

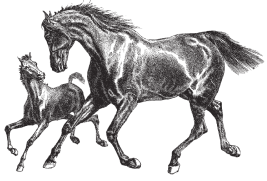
USDA EVA UMR, 2004

# **Equine Breeding Farm Infection Control and Biosecurity Measures**

**W. Ben Stoughton, DVM, PhD, DACVIM (LA)**

**March 19, 2024**

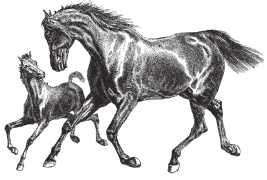
**PEI Standardbred Breeder's Association**



# OUTLINE

- What are **Infection Control** and **Biosecurity**?
- Why are they important?
- What is EVA? What is the cause?
- What are the symptoms? How is it spread?
- Where has it impacted the equine community worldwide?
- How has PEI been impacted?
- What are the economic consequences?
- **What next?**
  - Strategies for infection control in stallions, mares and foals
  - **10 Risk-Reduction Measures for EAV**

# BREEDING FARM MANAGEMENT

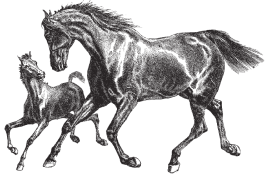


## WHAT ARE INFECTION CONTRL AND BIOSECURITY?

- **Infection Control**
  - *Limits the impact of the introduction of pathogens into a population*
    - *Aims to decreases risk and incidence of disease occurrence*
      - All equine farms have risk of infections!
- **Biosecurity**
  - Measures to reduce the risk of pathogen transmission **ENTRY**
    - *Aims to prevent entry of pathogens into a population*
      - Example: Chicken farm...



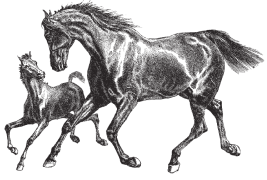
# BREEDING FARM MANAGEMENT



## WHY ARE THESE IMPORTANT?

- **Infection control and biosecurity aim to decrease the risk of:**
  - Infectious disease occurrence and outbreaks in the population
  - Societal disruption (i.e., event cancellation, travel restriction)
  - Industry disruption (i.e., export and import bans)
  - Social and emotional costs and public health (zoonotic)
  - Economic impact associated with infectious diseases
  - Recent examples in PEI: **Strangles and Equine Viral Arteritis...**

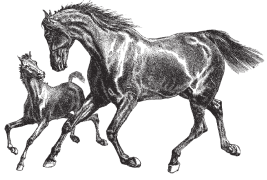
# EQUINE VIRAL ARTERITIS



## WHAT IS EVA?

- Unique contagious viral disease of equids
  - Venereal (breeding) and respiratory (nose/mouth) spread
- Inflammation to small blood vessels (arterioles)
- Worldwide distribution with sporadic outbreaks
  - Notifiable disease in UK
  - Absent or eradicated from New Zealand, Iceland and Japan
- AKA: “Equine typhoid”, “epizootic cellulitis-pink eye”

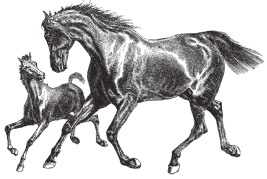
# EQUINE VIRAL ARTERITIS



## WHAT IS THE CAUSE?

- **Equine arteritis virus (EAV)**
  - RNA virus, spread via respiratory, placental, fomites and venereal routes
- Discovered in 1953 during abortion storm on Standardbred breeding farm in Bucyrus, Ohio

# EQUINE VIRAL ARTERITIS

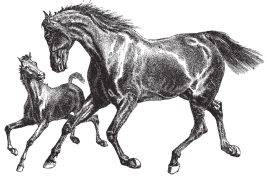


## WHAT ARE THE SYMPTOMS?

- None...(subclinical)
- Fever (up to 41°F), depression, not eating
- Swelling, edema of limbs, head, ventral abdomen (vasculitis), scrotum
- Hives (skin rash)
- Serous ocular and nasal discharge, conjunctivitis
- Abortions and early embryonic loss in mares (open)
- Severe interstitial pneumonia in neonatal foals
- Pneumoenteritis (pneumonia/diarrhea) in weanlings



