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# EQUINE RESEARCH … what you need to know

**Brought to you by the Equine Research Centre, Faculty of Veterinary Science,**

**University of Pretoria**

**Welcome to the eighth issue of the ERC Newsletter. We believe it is vitally important to ensure that horse owners are kept informed of the facts surrounding equine diseases and research. We will only give you facts … not rumours or speculations – so you can be sure that you're getting your information 'from the horse's mouth'. Please pass on to fellow horse owners, who should e-mail NJ Freeman on nfreeman@witshealth.co.za to be added to the mailing list.**

## Why a Central Database for horses in South Africa?

Over the past few years, at various meetings and workshops involving the World Organisation for Animal Health (OIE), the European Union (EU), the Federation Equestrian Internationale (FEI), as well as local government, it has become increasingly evident that a major stumbling block to the control of African horse sickness (as well as other equine diseases), and thus to the potential of exporting horses, is the lack of suitable and accessible surveillance and horse data. Currently there are several databases which don't 'talk to each other' and which do not meet international standards. The overriding advice of international experts is that South Africa needs a central database of all horse data.

The EU report of 2013 highlighted this as a problem, as did Prof Evan Sergeant of AusVet in his Surveillance Report following a visit to South Africa in October 2013. The matter was raised again at the Horse Export Workshop in April 2014, following which DAFF representatives met with the Equine Industry

representatives to discuss the development of a central database that supports movement control and disease reporting. A Central Database sub-committee was subsequently established, and is actively looking into possible solutions for a central database. Without accurate and available data, there is a critical missing link that will cause all the hard work of research, surveillance and movement control to be nullified.

These are just a few of the recommendations, which relate to the maintenance of data, made by Prof Evan Sergeant in the AusVet Report:

- Review movement control system and documentation
  - A review of the process and requirements for horse movements into and within the area, including approval process and documentation/records is now appropriate to ensure a comprehensive, functional and auditable system is in place before submitting a Free Zone application.
- Review horse identification and census systems
  - Current systems for collecting and collating census information are labour intensive and incomplete and horse identification is incomplete and relies on multiple systems. Again, a review should consider the opportunities provided by recommendations for a shift to an integrated information management system, a critical element of which would be a unique horse identification system.
- Review information management and develop an integrated information management system
  - A critical component of maintaining a Free Zone and satisfying OIE and trading partners of its integrity is accurate, accessible and auditable data on all relevant aspects of the program. Currently a variety of systems are in place and are not well integrated, so that a review of information requirements and development of an integrated system to manage data is required. As part of this process it should be possible to take advantage of new technologies to simplify and streamline data collection and reporting.

Similarly, the EU report of their inspection in May 2013 following the mandatory ban on exports for 2 years after the Mamre AHS outbreak in 2011, included the following in their findings :

- Insufficient surveillance data was available for the Western Cape Free-Zone and Surveillance Zone to prove absence of AHSV after an outbreak and to comply with routine surveillance requirements for AHS and Dourine. Vector surveillance inside and outside the quarantine facility should support vector protection.
- There was inadequate control of movements with auditable documentary proof and inadequate legal powers to control movements.

***A high priority development is a single identification system for horses in South Africa, linked movement control, disease surveillance and reporting. One of the major problems highlighted during preparation for the OIE submission and during the EU visit was the need for an integrated database to facilitate easy input of data that will co-ordinate all data sources and can be used to monitor progress and generate reports required by trading partners.***

**For export and an Olympic bid the surveillance data is critical.**

South Africa has announced its intention to bid for the 2024 Olympics and in order facilitate the hosting of the Equestrian Games the following issues will have to be addressed:

- Identification of horses should be internationally acceptable.
- Movement protocol;
- Importance of a central database, which will prevent alterations post veterinarian signature;
- Legal framework to cover all horses and forms of identification;

**All relevant stakeholders will be involved**

The implementation of a central database will be undertaken in consultation with the DAFF, Western Cape Veterinary Services, and Government Communications and Information Systems. It is envisaged that, once a system is identified (this is a high priority for the Equine Health Fund), the first phase of the roll-out will be in the Western Cape, and will then move out to the rest of the provinces.

In the next issue, we will discuss why Monitoring, Surveillance and Movement Control are necessary, and the role that a central database will play in the effectiveness thereof.

