Received: 3 May 2024 | Accepted: 15 July 2024

DOI: 10.1111/eve.14032

Equine Veterinary Education

PERSPECTIVE ARTICLE

Strangles vaccination: A current European perspective

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Summary

Development of a subunit vaccine (Strangvac) from fusion of recombinant *Streptococcus equi* proteins offers a new tool in the management of infection with *Streptococcus equi* subspecies *equi*. Experience to date indicates that the vaccine is effective in limiting disease spread, and through inclusion of only the desired proteins needed for induction of an effective immune response, the safety profile appears far better than with previous vaccines. Published reports of the use of the vaccine are limited, and to date, vets have had limited information upon which to make informed decisions on the potential benefits of this novel vaccine. This article was developed to share the collective experience of the authors in using Strangvac and to highlight potential benefits of integrating vaccination alongside biosecurity measures in controlling 'strangles'. This article reviews the use of vaccination prior to movement, in the face of outbreaks and also discusses use in mares and foals. Safety and the benefits of differentiating vaccinated from infected animals are also discussed. The reader should consider the level of evidence upon which the recommendations are based as it is frequently weak and limited to anecdotal reports or interpretation of unpublished data. The recommendations made are certain to be revised or replaced as new evidence comes forward but provide a basis for practitioners to implement vaccination strategies based on what is known currently. At times, the authors' recommendations deviate from those that were initially put down in the summary of product characteristics. This comes as a result of clinical experience that has been gained since the initial experimental studies were performed prior to registration. Veterinary surgeons using the vaccine outside of the regimen set down in the summary of product characteristics should be cognisant of their local legal framework and should ensure that they have informed consent to do so.

KEYWORDS

horse, biosecurity, DIVA, infection, Streptococcus

BACKGROUND

Strangles is a highly infectious disease caused by *Streptococcus equi* subspecies *equi* (*S. equi*) that has a global distribution. Disease is associated with high rates of morbidity and mortality rates of up to 10% (Boyle et al., 2018; Duffee et al., 2015) and as a result is reportable or notifiable in some countries. A few countries with well-established equine surveillance systems consistently report strangles among their most frequently occurring equine infectious diseases. Data collated by the International Collating Centre (ICC; https://equinesurveillance.org/iccview/) indicate that for the 5 years 2019–2023, strangles was reported on 487 occasions by USA and on 324 occasions by both France and the Netherlands. In Sweden, where *S. equi* is notifiable, 246 reports were filed during the same period, 2019–2023. The United Kingdom

now has a dedicated system for surveillance of equine strangles (SES; https://app.jshiny.com/jdata/ses/sesview/), and for 2019–2023, there were 1427 laboratory confirmed diagnoses of strangles by 315 veterinary practices across 93 UK counties recorded by SES. The disease is highly emotive among horse owners as it spreads rapidly between horses via direct contact or fomites (Houben et al., 2023), is difficult to contain and expensive to eliminate. A subclinical carrier state can result in long-term retention of infection within the guttural pouches, often with limited, or no clinical signs. Its impact on disease epidemiology is not fully understood but is assumed to facilitate persistence and spread of infection within and between populations, frustrating efforts to control disease spread (Pringle et al., 2019).

S. equi is an obligate pathogen that does not survive for long periods outside the horse and elimination of the infection should be possible. An effective vaccine with DIVA-capability (i.e. able to Differentiate Infected from Vaccinated Animals) provides a powerful opportunity in controlling, and potentially eliminating, strangles. Horses will always mix and move between populations and the subclinical carrier state will always make it difficult to eliminate the risk of disease. The journey towards development of an effective vaccine has not been smooth, but a recombinant protein-based vaccine (Strangvac) has been shown to be protective against experimental challenge with *S. equi* (Robinson et al., 2018, 2020). As with any experimental vaccine transitioning from regulatory studies, questions remain on the effectiveness in the vaccine in a field setting and how the vaccine should best be used to protect against clinical disease in equine practice. An increasing amount of unpublished data is being generated from the field which can help to inform clinical decision-making. This report aims to summarise published and unpublished data to assist practitioners with clinical decision-making in the field.