# EQUINE VIRAL ARTERITIS

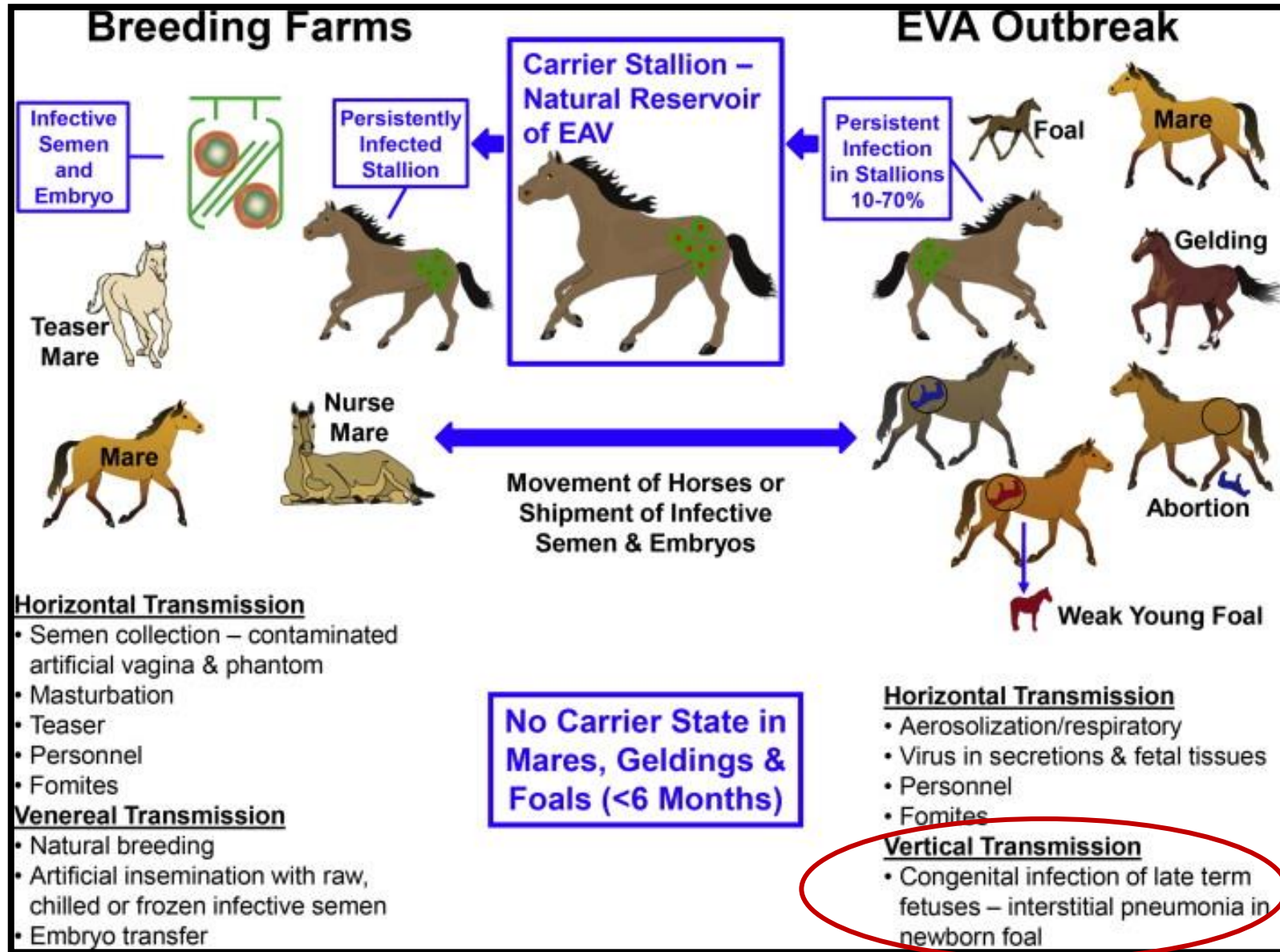


## HOW IS IT SPREAD?

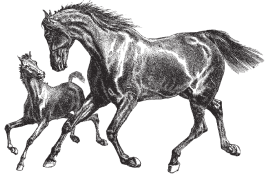
- Nasal discharge, coughing, ocular discharge (respiratory)
- Venereal routes:
  - Spread by infected stallion semen to mares
  - Stallions can be short or long-term carriers of EAV
- Placenta and uterine fluids
- Fomites in environment: hands, stalls, trailers, buckets, AV's
- Incubation period is **2-14 days** after infection...



