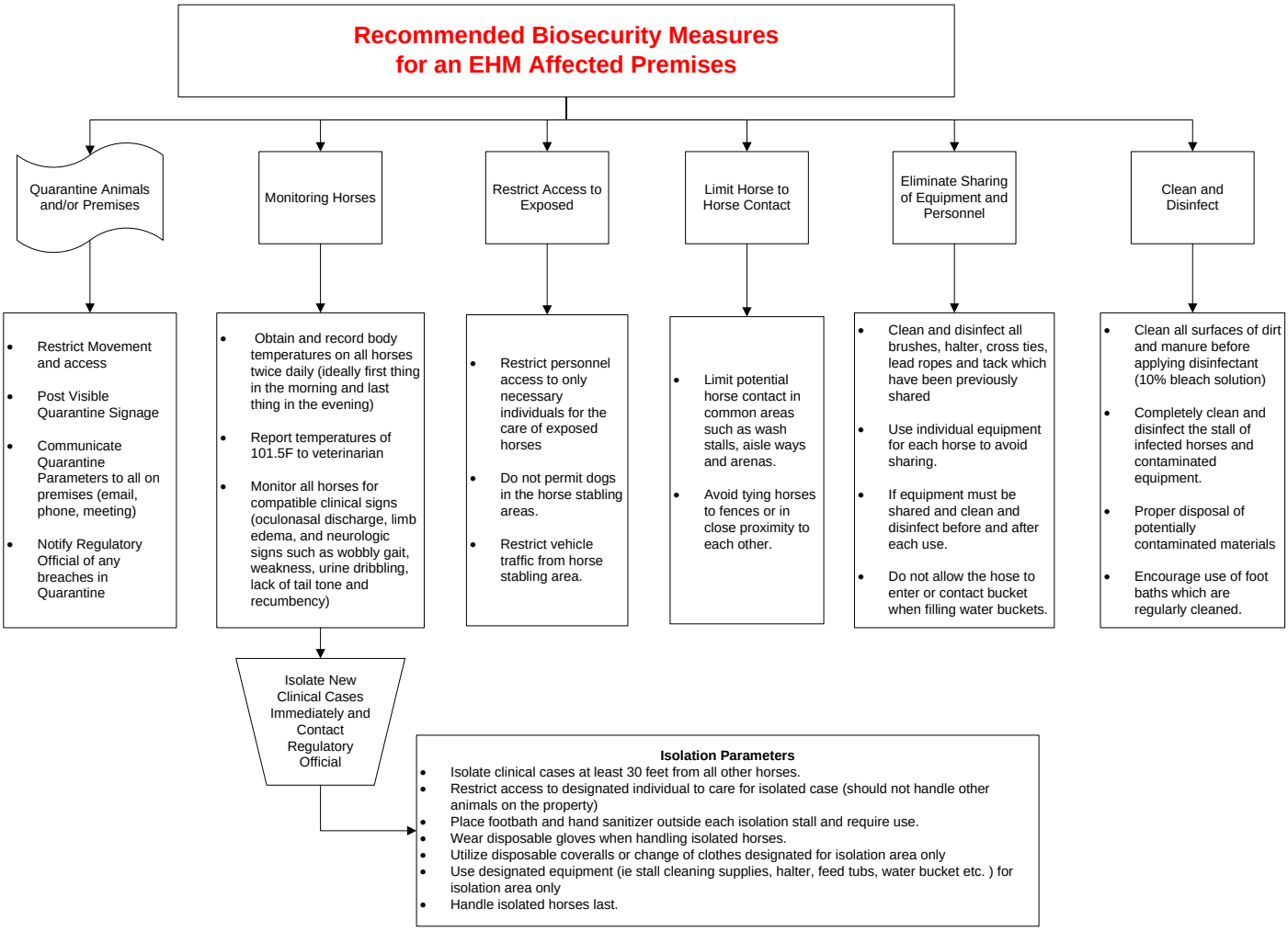
□ Ataxia _____	□ Colic _____	□ Fever ____ °F _____
□ Flaccid Tail _____	□ Hind Weakness_____	□ Incoordination _____
□ Lethargy _____	□ Limb Edema _____	□ Nasal Discharge _____
□ Recumbent _____	□ Dribbling Urine _____	□ Abortion _____

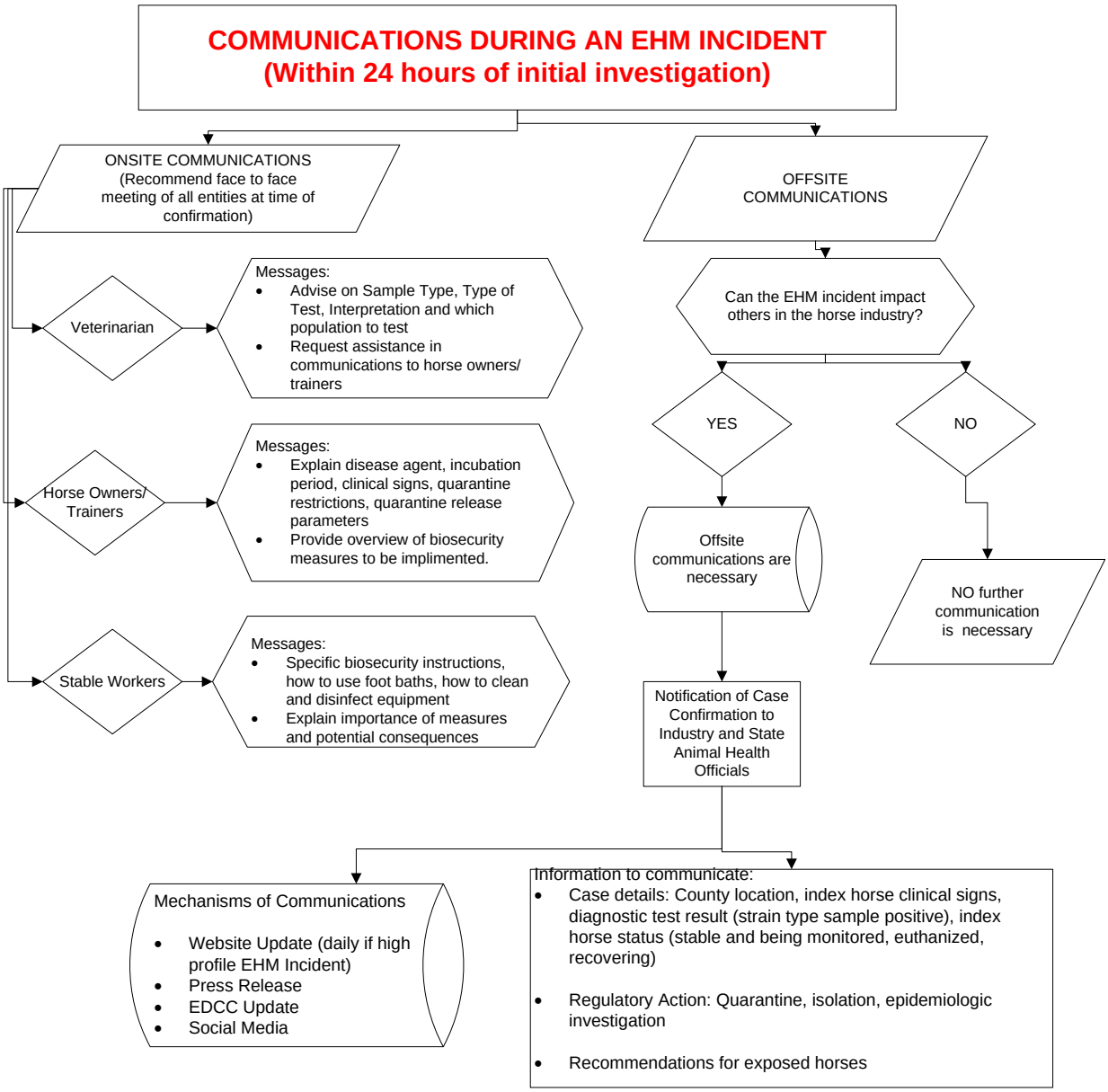
Other: _____

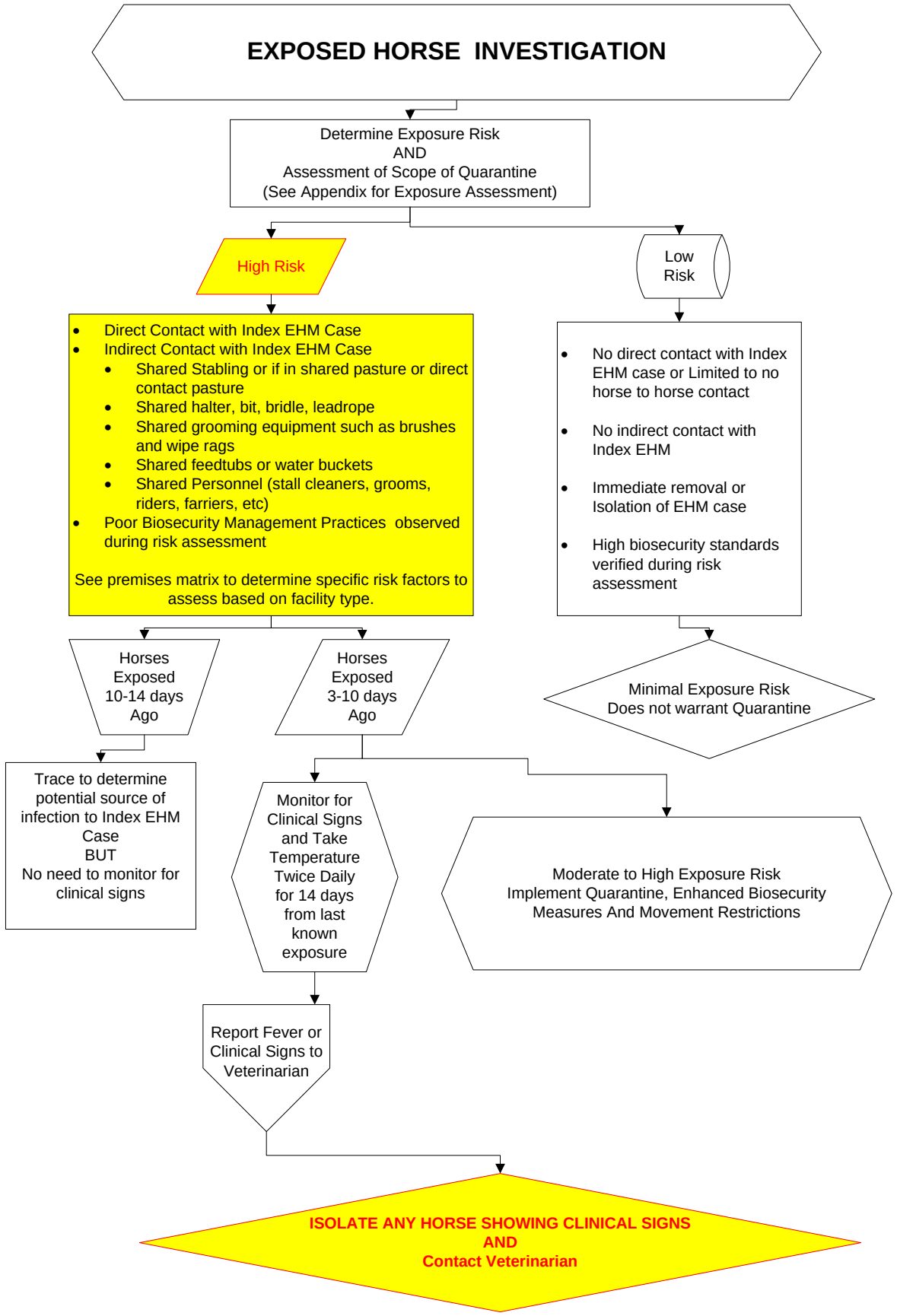
Investigation Comments:

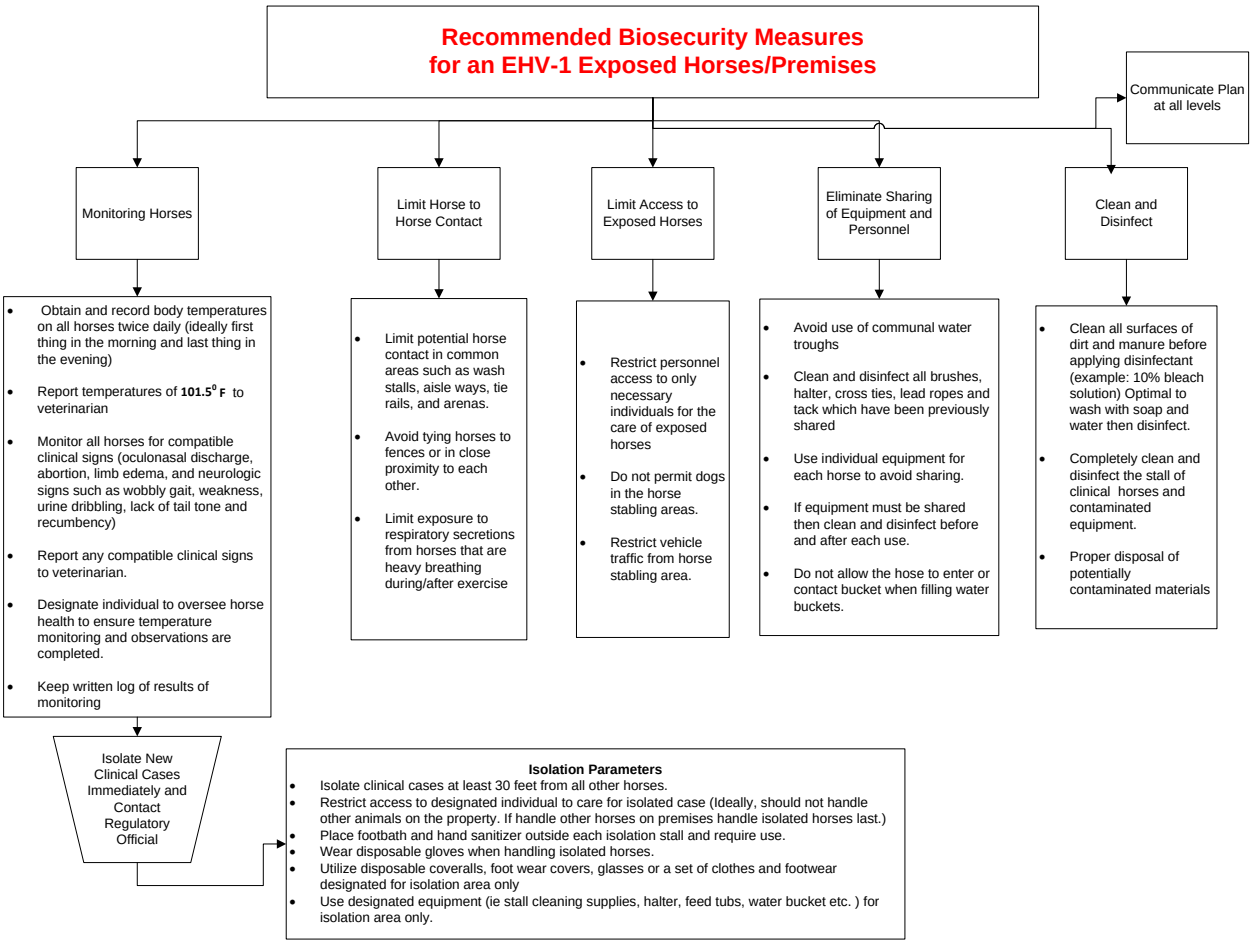
NOTE: If any horses on this property display neurologic signs then the full case epi investigation shall be completed.


EHM Suspect
(Compatible Clinical Signs)
