

Correction

Correction: Preziuso et al. Schmallenberg Virus: Pathogenesis, Diagnostic Challenges, and Control Gap in Endemic Europe. *Microbiol. Res.* 2026, 17, 113

Silvia Preziuso ¹, Anna-Rita Attili ¹, Chiara Storoni ¹, Lorenza Di Perna ¹, Yubao Li ²
and Vincenzo Cuteri ^{1,2,*}

¹ School of Biosciences and Veterinary Medicine, University of Camerino, 62024 Matelica, Italy; silvia.preziuso@unicam.it (S.P.); annarita.attili@unicam.it (A.-R.A.); chiara.storoni@unicam.it (C.S.); lorenza.diperna@studenti.unicam.it (L.D.P.)

² School of Pharmaceutical Sciences and Food Engineering, Liaocheng University, Liaocheng 252000, China; liyubao@lcu.edu.cn

* Correspondence: vincenzo.cuteri@unicam.it; Tel.: +39-073-740-4001

Text Correction

In the original publication [1], there were errors in several bibliographic references and in a limited number of statements that relied on insufficiently supported citations. The authors have re-examined the reference list against original publication records and have reviewed whether the cited references support the corresponding statements. Corrections have been made to the reference list and to the text passages below. The authors state that the scientific conclusions are unaffected. This correction was approved by the Academic Editor. The original publication has also been updated.

Section 3.3. Livestock Movement and the Role of Trade

There was an error in the original publication. The sentence stating that Gache et al. [27] demonstrated a 2.4-fold higher odds of seropositivity in herds receiving animals from SBV-affected regions could not be verified from the cited source. The sentence has been removed and the relevant paragraph should read:

Although vector-borne transmission is the primary route of infection, movement of infected animals during the viremic phase may contribute to introduction into new areas where competent vectors are present [6,26–28]. A seroprevalence survey in France during winter 2011–2012 documented exposure in cattle and sheep [27], while a bulk milk tank study in the south-west of Ireland showed evidence of SBV infection in dairy herds in 2013 [28]. The epidemiological significance of animal movement is therefore context-dependent and conditional upon the presence of competent vectors at the destination.

Section 3.6. Wildlife Hosts: Current Evidence and Research Gaps

There was an error in the original publication. The cited sources [29–31] are European field studies and do not constitute a systematic review. The sentence has been corrected as follows:

Available European field studies report SBV antibodies in wild ruminants and wild artiodactyls, with seroprevalence varying by species, region, and sampling period [29–31]. However, active viral circulation in wildlife has not been confirmed, and the duration of antibodies in wild species is unknown. Targeted longitudinal studies with repeated sampling of marked individuals are needed to determine whether wildlife can act as a true reservoir or merely as incidental spillover hosts.



Received: 14 July 2026

Accepted: 17 July 2026

Published: 27 July 2026

Copyright: © 2026 by the authors.

Licensee MDPI, Basel, Switzerland.

This article is an open access article distributed under the terms and conditions of the [Creative Commons Attribution \(CC BY\)](https://creativecommons.org/licenses/by/4.0/) license.

Section 4.2. Retrospective Diagnosis and Fetal Testing

There was an error in the original publication. The original sentence stated that Italian serological surveys had used pre-colostral or fetal testing approaches to confirm past SBV exposure. The replacement source supports Italian evidence of SBV exposure, but not that specific diagnostic pathway. The sentence has been corrected as follows:

Serological investigations in Italy have also confirmed SBV exposure in livestock [33].

Section 5.2. Drivers of Low Vaccine Uptake

There was an error in the original publication. Some quantitative statements regarding farmer vaccine uptake, reasons for non-vaccination, and cost sensitivity were not adequately supported by the cited reference. The relevant passage has been corrected as follows:

Field experience supports this pattern. A UK sheep-farmer survey conducted after the 2016–2017 re-emergence reported limited previous vaccine use and showed that willingness to vaccinate was strongly influenced by vaccine cost [41]. Similar patterns of low uptake have been reported in endemic settings when perceived disease risk is low and vaccine availability is limited [3,6,42].

Table 4 has been replaced by the following qualitative Table 4 to remove unsupported numerical estimates:

Table 4. Qualitative synthesis of factors contributing to low Schmallenberg virus vaccine uptake in endemic settings.