# EQUINE VIRAL ARTERITIS: TRANSMISSION



# EQUINE VIRAL ARTERITIS



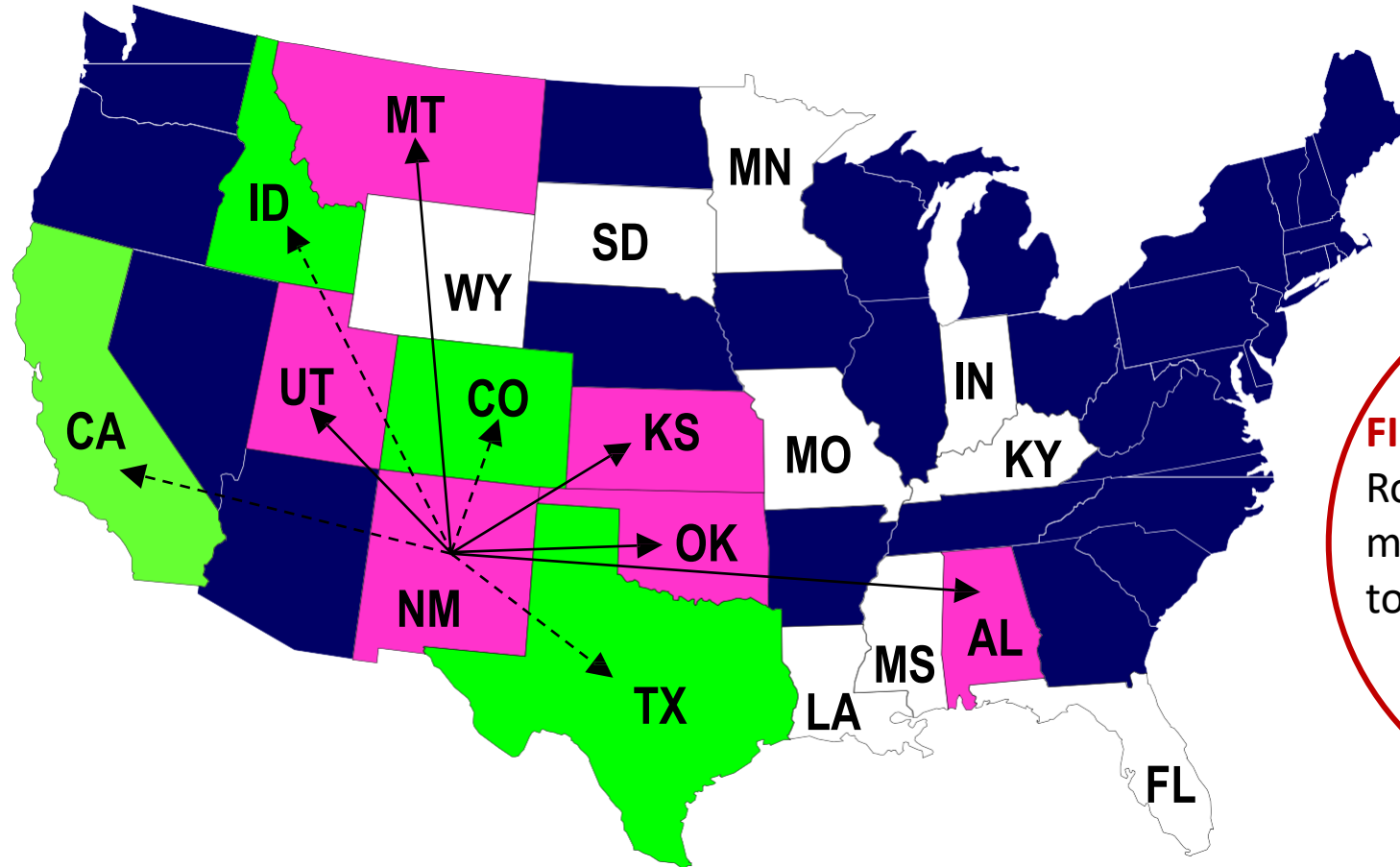
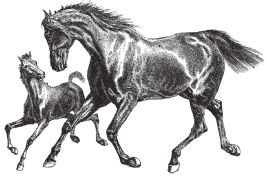
## HOW HAS IT IMPACTED THE EQUINE COMMUNITY?

- **1984** Thoroughbred (TB) breeding farms (n=41) in Kentucky, US
- **1986** Edmonton and Calgary, Alberta (TBs and STbs)
- **1993** Chicago, IL – Arlington Park Racetrack
- **1993** [United Kingdom](#) EVA Outbreak
- **2006** Multistate (18) and Canadian (2 provinces) [Outbreak](#) (QH)
- **2007** [France](#) EVA Outbreak (draught)
- **2019** [England](#) EVA Outbreak (Spanish stallions)
- **2020** [Germany](#) EVA Show Stallion Outbreak



Photos: Dr. Peter Timoney

# States Potentially Exposed to EAV Infection in 2006 through Shipment of Semen & Movement of Mares



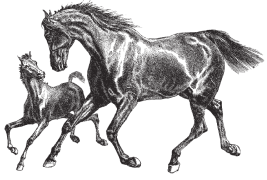
**FIRST CLUE OF OUTBREAK:**  
Routine 60-day check found  
mares previously confirmed  
to be pregnant, now open...

[USAHA Proceedings 2006](#)

- Diagnostically confirmed outbreaks of EVA.
- Circumstantial evidence of EAV infection (high titers & linked epidem.)
- No evidence of EAV infection.

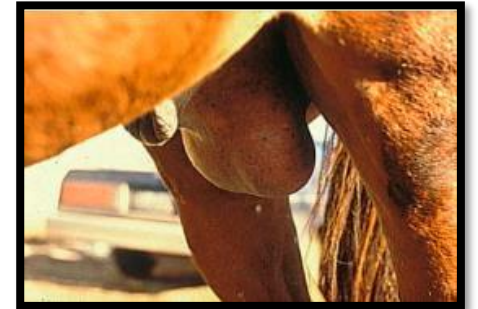


# EQUINE VIRAL ARTERITIS

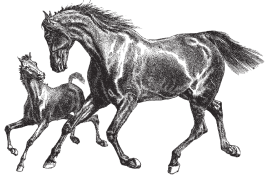


## WHAT ARE THE ECONOMIC CONSEQUENCES?

- **Losses from abortion and death in young foals...**
- Disruption of training schedules, reduced race or competition entries, races or event cancellations...
- Decreased commercial value of EAV carrier stallions
- Reduced demand to breed EAV carrier stallions
  - Due to expense & inconvenience with vaccinating and isolating mares after breeding
- Denied export markets for carrier stallions or virus-infective semen



# EQUINE VIRAL ARTERITIS



## HOW HAS PEI BEEN IMPACTED?

- EVA Outbreak reported in summer of 2023 in PEI
  - NEVER previously identified in the Maritimes...
  - Confirmed at 4 Standardbred breeding farms
- **Characterized by at least 9 neonatal foal deaths**
- More open mares and more breeding attempts needed
- EVA-like syndrome in racehorses
  - Lethargy, swollen legs, hives, fever, anorexia



Photos: Dr. Peter Timoney

# Equine Viral Arteritis in PEI

September 20, 2023

Posted by Edited Press Release

Multiple newborn foals in Queens County have died due to this outbreak.