DEVELOPMENT OF STRANGLES VACCINES

Several strangles vaccines have been developed utilising a range of technologies. Cell-free vaccines based on surface extracts such as Equivac S (Zoetis), Strepguard (MSD Animal Health) and Strepvax II (Boehringer Ingelheim) have been registered in Australia and the USA but are not available in Europe. There are limited data on their efficacy in the field and the requirement for frequent boosters has limited their popularity. A modified live vaccine (Pinnacle IN; Zoetis) that is sprayed intranasally has been registered in the USA, Canada and New Zealand. The vaccine is based on the CF32 strain that was isolated from a horse in New York during 1981 and attenuated via treatment with nitrosoguanidine (Waller, 2014). The vaccine has been identified as a significant cause of disease outbreaks (Cursons et al., 2015; Livengood et al., 2016) and shedding of *S. equi* for up to 46 days (Borst et al., 2011). A further limitation is the increasing divergence between the SeM strains used in the vaccine and those that are circulating in Europe (Waller, 2014).

In Europe, Equilis StrepE (MSD Animal Health) is a live-attenuated *aroA* deletion mutant vaccine, which is based on a 1990 isolate from The Netherlands (Jacobs et al., 2000; Kelly et al., 2006). In two small studies, two doses of Equilis StrepE administered via submucosal injection into the upper lip protected five of five and two of four horses from developing lymph node abscesses while all unvaccinated horses developed disease (Jacobs et al., 2000). Infectious challenge was performed 2 weeks after the second dose when levels of protection would be expected to be near their maximum. Intramuscular vaccination was efficacious but associated with significant adverse reactions at the injection sites. The submucosal use in clinical practice was also associated with reports of adverse reactions (Kemp-Symonds et al., 2010) which is clearly undesirable. Vaccine uptake with Equilis StrepE was poor in Europe primarily because the effects of the vaccine were considered to be short-lasting and horses needed to be vaccinated every 3–6 months, making it an expensive proposition for owners. Reports of adverse effects (Kelly et al., 2006; Kemp-Symonds et al., 2010), a perception of high rates of localised lip swellings and interruptions to supply all hampered attempts to increase vaccine uptake and Equilis StrepE was recently removed from sale in some countries. Induction of an antibody response which confounded interpretation of *S. equi* serology such that vaccinated and infected horses could not be differentiated (Waller, 2018) were further important practical limitations.

Strangvac is a subunit vaccine developed from fusions of recombinant *S. equi* proteins. The safety profile is dramatically improved by only including the desired proteins needed for induction of an effective immune response. Bacterial DNA and antigens that are used in diagnostic tests for strangles have been avoided, enabling differentiation of infected from vaccinated horses (DIVA) using both agent detection and serological assays (Robinson et al., 2020). A combination of seven proteins, that did not include SeM or SEQ2190 and were sourced from a *S. equi* strain isolated in Sweden in 2000 (Guss et al., 2009). Results of this study informed the development of a commercial vaccine that had DIVA capability (Strangvac, Intervacc) through inclusion of seven *S. equi* surface proteins combined as two recombinant fusion proteins and one further secreted protein (Robinson et al., 2020).

In experimental challenge studies of Strangvac, serum antibody concentrations increased within 7 days of the first vaccination (V1) with further increases occurring after a second vaccine 28 days later (V2). Antibody concentrations remained increased for at least 100 days after V2 and antibody concentrations could be restored by administration of a third vaccination (V3) up to 52 weeks after V2 (Robinson et al., 2020). Although vaccination did not eliminate clinical signs in all vaccinated animals, two doses of Strangvac significantly delayed the onset and reduced the severity of disease induced when horses were challenged at either 2 weeks or 2 months post-second vaccination. In horses that received three doses of vaccine, there was an even greater reduction in clinical signs and excellent clinical protection was conferred to experimental challenge administered 2 weeks after V3 (Robinson et al., 2020). Discrepancy between antibody concentrations and clinical protection conferred suggests that as well as inducing an antibody response, Strangvac is likely to induce an as yet undetermined cell-mediated immune response, which may reduce the ability of *S. equi* to infect the lymph nodes of the head and neck (Robinson et al., 2020).