Recommend Movement Restrictions for EHM Suspect and Contact Regulatory Veterinarian
ISOLATE OFFSITE (Optimal)
Isolate Onsite as far away from other horses as possible (minimum 30 feet)
Remains On Site NOT ISOLATED
Moved Offsite NOT ISOLATED
Euthanize
Sample Collection
Nasal Swab (Synthetic Swab inserted 5 inches into nasal cavity for 15 seconds) AND 10 ml Whole Blood (EDTA)
Necropsy Tissue Samples
LABORATORY PCR TESTING
Screening Assay: Glycoprotein B gene
Differentiation Assay: DNA Polymerase gene
Negative Result
If negative pursue differentials
If Answer NO to any re-sample:
Adequate sample quality
Appropriate test requested
Appropriate timing of sample collection
Appropriate Sample storage and handling
Positive Result
Blood Positive = Viremia
Nasal Swab Positive= Viral Shedding
High Risk
Assessment for Scope of Quarantine (Risk Assessment – See appendix)
Low Risk
High Viral Shedding
Index horse not isolated within 12 hours
Index EHM horse within 30 feet of other horses
Routine use of shared equipment without cleaning and disinfecting
Poor biosecurity management practices observed during risk assessment
Euthanized Index EHM Case
Index EHM case moved offsite within 12 hours
Index EHM case immediately isolated onsite at least 30 feet away from all other horses
All horses test negative
Limited to no horse to horse contact
High biosecurity standards verified during risk assessment
Quarantine Index and High Risk Exposed Horses or Entire Premises
Quarantine Index EHM Case Only
Assessment for Quarantine Release (Release Assessment – See appendix)
Release with Testing
21 day Release Without Testing
Exposed and/ or Clinical Horses tested 14-21 days from the last febrile/clincial case
Confirmed cases have two negative test results (blood and nasal swab) from samples collected at least 7 days apart.