Topics: EDCC Health Watch, Horse Industry News, Welfare and Industry

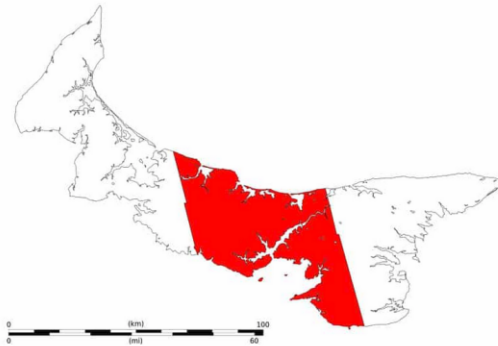
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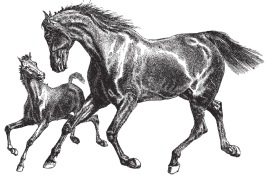
EVA Alert



Twelve horses in Queens County, Prince Edward Island, were confirmed positive for equine viral arteritis, and multiple newborn foals have died in this outbreak. | Wikimedia Commons

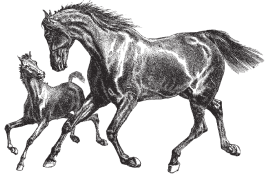
Twelve horses in Queens County, Prince Edward Island, were confirmed positive for equine viral arteritis (EVA). The EVA-positive horses that died in this outbreak were all newborn foals with severe interstitial pneumonia. Investigation is ongoing.

EDCC Health Watch is an Equine Network marketing program that utilizes information from the Equine Disease Communication Center (EDCC) to create and disseminate verified equine disease reports. The EDCC is an independent nonprofit organization that is supported by industry donations in order to provide open access to infectious disease information.



THE HORSE  
YOUR GUIDE TO EQUINE HEALTH CARE

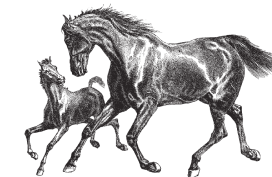
# 2023 EVA OUTBREAK IN PEI



## WHY A HIGH RATE OF NEONATAL DEATH?

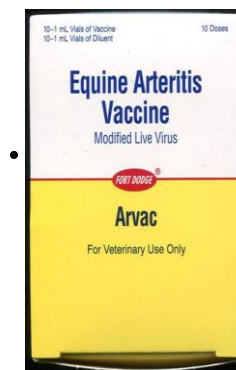
- **Considerations:**
  1. Naive population recently exposed to EAV (no herd immunity)
    - New horses, more movement of horses, new stallions (**carriers**)
  2. Greater congenital (in uterus) exposure to virus
  3. Insufficient colostrum, selenium deficiency
  4. Poor infection control practices
  5. New, mutated EAV strain with greater virulence
  6. Combination of the above...

# 2023 EVA OUTBREAK IN PEI

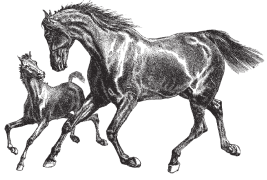


## WHAT HAS BEEN DONE TO DATE?

- Investigated and determined cause for severe fatal interstitial pneumonia
  - Tested horses at 18 farms and ~140 horses so far...
    - Story to be continued through AVC Research project...
- PEIHRIA secured CAP funding for EVA Management Initiatives for PEI!
- AVC secured a CFIA import permit to get the EVA vaccine into Canada
  - We got approved to bring in **250 doses of Arvac®** this spring!
- Heightened awareness to infection control & biosecurity practices..



# PEI EVA OUTBREAK MANAGEMENT



## TESTING FOR EVA: Things to know

- Testing for EVA is currently **FREE!**
  - Funding through PEI SCAP and PEIHRIA for ~3 years
    - *Goals: Manage EVA outbreak and protect Standardbred breeding industry*
- Test results will be **CONFIDENTIAL**
- Test results will **GUIDE** the customized EVA infection control plan
  - Infection control plan designed through collaboration with your local veterinarian
  - Help determine prudent EVA vaccination, biosecurity, breeding plan
    - EVA Program includes 2 free farm calls & consults for EVA
- **KEY: We need your help!**

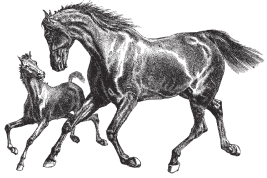


UNIVERSITY  
of Prince Edward  
ISLAND

Veterinary Diagnostic Services Laboratory



# PEI EVA OUTBREAK MANAGEMENT



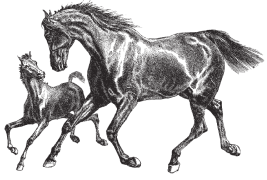
## WHAT NEXT?

- KEY: Need customized PLAN for each Standardbred breeding farm
- The **MOST important next step is disease surveillance (testing):**
  - Testing for immunity (blood titer against virus)
  - Testing for carrier stallions
- **Goals of testing:**
  - Determine level of herd immunity on each farm
  - Prevent spread of EAV to naïve mares, foals and stallions
  - Guide EVA vaccination and infection control measures...