Adverse events during experimental studies were limited to mild, transient injection site reactions and transient fever between 1 and

5 days after vaccination and, while these were common, in all cases they resolved without veterinary intervention (Robinson et al., 2020). Vaccination neither interfered with the results of the commercial dual antigen (A/C) iELISA nor the results of a triplex qPCR assay, confirming the vaccine's DIVA capability and its potential for continued use whilst managing strangles outbreaks (Robinson et al., 2020).

The relevance of the Strangvac antigens to historic field strains was assessed in a study that analysed the genomes of 759 *S. equi* isolates from 19 countries (40% and 19% from the United Kingdom and USA respectively), recovered from horses between 1955 and 2018 (Frosth et al., 2023). At least 1579 (99.9%) of 1580 amino acids in Strangvac were identical in 743 (97.9%) genomes, and all genomes encoded identical amino acid sequences for at least six of the eight Strangvac antigens (Frosth et al., 2023). By contrast, there was marked variation in the SeM protein because of the selection pressure on this immunodominant component. Variation in the SeM protein can occur rapidly within outbreaks and individual animals (Kelly et al., 2006; Lindahl et al., 2011; Riihimäki et al., 2018) which potentially compromises the protection conferred by other vaccines that direct an immune response towards the SeM protein.

CLINICAL APPLICATION OF THE RECOMBINANT STRANGLES VACCINE

The study by Robinson et al. (2020) demonstrated the potential of Strangvac to protect against measured experimental challenge with *S. equi*. However, application of vaccination in a field setting is more complex due to undetermined but likely variable infectious doses of *S. equi* being encountered by animals of varying immune status. The potential benefits of Strangvac vaccination are now beginning to be demonstrated in an increasing number of strangles outbreaks on equestrian properties in various different European countries where use of the vaccine has been adopted. For example, in a yard in Sweden with three confirmed cases of strangles, vaccination in the face of the outbreak was performed in 17 healthy horses. Despite serological evidence of natural exposure to *S. equi* infection in half of the horses in this group, all vaccinates remained healthy (G. Gröndahl, unpublished observations). Vaccinates had a significant increase in antibody titre to the Strangvac antigens from at 28 days (G. Gröndahl, unpublished observations). In another strangles outbreak in Sweden, in an earlier partially vaccinated yard, clinical signs were noted in two out of 20 (10%) vaccinated horses and 48 out of 65 (73.8%) unvaccinated horses (G. Gröndahl, unpublished observations; Figure 1).

Which horses should be vaccinated for strangles using Strangvac?

Considering the high rates of morbidity and the potential for mortality, there is an argument for vaccinating all horses against strangles. *S. equi* does not survive long outside the horse and if the entire population could mount an effective immune response, then it ought to be possible to eradicate strangles. However, compliance with vaccination will never be 100% and it is important that efforts are