# West Nile Virus … is it a concern in South Africa?

**The Role of Zoonotic Vector Borne Viruses as Neurological Pathogens in Horses and Wildlife in South Africa**

*(Extracted from paper by Prof Marietjie Venter, Zoonoses Research Unit, Department Medical Virology, University of Pretoria, and One Health Programme Director, Centres for Disease Control and Prevention, Global Disease detection, South Africa).*

During the rainy season in South Africa all horse owners fear the little *Culicoides* midges that transmit African horse sickness virus (AHSV) and are aware of the symptoms to watch out for. However, the rains also bring with them mosquito transmitted viruses of which horse owners should be aware. Viruses transmitted by insects are called arboviruses and include various important human and animal pathogens. Some mosquito borne arboviruses have the ability to infect both humans and various other

animal species and may cause severe neurological disease in a subset of cases. Zoonotic pathogens are diseases that can be transmitted from arthopods to humans and animals or from animals to humans. Although many of these viruses are endemic in Africa, few cases are reported due to a lack of specific diagnostic tests and clinical awareness of the disease potential of these viruses.

Because these viruses also have an impact on human health, the Zoonosis research unit at the Department of Medical Virology, University of Pretoria started investigating horses as sentinel animals for West Nile virus (WNV) in 2008 after showing that local strains exist that are just as pathogenic as strains that caused large outbreaks of neurological disease in humans and horses in the United States and Europe. Apart from WNV we wanted to know if any other important arboviruses circulated that can cause neurological disease in horses and potentially humans in South Africa. To address this, further investigation was done by testing horses with neurological disease and some fever cases for important families of arboviruses. Veterinarians were invited to submit blood or post mortem brain and spinal cord specimens from horses that suffered from acute neurological signs. WNV, Wesselbronvirus, Sindbisvirus, Middelburgvirus, Shunivirus and EEV were identified as possible arbovirus causes of neurological disease in horses in South Africa. Apart from WNV very little information was previously available about most of these viruses in horses. Here we provide an overview of these viruses for the concerned horse owner:

**West Nile Virus**

WNV, a mosquito-borne flavivirus that mainly circulates between birds as vertebrate host and Culex mosquitoes found in the vicinity of dams and other sources of standing water. Humans and horses are considered incidental dead-end hosts and cannot transmit the virus back to mosquitoes or to each other. Nevertheless, brain and spinal cord tissue of animals that died of the disease should be handled with the necessary precautions due to the risk of zoonotic infection of humans. WNV emerged for the first time in the USA in 1999 resulting in more than 30 000 cases of neurological disease in humans over the next ten years. The largest neurological outbreak in horses occurred in 2004 with more than 16 000 cases reported before a vaccine was introduced, resulting in a drastic decrease in the number of cases the following year. This high number of cases may be due to the fact that no human or animals in the USA had any antibodies to this virus at that stage.

***Clinical signs*** : Approximately 20% of human cases present with fever, rash, joint- and muscle pain while approximately 1% of these may develop severe disease including meningoencephalitis (infection of the membrane surrounding the brain), encephalitis (brain infection), polio-like flaccid paralysis and death. In horses, 20% of cases develop clinical disease of which up to 90% develops neurological disease following WNV infection. Symptoms include stumbling, weakness, inability to stand up, muscle tremors, loss of tongue tone, back and/or front leg paralysis, seizures as well as high death rates (>30%). Up to 80% of cases may however show no signs and develops antibodies without the horse being sick.

***WNV in South Africa :*** The largest outbreak of WNV occurred in humans in South Africa in 1974 in the Karoo resulting in more than 10 000 cases with thousands of patients visiting their local doctors with West Nile fever. No neurological cases were identified in this outbreak although cases may have been missed due to a lack of clinical awareness of the disease potential of WNV at the time. For the last two decades, cases have been routinely identified every year in humans in South Africa, including several neurological cases and a number of deaths.

In the five years of investigation of horses with neurological disease in South Africa we identified WNV in 14% of cases of neurological disease in horses of which >40% were fatal. Some horses did recover after neurological infections despite not being able to rise for a few days. WNV cases were identified in all provinces of South Africa and occurred between February and June every year.

