



FOCUS ARTICLE: CURRENT AND FUTURE APPROACHES TO EVA CONTROL

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Introduction:

Following the outbreak of Equine Viral Arteritis (EVA) reported in Ireland and Argentina in May 2010 and the recently reported outbreak in the UK in August 2010, the aim of this focus article is to give an overview on the epidemiological features of this disease and the current and new approaches to its prevention.

EVA epidemiology:

EVA can be transmitted either venereally from a stallion with infected semen through natural covering or artificial insemination (AI) or through the respiratory route through close contact between horses. After initial infection, most animals excrete virus in all bodily secretions, including semen, nasal and ocular discharges, urine and faeces for up to three weeks. After this time, the virus is cleared by the immune system, with the important exception of the accessory sex glands in stallions. The majority of infected stallions can shed the virus for 2-5 weeks (short-term shedders) or for many years (long-term shedders); approximately 30% of infected stallions are long-term shedders.

Shedding stallions and chilled semen are the most common ways that infection spreads long distances and across international borders; the recent outbreaks in Argentina, Ireland and the UK support this fact. In the UK it has been recognized that importation of shedding stallions (or their semen) poses the biggest risk of EVA. Although respiratory spread of EAV infection contributes to infectious transmission in some outbreaks, infected horses are usually only potentially infectious to other animals for several weeks and close contact is usually required.

The fact that EVA is subclinical (i.e. animals do not show obvious clinical signs) in a significant proportion of infections has led to the attitude in some quarters that the need for control of EVA is unnecessary and financially unjustified; however, subclinically infected horses are still able to transmit the infection to other animals with which they are in contact.

Current approaches to EVA control: the UK model

The annually updated Horserace Betting Levy Board Code of Practice (available online at <http://www.hblb.org.uk/>) continues to be the practical means by which prevention of EVA is implemented in the UK and some other parts of Europe, which is done particularly but not exclusively by the Thoroughbred breeding industry. This is based on annual pre-breeding serological screening of both stallions and mares and use of a killed vaccine (Artervac; Fort Dodge Animal Health) in stallions only.

In the event that EVA is confirmed, the Code of Practice recommends that the local Divisional Veterinary Manager of the Department for the Environment, Food and Rural Affairs (DEFRA) be immediately notified in accordance with The EVA Order 1995 (available online at http://www.opsi.gov.uk/si/si1995/Uksi_19951755_en_1.htm).

In addition, all movements and breeding is stopped, all cases and contacts are traced, sampled and isolated and all other horses on the affected premises are screened and grouped according to infectious status. It is also important that good communication exists between interested parties including premises that have received animals (and semen if relevant) from the infected stud, those that are due to send animals and the breeder's association. Testing and screening should continue on all possible affected premises until the end of the outbreak, seropositive animals and pregnant mares should be isolated for four weeks after first sampling and stallions must have their shedding status investigated.

Current vaccination strategies in control of EVA:

Vaccination strategies for EVA are based on use of formalin inactivated and live attenuated (also referred to as modified live) vaccines, with a geographical split in their use between Europe and Japan (inactivated) and North America (live attenuated).

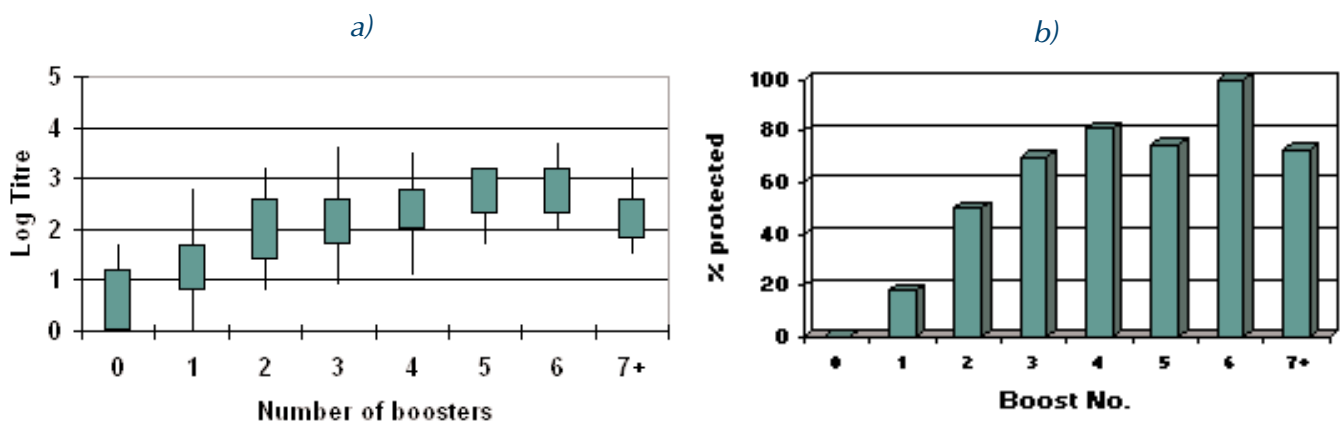


Following the outbreak in the UK in 1993, a formalin inactivated vaccine (Artervac; Fort Dodge Animal Health) has been in use. In order to provide protection from the commercially devastating effects that long term EAV shedding would incur, vaccination has almost exclusively been restricted to breeding stallions, with the majority of Thoroughbred stallions receiving vaccine. The decision not to adopt EAV vaccination among breeding mares, in which the carrier state does not occur, in combination with requirements for routine pre-breeding serological screening has effectively provided a sentinel population in which on-going surveillance for new EVA subclinical infections can be conducted.

Future approaches regarding vaccination strategies in control of EVA:

Sero-surveillance of stallions vaccinated using Artervac conducted at the Animal Health Trust (J. Cardwell personal communication) demonstrates that to achieve and maintain levels of immunity required to protect against developing semen shedding, stallions require several boosters in addition to the two or three dose primary course (Figure 1). This indicates that many first season Thoroughbred sires are probably inadequately protected against EVA infection by use of killed vaccine. This could be overcome by vaccination and subsequent boosting of potential stallions whilst they are still racing.

Figure 1: EAV VN serological status of 108 stallions measured between 320 and 400 days after last vaccination using a killed virus vaccine: a) \log_{10} titre vs number of previous boosters and b) proportion with protective titres ($>1.9 \log_{10}$) vs number of previous boosters



In the UK, the vaccine can be used in all horses and ponies over nine months of age. Veterinary surgeons and horse owners should be aware that the current datasheet requirement for the only inactivated EVA vaccine used in Europe presently is for **6 monthly boosters** and NOT 12 monthly (annual) boosters as was previously the case for this vaccine. This has been the case since April 2005, when the vaccine was granted a full licence by the Veterinary Medicines Directorate. Non-compliance with this booster interval requirement may necessitate investigation of the viral shedding status of stallions by Defra under the Equine Viral Arteritis Order 1995. It is important to note that vaccinated horses will become seropositive and this cannot be distinguished from true infection; therefore horses should be blood tested before vaccination to show that they are likely to be free of infection at the time of vaccination.

Some concern exists for both types of vaccines (formalin inactivated and live attenuated) regarding absence of their ready differentiation from natural infection and as such future marker vaccines based on a range of technology such as subunits, DNA or viral vectors would be useful, especially if they provided rapid onset and long lasting immunity.

Ideally, the model adopted by the Thoroughbred breeding industry in the UK and across Europe should be expanded to other breeds. However and unfortunately, it is only when outbreaks of clinically and financially significant EVA and constraints on national and international travel and trade occur that the attitude towards EVA control actually changes.