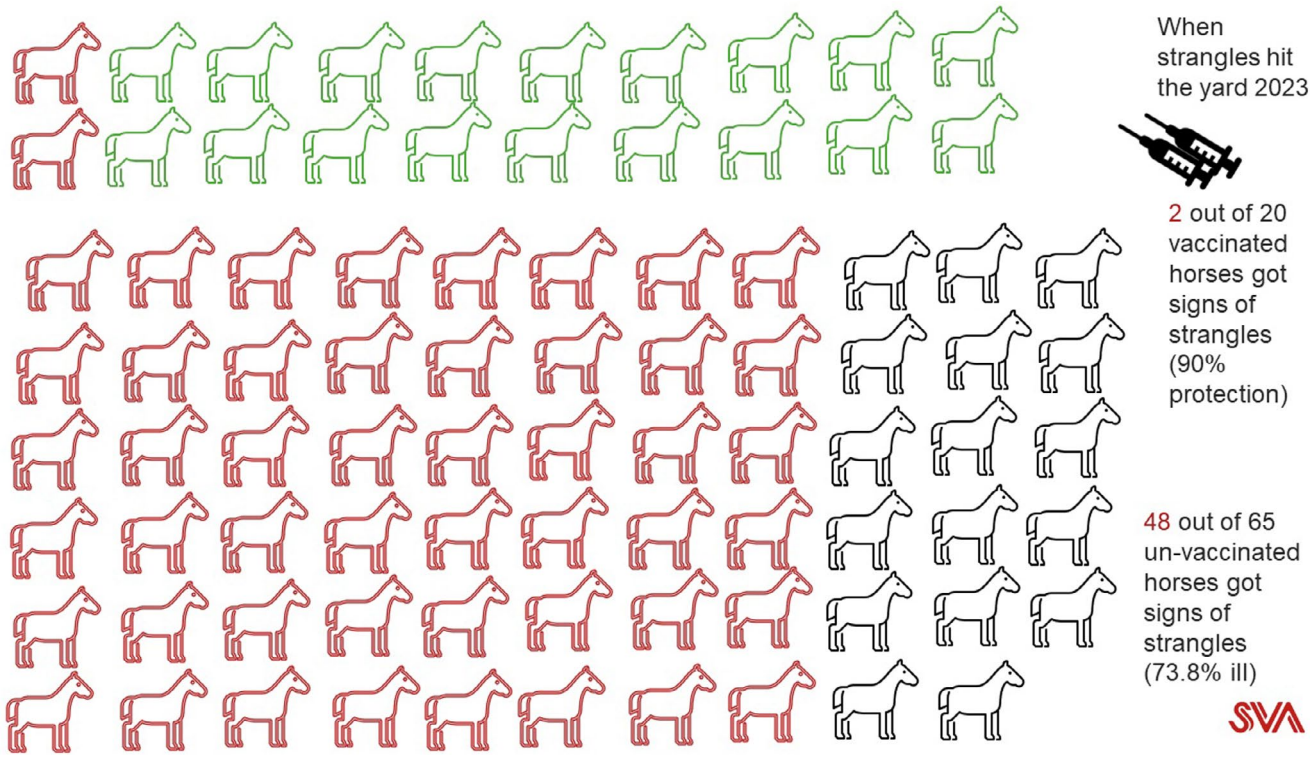

FIGURE 1 Infographic showing the effect of vaccination in a population of horses exposed to *Streptococcus equi* subspecies *equi* in 2023.

focused where the benefits of vaccination will be greatest. Although not an exhaustive list, the following groups of horses are illustrative of those considered at the highest risk of exposure to *S. equi* and vaccination is indicated to reduce the risk of infection and transmission:

- Premises that frequently receive new horses.
- Premises with large numbers of horses transiting through for lessons, exercise.
- Premises with large numbers of foals and young horses.
- Livery yards with horses of mixed ownership, particularly if there are frequent movements of horses onto the yard.
- Equestrian businesses where the risk of disease would threaten its commercial viability or have an unacceptable impact on competition or other business-related schedules.
- Horses that attend 'enthusiastic amateur' competitions where levels of biosecurity and knowledge are sometimes suboptimal.
- Studs that accept walk-in mares and the mares that visit them.
- Horses kept on any premises that have poor levels of biosecurity.

What vaccination schedule should be recommended for Strangvac?

Previous experimental challenge studies have demonstrated that a primary course of two vaccinations with a 4-week interval reduces the clinical signs and lymph node abscess formation associated with infection with *S. equi* (Robinson et al., 2020). The summary of product characteristics (SPC) for Strangvac states that in high-risk populations the primary course should be repeated after 2 months. The authors consider that few, if any, horse owners would be prepared to comply with bi-monthly vaccinations unless the risk of ongoing infection was overwhelming. Robinson et al. (2020) demonstrated that immunity was enhanced by administration of a booster 3 months after the second vaccination of the primary course; however, they also showed that immunological memory is retained for at least 12 months after only the primary course. This does not equate to clinical protection and while clinical protection was demonstrated at 2 months after the primary course, clinical protection was not assessed at later time points. The authors do not believe that repeating the primary course after only 2 months is necessary under normal conditions and would only advocate a booster at 3 months if the risk of disease was considered to be very high and would ordinarily be happy to advise boosters at 6–12-month intervals according to risk. If the level of risk increases, then the interval can be decreased so vaccination with Strangvac effectively constitutes a responsive disease management intervention.

Should Strangvac be used in the face of an outbreak?