During this same study, Shunivirus, Wesselsbronvirus, Sindbis virus and Middelburg Virus was detected in brain tissue and blood from horses with neurological disease and fever. Sindbis cases were mostly associated with fevers, although two co-infections with WNV were fatal while Wesselsbron virus was identified in 2 cases of neurological disease. On the other hand, Shunivirus and Middelburg virus was detected in a significant number of cases with neurological disease and although the death rate appears to be lower than with WNV, a few horses with severe neurological disease died of this infection and had symptoms similar to severe WNV cases. This study is ongoing to describe the clinical presentation and prevalence in the country and diagnostic testing is provided at no cost if the submission forms with clinical data are completed.

***Vaccines and prevention :*** There are a number of WNV vaccines available, two of which are now licensed in South Africa. These are dead or recombinant vaccines that are quite safe and can be given following the AHSV vaccine schedule at least 6 weeks before the rainy season starts. The first year a booster is required but after that a single dose annually between September and December should provide protection for the rainy months. Other preventative measures include spraying of horses daily with mosquito repellents that contain DEET; using mosquito screens and fans in stables, minimising wet breeding areas such as flower pots, tyres or other standing water, and cleaning water tanks and buckets daily.

***Treatment :*** There is currently no specific treatment of these viruses. The Merck veterinary manual recommends management of pain and inflammation using anti-inflammatory drugs, preventing injuries associated with stumbling and inability to rise and providing support care for WNV. In severe cases, animals that cannot rise are sometimes suspended on a sling. Some horses that were paralyzed recovered after a few days, but may need to rest for a few months to recover completely.

More information on the study and submission forms for testing can be found at www.zoonosesresearchunit.up.ac.za .

# SUMMARISED PUBLICATIONS

Following are summaries of two research projects concerning exercise-induced pulmonary haemorrhage (EIPH) in Thoroughbred race horses. The first is dated July 2009, and the second is 'hot off the press'.

**EFFICACY OF FUROSEMIDE FOR PREVENTION OF EXERCISE-INDUCED PULMONARY HEMORRHAGE IN THOROUGHBRED RACEHORSES**

Horse racing is a popular, multimillion-dollar industry worldwide, but reports of injuries and other physical disorders in racehorses have harmed public perceptions of the sport and challenged the economic viability of the racing industry. In addition, controversy has been generated by use of medications that are perceived to affect the performance or well-being of racehorses. One of the foremost concerns in this regard is the occurrence of EIPH and the use of medications in an attempt to prevent it. Factors that make this an important issue include the frequency of EIPH, the importance of the disease in terms of the performance and well-being of horses, and the common use of prophylactic treatments. At least 80% of racehorses can be expected to develop the condition at some time during their career; approximately 60% of sudden deaths during racing have been attributed to pulmonary haemorrhage; severe EIPH has been shown to adversely affect race performance, and EIPH is believed to adversely affect the overall health of racehorses.

Furosemide is the drug most widely used to prevent EIPH in racehorses and is administered on the day of racing to more than 92% of Thoroughbred racehorses in North America. However, few studies have examined whether furosemide is effective in preventing the development of EIPH, and the studies that have been performed were not conducted under actual racing conditions. Given this lack of evidence and the finding that furosemide can improve the performance of Thoroughbred racehorses, the use of furosemide to prevent EIPH remains controversial. The purpose of this study, therefore, was to evaluate the capacity or power of furosemide to prevent EIPH in Thoroughbred racehorses racing under typical racing conditions.

The study was conducted as a randomised, placebo-controlled, cross-over field trial, using a total of 167 horses which had been nominated by trainers following a nationwide campaign including announcements at public meetings of trainers, via racing Web sites, on TV programmes dedicated to horseracing etc. All study participants including data analysts, were blinded to treatment assignments until statistical analyses were completed.

Horses accepted for inclusion in the study were assigned to race fields on the basis of age, sex, and race record by a professional handicapper who also assigned handicap weights, with each race field consisting of 9-16 horses. Enrolled horses raced twice, 7 days apart, with each of the 2 races consisting of the same race field, same race distance, same jockeys, same weight, same starting stalls and identical tack used.

Four hours before the scheduled start of the race, horses were treated with furosemide or a placebo. Each horse received furosemide before one race and a placebo before the other. The treatment order was randomly determined by assigning a computer-generated random number to every horse prior to the first race. The first half

of each field, as determined by these random numbers, was assigned to receive furosemide prior to the first race and a placebo prior to the second race. The second half of each field was assigned to the opposite treatment order.