[www.horseandrideruk.com](http://www.horseandrideruk.com)

# EAV Risk-Reduction Measures: #1



## Creating an Infection Control plan for your farm

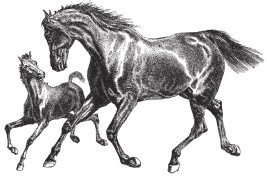
- **KEY:** Need customized **PROACTIVE PLAN** for each breeding farm!
- Overall GOALS of an infectious disease control plan:
  - Reduce exposure to infectious agents in the environment
  - Minimize factors that ↓ resistance or ↑ susceptibility to disease
  - Enhance resistance to disease by vaccination and herd immunity



**American Association  
of Equine Practitioners**

[Infection Control Guidelines](#)

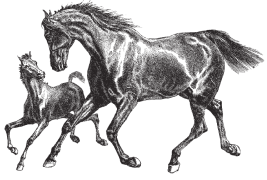
# EAV Risk-Reduction Measures: #2



## Isolating all ‘newcomer horses’

- **KEY:** New horses should be isolated for 2-3 weeks prior to co-mingling
- Goals of isolation:
  - Preventing spread of infectious disease to the resident herd
  - Preventing horses in the incubation period from shedding organisms
    - **Example:** *Typical recovery period for adult horses with EVA is ~2-3 weeks*
  - Monitoring for clinical signs in newcomers (e.g., fever, anorexia)

# EAV Risk-Reduction Measures: #3



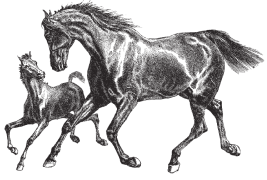
## Segregate equine population into two categories

- **KEY:** Keeping the breeding population separate from non-breeding
- Goals of segregation:
  - Preventing infectious disease spread from higher-risk training and racing performance horses to:
    - **Stallions:** Can lead to them becoming carriers for EAV and spreading disease
    - **Broodmares:** Can lead to abortion, fatal congenital infections...
    - **Foals:** Can lead to neonatal foal death...

**REMINDER:** *If abortion or newborn foal death occurs, contact your Veterinarian, save placenta, fetus or foal in leak proof bag, keep cold, and send to laboratory for testing (PEI Necropsy Program!)*



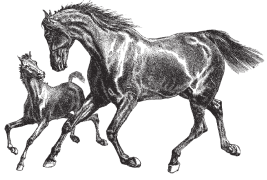
# EAV Risk-Reduction Measures: #4



## Check all breeding stallions

- **KEY:** EAV Blood test all breeding stallions on premise and any newcomers
- Goals of Stallion Blood Testing:
  - Identification of **seronegative stallions** (no immunity = not carrier)
    - Vaccinate for EVA to prevent infection and becoming carrier in future = prevent outbreaks...
  - Identification of **seropositive stallions** (immunity = suspect carrier)
    - Semen test (RT-PCR) to see if shedding virus and is a carrier...if so, **must plan accordingly**...

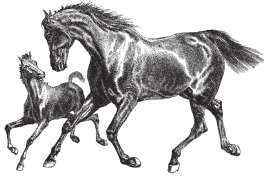
# EAV Risk-Reduction Measures: #5



## Physically separate EAV carrier stallions

- **KEY:** Manage and keep the EAV carrier stallions separate from non-carriers
- Goals of separation:
  - Prevent the non-carrier stallions from getting EAV from carrier stallions
  - Carrier stallions are the **MOST important source** for outbreaks in naïve breeding populations

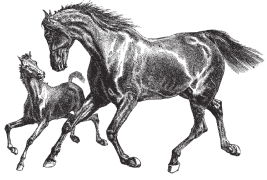
# EAV Risk-Reduction Measures: #6



## Vaccinate all EAV seronegative stallions with Arvac<sup>®</sup>

- **KEY:** If breeding stallion is negative for EAV, vaccinate him
- Goals of stallion vaccination:
  - Preventing outbreaks
  - Preventing EAV carriers
    - Can also vaccinate seronegative colts between 6-12 months of age
      - Assuming they will not be castrated...(Reminder: carrier status is testosterone dependent)

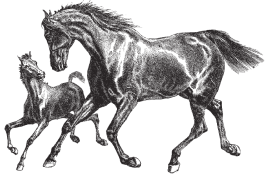
# EAV Risk-Reduction Measures: #7



## Biosecurity measures for carrier stallion semen collection

- **KEY: Critical to use biosecurity measures when collecting EAV carriers**
- Goals of semen collection biosecurity:
  - Preventing spread of EAV to naïve stallions
  - Preventing spread to naïve pregnant mares
  - Preventing spread to foals
  - *Example: Separate AV, cleaning & disinfecting between use...*
  - *Virus inactivated by common disinfectants and detergents BUT if no measures taken can survive:*
    - *Years at -70°C or below, 75 days at 4°C, 2-3 days at 37°C, 20–30 minutes at 56°C...*

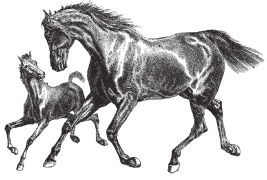
# EAV Risk-Reduction Measures: #8



## Protecting naïve pregnant mares from contacting EAV+ semen

- **KEY: Preventing naïve PREGNANT mares from contacting EAV + semen in recently bred mares**
- Goals of physical separation:
  - Preventing abortion, early embryonic death
  - Prevent congenital neonatal foal infections (fatal) and outbreaks
- **Time of physical separation depends on individual MARE immunity:**
  - Seropositive mares (EAV immune) bred with EAV + semen = 1 day
  - Seronegative mares (EAV naïve) bred with EAV + semen = 21 days