To date, there are no published reports of the value of vaccination in the face of an outbreak. There are, however, now several examples of the vaccination being initiated on yards after strangles has been identified with protection being conferred to the vaccinated horses (G. Gröndahl et al, unpublished observations). However, horses that have previously received a primary course of vaccine are likely to be better protected as they will have a more rapid increase in antibody levels and an increase in clinical protection in response to booster vaccination. Anecdotally, horses on one property that were vaccinated 1 month after recovery from clinical disease were more likely to experience adverse events. Further investigations are required to determine whether this is a genuine phenomenon as horses vaccinated 3 months or longer after an outbreak do not appear to have an increased frequency of adverse reactions. Inadvertent vaccination of horses with chronic guttural pouch empyema does not appear to affect recovery adversely and in one outbreak, horses that had been vaccinated had more rapid clinical resolution than those which were not vaccinated (N. de Brauwere, unpublished data). However, this observation merits further scrutiny as it was based on limited case numbers and might not be representative of other outbreaks in different populations with other strains of *S. equi*. Diagnostic serology using the A/C iELISA can be used to determine whether horses have been exposed to infection and mounted a natural immune response. However, association between these antibody levels and clinical protection has not been demonstrated, and it is therefore unclear whether vaccination with Strangvac may confer additional benefit to such horses. Figure 2 highlights a traffic light approach to incorporating vaccination into the response to disease outbreaks.

Should pregnant mares be vaccinated?

Although passive transfer of maternally derived immunity (MDI) to foals following the administration of the recombinant protein vaccine to their dam has not been demonstrated, the authors believe that this is likely to occur. Safety for regulatory licensing has so far not been established during pregnancy or lactation (nor has it been established in breeding stallions), although the authors have no reason to believe that there will be adverse consequences of vaccinating these horses. Although the safety of vaccination with Strangvac in pregnant mares was not established prior to registration, the vaccine has been used in pregnant mares post-registration. Routine vaccination of 73 brood mares was reported recently (alongside influenza, tetanus and herpesvirus vaccination) and was not associated with any major adverse effects (Hellander et al., unpublished data). To maximise the level of MDI that is conferred to foals being born to mares that have not been previously vaccinated with Strangvac, the authors suggest performing the recommended primary course with vaccination at 5, 6 and 9 months of gestation; however, this recommendation is based on first principles, and it has not been confirmed that this confers protection to foals. Where EHV vaccination is also being performed as indicated for some EHV vaccines, use at 5, 7 and 9 months could be considered to improve compliance (and in the authors' opinion is likely to be effective); however, the 2-month interval is not aligned with the Strangvac SPC. In mares that have