Minimum of 14 days Qurantine Release if the immediate removal of index case, all exposed horses onsite monitored and verified twice daily temperature monitoring and verified high level of biosecurity
No horses tested
No clinical disease among exposed horses within 14 day period
Adequate biosecurity verified by onsite inspection
Verified twice daily temperature monitoring with no fevers within previous 14 days.


Recommended Biosecurity Measures for an EHM Affected Premises
Quarantine Animals and/or Premises
Monitoring Horses
Restrict Access to Exposed
Limit Horse to Horse Contact
Eliminate Sharing of Equipment and Personnel
Clean and Disinfect
Restrict Movement and access
Post Visible Quarantine Signage
Communicate Quarantine Parameters to all on premises (email, phone, meeting)
Notify Regulatory Official of any breaches in Quarantine
Obtain and record body temperatures on all horses twice daily (ideally first thing in the morning and last thing in the evening)
Report temperatures of 101.5F to veterinarian
Monitor all horses for compatible clinical signs (oculonasal discharge, limb edema, and neurologic signs such as wobbly gait, weakness, urine dribbling, lack of tail tone and recumbency)
Restrict personnel access to only necessary individuals for the care of exposed horses
Do not permit dogs in the horse stabling areas.
Restrict vehicle traffic from horse stabling area.
Limit potential horse contact in common areas such as wash stalls, aisle ways and arenas.
Avoid tying horses to fences or in close proximity to each other.
Clean and disinfect all brushes, halter, cross ties, lead ropes and tack which have been previously shared
Use individual equipment for each horse to avoid sharing.
If equipment must be shared and clean and disinfect before and after each use.
Do not allow the hose to enter or contact bucket when filling water buckets.
Clean all surfaces of dirt and manure before applying disinfectant (10% bleach solution)
Completely clean and disinfect the stall of infected horses and contaminated equipment.
Proper disposal of potentially contaminated materials
Encourage use of foot baths which are regularly cleaned.
Isolate New Clinical Cases Immediately and Contact Regulatory Official
Isolation Parameters
Isolate clinical cases at least 30 feet from all other horses.
Restrict access to designated individual to care for isolated case (should not handle other animals on the property)
Place footbath and hand sanitizer outside each isolation stall and require use.
Wear disposable gloves when handling isolated horses.
Utilize disposable coveralls or change of clothes designated for isolation area only
Use designated equipment (ie stall cleaning supplies, halter, feed tubs, water bucket etc.) for isolation area only
Handle isolated horses last.


COMMUNICATIONS DURING AN EHM INCIDENT
(Within 24 hours of initial investigation)
ONSITE COMMUNICATIONS
(Recommend face to face meeting of all entities at time of confirmation)
OFFSITE COMMUNICATIONS
Veterinarian
Messages:
Advise on Sample Type, Type of Test, Interpretation and which population to test
Request assistance in communications to horse owners/ trainers
Horse Owners/ Trainers
Messages:
Explain disease agent, incubation period, clinical signs, quarantine restrictions, quarantine release parameters
Provide overview of biosecurity measures to be implimented.
Stable Workers
Messages:
Specific biosecurity instructions, how to use foot baths, how to clean and disinfect equipment
Explain importance of measures and potential consequences
Can the EHM incident impact others in the horse industry?