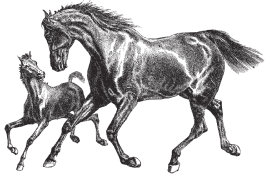
# EAV Risk-Reduction Measures: #9



## Vaccinate maiden and seronegative non-pregnant mares

- **KEY: Vaccinate mares ~2-3 weeks before breeding with EAV+ semen**
- Goals of mare vaccination = Herd immunity:
  - Preventing outbreaks and abortions
  - Preventing spread to naïve mares
  - Preventing spread to foals

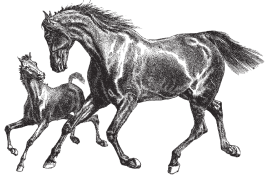
# EAV Risk-Reduction Measures: #10



**Ensure foal gets good quality colostrum from EAV immune dam**

- **KEY: Good colostrum strengthens foal immunity to infectious diseases!**
- Goals of EAV immune colostrum:
  - Protect the foals from infections after birth including EAV
  - Strengthen the foal's immune system overall
    - Needs to ingest it in first 6-12 hours to get best absorption into system
  - Arvac<sup>®</sup> vaccinated or naturally immune dam provides EAV protection
- **REMINDER:** Ensure adequate selenium in diet for dam, +/- selenium inj.

# BREEDING INDUSTRY EVA MANAGEMENT

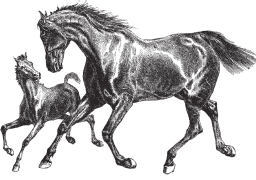


**Breeding an EVA carrier stallion is ENTIRELY manageable!**

- **KEY: Having a plan benefits the INDUSTRY!**
- Goals of observing sound breeding management practices:
  - Healthy foals and a sustainable breeding and racing industry
  - Minimize risk of spreading EAV and other infectious diseases
  - Preventing new carrier stallions through **EVA testing and vaccination**
  - Guide broodmare housing, testing and breeding based on blood-testing
    - **Important challenge:** Shorter breeding season in PEI...requires customized plan



# BREEDING INDUSTRY EVA MANAGEMENT



## What can you do to help?

- **KEY: Work with vet to create infection control plan to fit your farm!**
- **1<sup>st</sup> step: Get your breeding horses tested for EVA immunity (for free!)**
- Implement common sense infection control and biosecurity measures
  - *Examples: wash hands, clean stalls, trailers, segregate sick, newcomers, breeding vs. racing, monitor for signs...*
- Manage mare health, immunity, & diet (ex: selenium) to protect foals
- Ensure good colostrum ingested in a timely manner in newborn foals
- Utilize PEI Agriculture Necropsy Program (80% cost covered)



# Thank you!



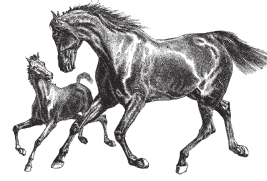
- Prince Edward Island Harness Racing Industry Association
- PEI Standardbred Breeders Association
- Sustainable Canadian Agricultural Partnership
- Dr. Jill Wood, Chief Veterinary Officer, PEI
- Dr. Peter Timoney, University of Kentucky
- Dr. Martha Mellish, Dr. Louie Genis and others at the AVC
- Charlottetown Veterinary Clinic
- Montague Veterinary Clinic
- Dr. Richard Newton, University of Cambridge