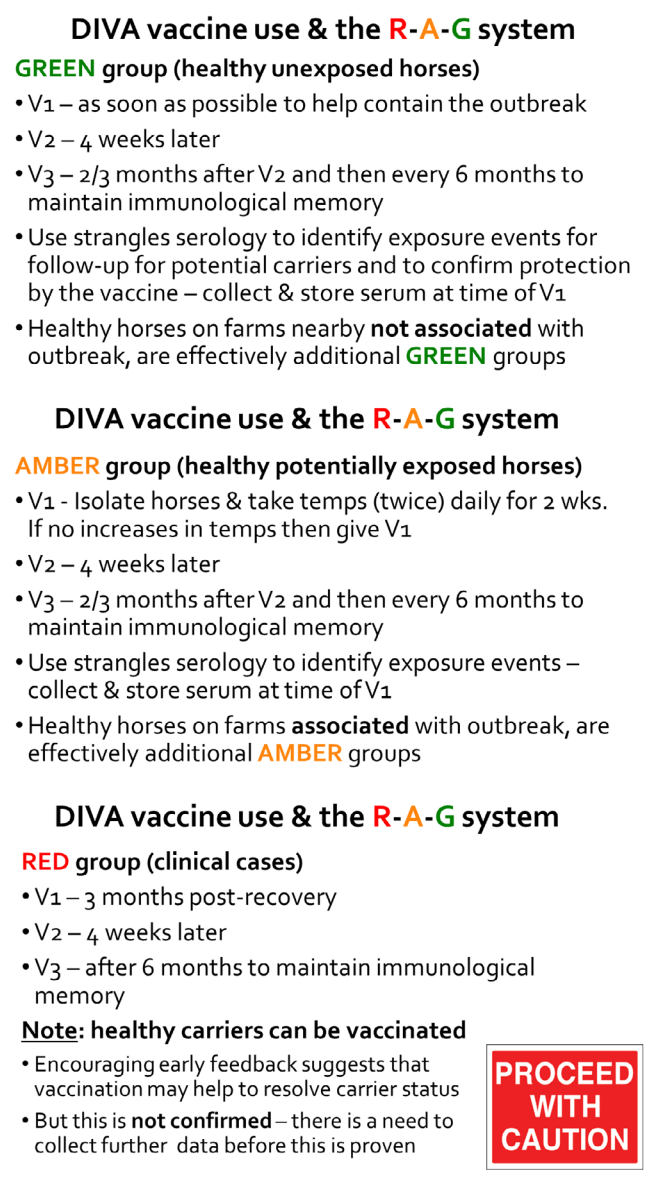

FIGURE 2 Use of a traffic light system to guide the use of Strangvac in responding to a disease outbreak.

received a primary vaccine course previously, a single vaccination in mid-gestation (and not less than 1 month before foaling) would be expected to be sufficient to boost antibody response and confer protection via MDI. The authors would advise against vaccination during the first trimester as the inflammatory response and pyrexia that can be associated with vaccination might be associated with an increased risk of early pregnancy loss.

Should foals be vaccinated?

In the United Kingdom, the SPC for Strangvac indicates that the vaccine can be used in foals older than 5 months of age, based on the age of the animals used in the regulatory studies. The SPC from European Medical Agency indicates 8 months. Use in younger foals is not recommended if there is a high probability that the response will be compromised by the presence of maternally derived antibodies (MDA), which may be suggested by the presence of antibodies in the serum of the dam and foal using the A/C IELISA. If foals are being born into a high-risk environment, then vaccination of mares would be recommended to confer protection via MDA. Vaccination of foals would ideally be initiated just as MDI wanes but the timing of this varies between foals and is impossible to predict. A primary course of two doses of Strangvac 4 weeks apart is recommended based on challenge studies (Robinson et al., 2020). This timing is consistent with starting the primary vaccination course for influenza, tetanus and equine herpes virus vaccines and, although specific studies have not been performed and there is no claim on the product SPC, there is no reason not to administer the vaccines concurrently. Combining Strangvac with other vaccines has been practiced on Swedish stud farms without any detrimental effects (Hellander et al, unpublished data). With live vaccines administered into the lip (Equilis StrepE) or via the intranasal route (Pinnacle IN), concurrent intramuscular injection was not recommended as there was a risk of introducing live bacteria that had become aerosolised, but this is not a concern with the recombinant protein vaccine. Concurrent administration of strangles vaccine with other vaccine has a significant impact on the overall cost–benefit of vaccination and is likely to be associated with much better compliance with vaccination.

Does Strangvac confer any protection against infection with *Streptococcus zooepidemicus*?

Respiratory disease associated with *S. zooepidemicus* infection is common in young Thoroughbred racehorses and the recombinant protein vaccine has been used in this population in an attempt to limit the spread and impact of disease. Currently, there are no claims for protection against *S. zooepidemicus* infection and associated clinical benefits. The authors are aware of anecdotal reports of protection against respiratory and endometrial infection with *S. zooepidemicus* in the field (Hedenström, unpublished data); however, this needs to be corroborated. Strangvac was associated with protection against clinical signs of marked coughing that resulted from infection with *S. zooepidemicus* in a group of 16 Welsh Mountain ponies when compared with the corresponding group of 16 placebo-vaccinated ponies (R. Newton, unpublished data). Further investigations are warranted to determine whether vaccination has the potential to reduce antibiotic use in young racehorses, where there remains widespread use of critically important antimicrobials such as cephalosporins and fluoroquinolones (Dorph et al., 2022).

Is vaccination using Strangvac an effective alternative to pre-movement serology or post-movement quarantine?