Following each race all horses were examined by one or the other of two teams consisting of two veterinarians and two lay assistants each. They were blinded to the treatment group assignment. Following analysis, it was found that horses were substantially more likely to develop EIPH or moderate to severe EIPH following administration of saline solution (placebo) than following administration of furosemide. In addition, 67,5% of the horses that had EIPH after administration of saline solution, had a reduction in EIPH severity score when treated with furosemide.

These results indicated that prerace administration of furosemide decreased the incidence and severity of EIPH in Thoroughbreds racing under typical conditions in South Africa.

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**EXERCISE-INDUCED PULMONARY HAEMORRHAGE IMPAIRS RACING PERFORMANCE IN THOROUGHBRED RACEHORSES**

Exercise-induced pulmonary haemorrhage (EIPH) is frequently a concern in Thoroughbred racehorses and other horses performing strenuous exercise. EIPH is an important issue because of its high frequency of occurrence, the perceived importance of EIPH regarding its impact on performance and well-being of horses, the common use of prophylactic treatments such as furosemide in some jurisdictions, and concerns about whether these treatments provide an unfair competitive advantage. EIPH is also a concern because of potential harm to public perceptions of the sport, which in-turn might influence the economic viability of the racing industry.

Published evidence from the best documented large study performed under actual racing conditions provides strong evidence that EIPH can have a substantial effect on racing performance. Smaller studies were impaired by inadequate statistical power, non-random selection of subjects, and various other factors. Because a successful race is often determined by very small performance margins, studies examining the effect of EIPH on performance must include a large number of study subjects in order to detect differences in outcome measures that are relevant markers of successful performance in elite athletes. Furthermore, a large number of factors can affect the athletic performance of horses, and analysis of epidemiologic information gathered from field investigations requires appropriate use of sophisticated tools to fully account for these sources of extraneous variability that can impact race performance but are unrelated to EIPH occurrence.

As furosemide is permitted for use in North America, this impairs the ability to investigate the relationship between EIPH and performance in those racing jurisdictions. In South Africa, however, the National Horseracing Authority (NHRA), which governs Thoroughbred racing in the country, imposes strict bans on the use of furosemide on race day, making it an ideal population to assess the impact of EIPH. The primary goal of this study was to evaluate the

purported association between EIPH occurrence and performance in a population of Thoroughbred racehorses untreated by furosemide. Secondarily, we evaluated potential risk factors for EIPH, including hardness of track surfaces and elevation.

One thousand horses were enrolled prior to racing in this cross-sectional study. After racing, the enrolled subjects underwent tracheobronchoscopic examinations that were video recorded. A panel of investigators who were blinded to horse identification, racing performance and observations of field personnel reviewed the video recordings and determined a consensus score of EIPH severity. The potential impact of EIPH on various performance outcomes was investigated, as well as factors that could have affected EIPH occurrence, such as track hardness and elevation. The 1000 horses competed in flat races at five racecourses in South Africa, and in accordance with NHRA rules, were not treated with furosemide or nasal dilator strips on the day of racing.

After the completion of the field investigations, comparisons were made with the racing performance data that is compiled by the NHRA, which takes into account age, sex, trainer name, jockey name, weight carried, race distance, post time, track surface etc. Elevation for races was assigned based on racing venue: Turffontein and Vaal Racecourses were classified as "high elevation" while Clairewood, Greyville and Kenilworth Racecourses were classified as "sea level".

**Results :** During a 2 ½ month period, data was collected from horses racing over 28 days at the five racetracks. The consensus opinion of the blinded reviewers was that 68% of the horses produced conclusive results showing some evidence of EIPH, of which 64% were EIPH Grade 1 (lowest severity), 21% were EIPH Grade 2, 12% were EIPH Grade 3 and only 3% having Grade 4 (highest severity).

The presence of EIPH was significantly associated with poorer race performance. Horses with EIPH severity Grade 0 were 2.3 times more likely to win a race compared with horses with EIPH severity Grade 1. On average, horses with EIPH severity Grade 1 or more finished about one length further behind race winners when compared with horses without EIPH. When assessing each level of EIPH, there was a trend for horses to finish further behind the winner as EIPH severity grade increased.

It was concluded that EIPH was associated with impaired performance in Thoroughbred racehorses not medicated with furosemide and not using nasal dilator strips. These findings provide strong corroboration of previous research indicating that the occurrence of EIPH has a major impact on the ability of Thoroughbred racehorses to compete successfully as elite athletes.

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