Sustainable Canadian  
Agricultural Partnership

Canada





# QUESTIONS?

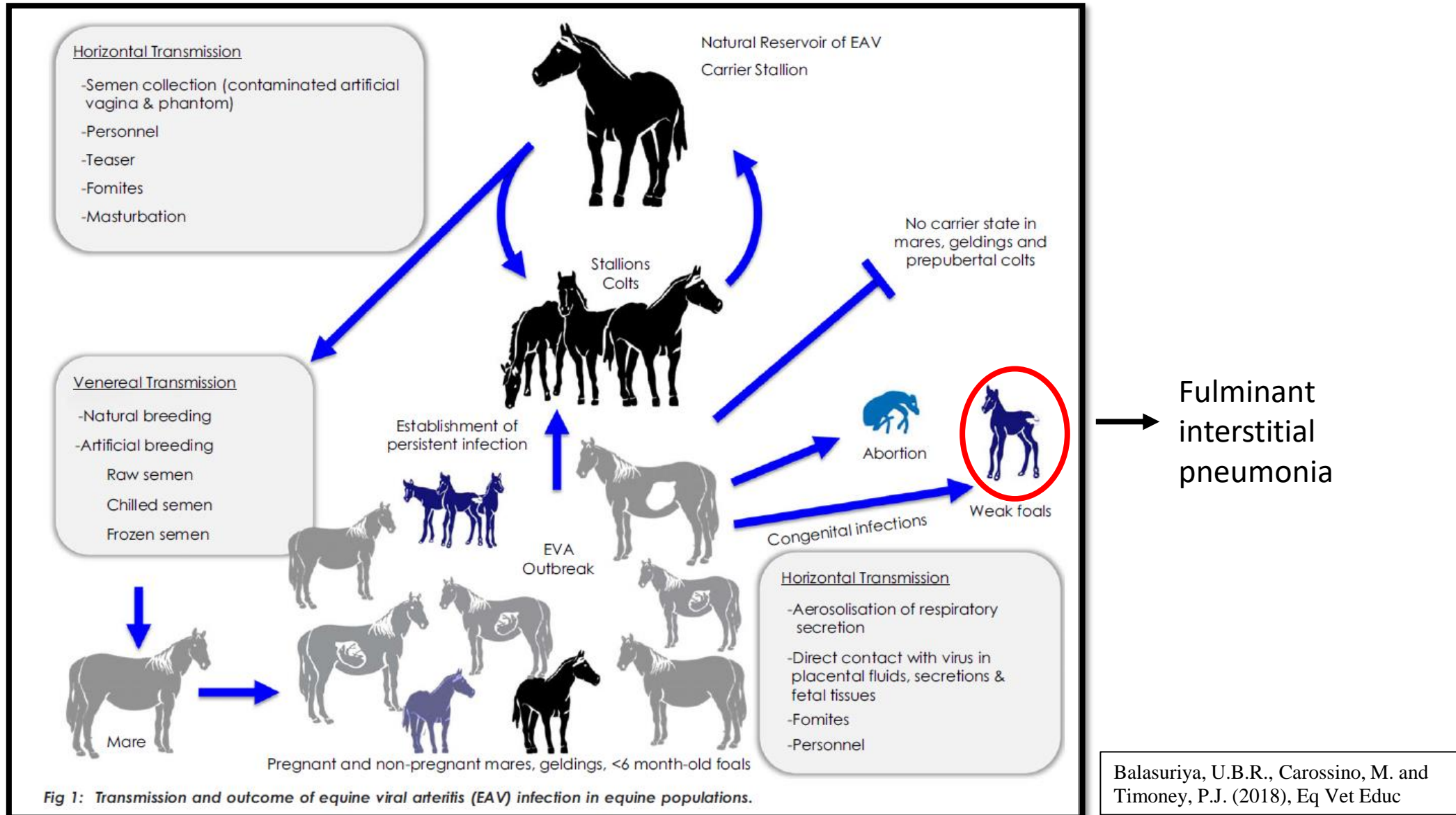
Bray, Ireland

**Dr. W. Ben Stoughton**  
**902-393-5418**  
**[wbstoughton@upeil.ca](mailto:wbstoughton@upeil.ca)**

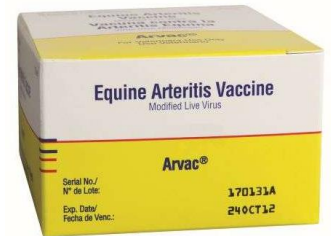
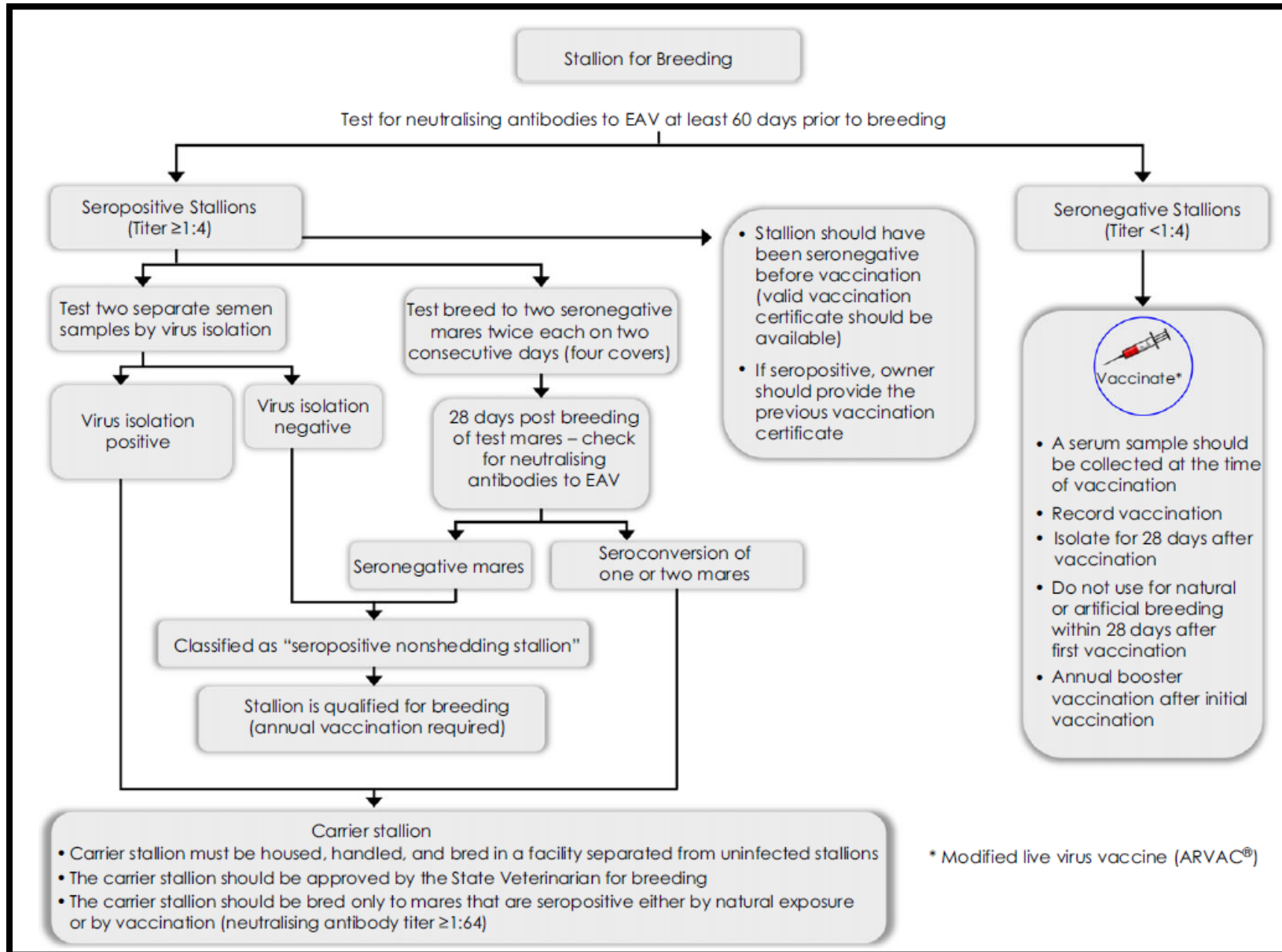
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# EQUINE VIRAL ARTERITIS: TRANSMISSION