Horse movement represents a high-risk event for *S. equi* transmission. Horses that are transported will experience stress and

potentially lowered immunity, particularly if they are moving to a new environment. They may transmit infection to a new population or may become infected when, in an immunosuppressed state, they are exposed to a new group of horses. There is no substitute for quarantine of new horses entering a yard, ideally for at least 3 weeks, although vaccinated horses that move premises will be less likely to develop clinical signs or to transmit infection. However, quarantine is rarely imposed in livery yard settings, especially in the United Kingdom and serology is used by some as a surrogate for disease-free status. Serology is used widely to screen horses for chronic *S. equi* infection and, while it is a useful tool for identifying horses that have recently been infected, it is not a reliable means of detecting chronic carriers, since these may be seronegative (Durham & Kemp-Symonds, 2021; Pringle et al., 2020). The authors consider that vaccination among the receiving population would provide better protection of an established herd than pre-movement serology.

How common are reactions to Strangvac?

In the experimental studies of Strangvac performed by Robinson et al. (2020), localised heat, pain or swelling at the injection site in the neck occurred in a quarter of horses after the first dose of vaccine and around half of horses that were receiving repeat injections and these reactions resolved without treatment within 5 days in all horses (Robinson et al., 2020).

In the field, where injection sites are generally subject to less scrutiny, the rate of reported reactions to Strangvac appears to be lower. Examination of official reports of vaccine reactions after the sale of over 20,000 doses in Europe (approximated to 10,000 treated horses in the following calculations) identified reports of transient reactions in 560 horses (~5.6%), with some horses experiencing more than one reaction (A. Waller, unpublished data). A rise in body temperature was reported in 238 horses (~2.4%), local reactions at the injection site occurred in 245 horses (~2.5%), dullness and reduced appetite in 259 (~2.6%) horses and ocular signs in one horse (<0.01%), all of which were transient and resolved within a week of vaccination. One horse (<0.01%) was reported with an injection site abscess, which also resolved without complications.

One horse (<0.01%) was reported with signs consistent with an autoimmune response after vaccination with Strangvac; however, the nature of these signs could not be verified. Antibodies to SeM from natural *S. equi* infection or vaccines containing SeM (Pusterla et al., 2003), have been associated with immune-mediated vasculitis or purpura haemorrhagica. Since Strangvac does not contain

TABLE 1 Summary of experiences with administration of Strangvac to 572 horses at the Swedish National Equestrian Centres and Menhammar, April 2024.

Equestrian centre	Strömsholm Elite horse riding, school for instructors, grooms and farriers	Flyinge Elite horse riding, school for instructors, grooms and farriers	Wången Harness racing, Icelandic horses	Menhammar Largest horse breeding farm in Sweden
Breeds	Warmblood	Warmblood ($n=96$), mixed breed at riding school ($n=23$)	Standardbred trotters, Icelandic horses, Gotland ponies and Cold-blooded trotters	Standardbred trotters
Total number of horses vaccinated	153	119	87	213
Number of doses	3 doses	Three doses (Flyinge) and two doses (riding school)	Three doses	Three doses (foals and yearlings, $n=150$) or two doses (pregnant mares, $n=63$)
Temperature rise	0.5–1.5°C for 1 day in most horses	Fever in three horses (3%) for 2 days post-first vaccination, and in nine horses (8%) after third vaccination	Around 0.8°C in most horses for 1 day	No temperature increase above 1°C detected by thermochips
Local reactions at injection site	Eight horses (5%) experienced a local reaction for 2–6 days	Four horses (3%) had local reactions for a few days after second vaccination. Several horses with stiffness in neck and one (1%) horse had a large swelling after third vaccination	Ten per cent of horses developed a minor local reaction for 1 day after third vaccination	Three horses (1%) with local reactions that resolved within 1 week
Signs of dullness and reduced appetite	None	Several horses dull after third vaccination	None	None
Ocular signs	None	None	None	None
Notes			Combined vaccination with Tetanus, EIV and EHV1/4 vaccines	Combined vaccination with Tetanus and EIV vaccines in weanlings/yearlings, and in pregnant mares also combined with EHV1/4 vaccines

SeM, the risk for purpura haemorrhagica following vaccination with Strangvac is considered to be negligible and there is no merit in performing serology for SeM antibodies prior to vaccination as is advocated for the SeM vaccine (Boyle et al., 2018).