YES
NO
Offsite communications are necessary
NO further communication is necessary
Notification of Case Confirmation to Industry and State Animal Health Officials
Mechanisms of Communications
Website Update (daily if high profile EHM Incident)
Press Release
EDCC Update
Social Media
Information to communicate:
Case details: County location, index horse clinical signs, diagnostic test result (strain type sample positive), index horse status (stable and being monitored, euthanized, recovering)
Regulatory Action: Quarantine, isolation, epidemiologic investigation
Recommendations for exposed horses


EXPOSED HORSE INVESTIGATION
Determine Exposure Risk
AND
Assessment of Scope of Quarantine
(See Appendix for Exposure Assessment)
High Risk
Low Risk
Direct Contact with Index EHM Case
Indirect Contact with Index EHM Case
Shared Stabling or if in shared pasture or direct contact pasture
Shared halter, bit, bridle, leadrope
Shared grooming equipment such as brushes and wipe rags
Shared feedtubs or water buckets
Shared Personnel (stall cleaners, grooms, riders, farriers, etc)
Poor Biosecurity Management Practices observed during risk assessment
See premises matrix to determine specific risk factors to assess based on facility type.
No direct contact with Index EHM case or Limited to no horse to horse contact
No indirect contact with Index EHM
Immediate removal or Isolation of EHM case
High biosecurity standards verified during risk assessment
Horses Exposed 10-14 days Ago
Horses Exposed 3-10 days Ago
Minimal Exposure Risk
Does not warrant Quarantine
Trace to determine potential source of infection to Index EHM Case
BUT
No need to monitor for clinical signs
Monitor for Clinical Signs and Take Temperature Twice Daily for 14 days from last known exposure
Moderate to High Exposure Risk
Implement Quarantine, Enhanced Biosecurity Measures And Movement Restrictions
Report Fever or Clinical Signs to Veterinarian
ISOLATE ANY HORSE SHOWING CLINICAL SIGNS
AND
Contact Veterinarian


Recommended Biosecurity Measures
for an EHV-1 Exposed Horses/Premises
Communicate Plan at all levels
Monitoring Horses
Limit Horse to Horse Contact
Limit Access to Exposed Horses
Eliminate Sharing of Equipment and Personnel
Clean and Disinfect
Obtain and record body temperatures on all horses twice daily (ideally first thing in the morning and last thing in the evening)
Report temperatures of 101.5° F to veterinarian
Monitor all horses for compatible clinical signs (oculonasal discharge, abortion, limb edema, and neurologic signs such as wobbly gait, weakness, urine dribbling, lack of tail tone and recumbency)
Report any compatible clinical signs to veterinarian.
Designate individual to oversee horse health to ensure temperature monitoring and observations are completed.
Keep written log of results of monitoring
Limit potential horse contact in common areas such as wash stalls, aisle ways, tie rails, and arenas.
Avoid tying horses to fences or in close proximity to each other.
Limit exposure to respiratory secretions from horses that are heavy breathing during/after exercise
Restrict personnel access to only necessary individuals for the care of exposed horses
Do not permit dogs in the horse stabling areas.
Restrict vehicle traffic from horse stabling area.
Avoid use of communal water troughs
Clean and disinfect all brushes, halter, cross ties, lead ropes and tack which have been previously shared
Use individual equipment for each horse to avoid sharing.
If equipment must be shared then clean and disinfect before and after each use.
Do not allow the hose to enter or contact bucket when filling water buckets.
Clean all surfaces of dirt and manure before applying disinfectant (example: 10% bleach solution) Optimal to wash with soap and water then disinfect.
Completely clean and disinfect the stall of clinical horses and contaminated equipment.
Proper disposal of potentially contaminated materials
Isolate New Clinical Cases Immediately and Contact Regulatory Official
Isolation Parameters
Isolate clinical cases at least 30 feet from all other horses.
Restrict access to designated individual to care for isolated case (Ideally, should not handle other animals on the property. If handle other horses on premises handle isolated horses last.)
Place footbath and hand sanitizer outside each isolation stall and require use.
Wear disposable gloves when handling isolated horses.
Utilize disposable coveralls, foot wear covers, glasses or a set of clothes and footwear designated for isolation area only
Use designated equipment (ie stall cleaning supplies, halter, feed tubs, water bucket etc.) for isolation area only.

EHV-1 References

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11. Pusterla, N., Wilson, W.D., Mapes, S., Finno, C., Isbell, D., Arthur, R.M. and Ferraro, G.L. (2009) Characterization of viral loads, strain and state of equine herpesvirus-1 using real-time PCR in horses following natural exposure at a racetrack in California. Vet. J. 179, 230-239.
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