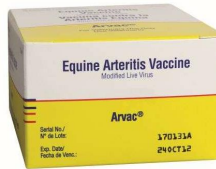
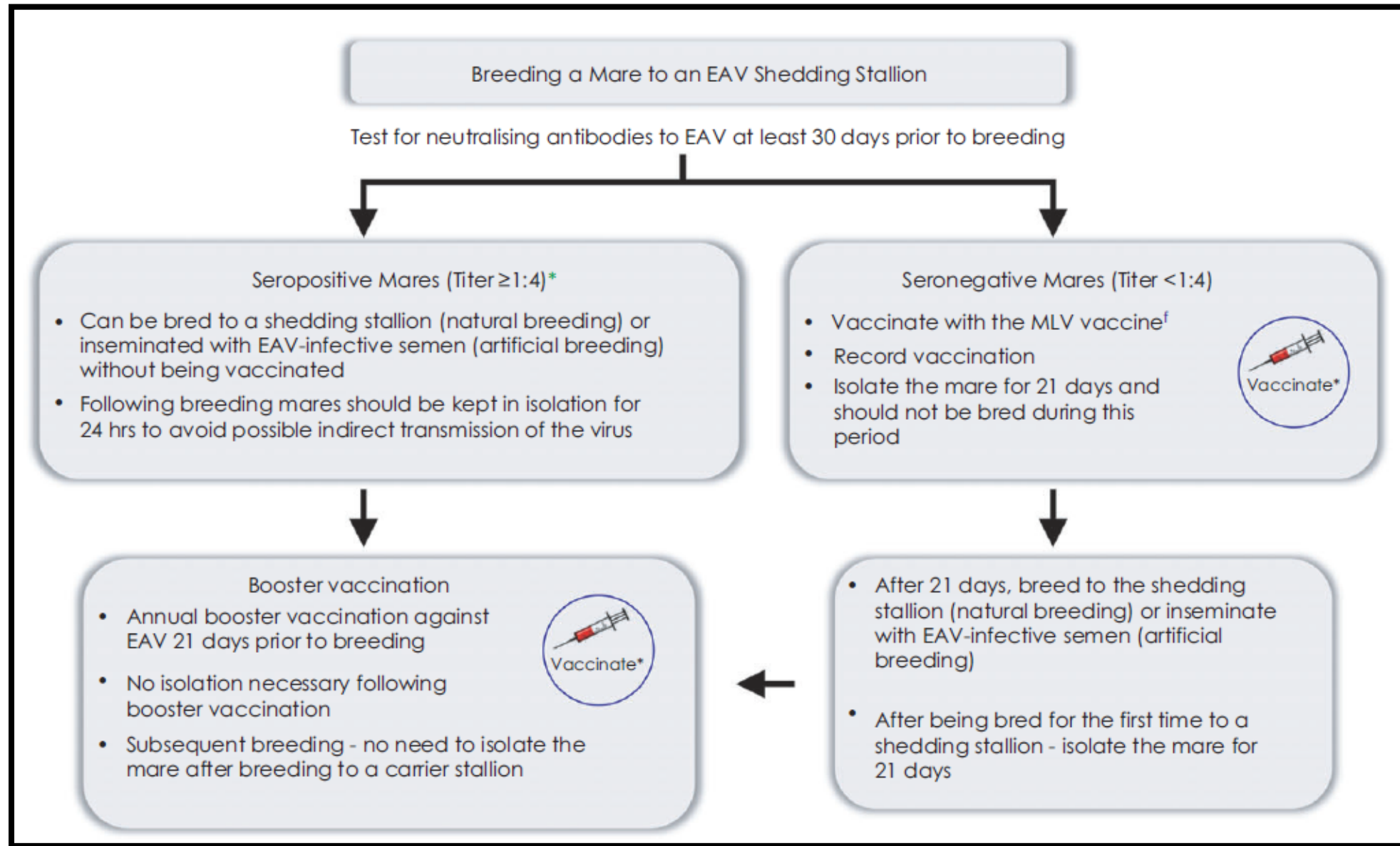


# EQUINE VIRAL ARTERITIS: EVA STALLION GUIDE



# EQUINE VIRAL ARTERITIS: MARE GUIDE

\*Titer  $\geq 64$   
protective



Balasuriya,  
U.B.R., Carossino,  
M. and Timoney,  
P.J. (2018), Eq  
Vet Educ

Please complete our survey on tonight's presentation at the link below.  
We value your feedback!

## SCAP Survey