Safety of the Strangvac vaccine in the field was further scrutinised in a review of data collected at the Swedish National Equestrian Centres at Strömsholm, Flyinge and Wången, and the largest breeding farm in Sweden at Menhammar Stuteri (Table 1). In total, 1630 doses of Strangvac were administrated to 572 horses (three doses/horse, $n=486$; two doses/horse, $n=86$). The vaccinated horses were of a range of different ages from foals to adult horses, and various breeds including Warmbloods, Standardbred trotters, Icelandic horses, Gotland ponies and Cold-blooded trotters. Pregnant mares ($n=63$) were included in the vaccination programme at Menhammar Stuteri. The incidence of transient increases of body temperatures for 1–2 days after vaccination ranged from zero to all horses at different occasions and was only rarely associated with any general signs of dullness or reduced appetite (Table 1). Local reactions of heat, pain and minor swelling (<5 cm) occurred at the injection site in 25 of 572 horses (4%). One horse (0.2%) with a large swelling (>8 cm) and dullness post-third vaccination was noted. All the observed reactions resolved within a week.

Should anti-inflammatories be administered with the vaccine to reduce injection site reactions?

Some clinicians reportedly administer nonsteroidal anti-inflammatory drugs to horses that have reacted to previous vaccinations. While the authors consider that this practice is unlikely to compromise the immune response significantly, it is better avoided as its impact has not been established.

CONCLUSIONS

Strangvac, a recombinant protein vaccine for control of *S. equi*, is considered a significant development in the battle to control strangles; however, considerable knowledge gaps remain on how it can be used to best effect in the field. Integration of the vaccine into disease control strategies for individual horses or equestrian premises alongside other vaccines should be considered, particularly where the risk of strangles is likely to be high. There is currently a lack of published evidence on the use of Strangvac in the field but administration of the vaccine bi-annually after a primary course of two vaccine doses administered 4 weeks apart is considered likely to confer good protection and makes the vaccine a more practical and affordable option than previous strangles vaccines that were typically repeated every 3 months. However, this and many of the recommendations herein are based on informed opinion rather than robust evidence and need to be subjected to scrutiny and re-evaluation moving forward. The DIVA capability and improved vaccine safety profile of Strangvac are also considered highly advantageous.

AUTHOR CONTRIBUTIONS

David Rendle: Conceptualization; writing – original draft; writing – review and editing. **Mark Bowen:** Conceptualization; writing – review and editing. **Jessika Cavalleri:** Conceptualization; writing – review and editing. **Nicolas De Brauwere:** Conceptualization; writing – review and editing. **Gittan Grondahl:** Conceptualization; writing – review and editing. **C. van Maanen:** Conceptualization; writing – review and editing. **J. Richard Newton:** Conceptualization; writing – review and editing; writing – original draft.

ACKNOWLEDGEMENTS

The authors are grateful to colleagues and owners who have been involved in the work and experiences gathered to date, and for their willingness to share relevant data in order to further our collective knowledge base.

FUNDING INFORMATION

Not applicable.

CONFLICT OF INTEREST STATEMENT

All the authors have received subsidised travel and accommodation from the manufacturers (Intervacc) and distributors (Dechra) of Strangvac for attendance at an expert meeting. D. Rendle has received payment for consultancy work performed for the distributors of Strangvac. J. Cavalleri has been provided with antigens by Intervacc for use in her noncommercial research into strangles and equine immunology but received no funding from them. GG has collaborated on research funded by Intervacc but has received no funding. None of the authors have a financial connection to Intervacc or Dechra.

ETHICS STATEMENT

Not applicable.

ANTIMICROBIAL STEWARDSHIP DECLARATION

Not applicable for this article.

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How to cite this article: Rendle, D., Bowen, M., Cavalleri, J., De Brauwere, N., Grondahl, G., van Maanen, K. et al. (2025) Strangles vaccination: A current European perspective. *Equine Veterinary Education*, 37, 90–97. Available from: https://doi.org/10.1111/eve.14032