Factor	Qualitative Contribution to Low Uptake	Evidence Base/Interpretation	Practical Implication
Perceived low disease risk	Major driver	In endemic settings, clinical disease is intermittent and congenital cases may occur only after periods of renewed susceptibility. After large outbreaks, farmers may perceive vaccination as unnecessary when visible disease declines.	Risk communication should emphasize cyclical re-emergence, herd immunity decline, and the vulnerability of naive breeding females.
Direct vaccine cost	Important economic barrier	Willingness to vaccinate is strongly influenced by vaccine price, especially in low-margin sheep and extensive ruminant systems.	Subsidies, risk-based support, or targeted vaccination of high-risk groups may improve uptake.
Labour and animal-handling costs	Important operational barrier	Vaccination requires gathering, restraint, and administration; these costs are proportionally higher in extensive grazing systems.	Vaccination campaigns should be aligned with routine handling, breeding preparation, or other scheduled flock/herd management procedures.
Vaccine availability and logistics	Context-dependent barrier	Withdrawal or limited availability of commercial vaccines reduces practical access even when farmers or veterinarians are willing to vaccinate.	Vaccine banks or advance procurement mechanisms may help maintain preparedness.

Table 4. *Cont.*

Factor	Qualitative Contribution to Low Uptake	Evidence Base/Interpretation	Practical Implication
Veterinarian recommendation and farmer awareness	Moderate but modifiable factor	Uptake is influenced by whether farmers receive clear, timely advice on SBV risk, breeding timing, and vaccination value.	Continuing veterinary education and decision-support tools could improve risk-based recommendations.
Concerns about vaccine use in breeding or pregnant animals	Minor to moderate barrier	Although inactivated vaccines are generally considered suitable for use in breeding animals, uncertainty or hesitancy may reduce uptake.	Communication should distinguish clearly between licensed vaccine safety data and unsupported safety concerns.
Lack of DIVA compatibility	Mainly relevant to surveillance and trade	First-generation inactivated vaccines do not readily distinguish vaccinated from naturally infected animals serologically.	DIVA-compatible vaccines and companion diagnostics would improve compatibility with surveillance and certification programmes.

Section 5.4. Emerging Vaccine Platforms and Practical Barriers

There was an error in the original publication. The originally cited reference for regulatory complexity of novel vaccine platforms was an economic paper and was not appropriate for the statement. The sentence has been corrected as follows:

However, several barriers remain: platform-specific regulatory data requirements for novel vaccine technologies [45], limited long-term safety data in food-producing animals, uncertainty regarding duration of immunity, and lack of accompanying diagnostic tools for full DIVA implementation.

In addition, the column “Estimated timeline to licensure” in Table 5 was not directly supported by the cited literature and has been removed. The corrected Table 5 appears below:

Table 5. Comparative analysis of second-generation SBV vaccine platforms after removal of unsupported timeline estimates.

Platform	Advantages	Main Production or Implementation Bottleneck	Evidence for Duration of Protection	DIVA Compatibility	Regulatory or Validation Considerations
NSs-deletion modified-live vaccine	Strong immunogenicity; potential for single-dose protection; possible DIVA compatibility.	Requires robust attenuation, genetic-stability testing, biosafety assessment and controlled production of live virus.	Experimental challenge data are supportive, but long-term field duration data remain limited.	Yes, in principle, if companion serology distinguishes anti-NSs responses.	Requires platform-specific assessment of safety, stability, shedding and reversion-to-virulence risk.

Table 5. Cont.

Platform	Advantages	Main Production or Implementation Bottleneck	Evidence for Duration of Protection	DIVA Compatibility	Regulatory or Validation Considerations
Subunit vaccine based on recombinant Gc	No infectious virus; targets neutralizing epitopes; potentially suitable for breeding animals.	Antigen yield, formulation, adjuvant selection and booster requirements may limit field practicality.	Experimental data support immunogenicity and protection, but field duration remains uncertain.	Potentially yes, if used with a compatible companion diagnostic assay.	Requires validated potency assays, manufacturing consistency and companion diagnostic development.
Virus-like particles (VLPs)	Non-replicating platform; presents viral antigens in a native-like structure; DIVA-compatible design is possible.	Assembly, purification, scale-up and batch-to-batch consistency remain important production challenges.	Evidence is mainly experimental; duration under field conditions remains to be established.	Yes, depending on antigen design and diagnostic strategy.	Requires detailed characterization of particles, quality control and target-species safety evaluation.
mRNA lipid-nanoparticle vaccine	Rapid design and manufacture; no infectious SBV; antigen sequence can be updated quickly.	LNP production, stability, storage requirements, dose optimization and target-species data are limiting factors.	No SBV-specific livestock field duration data are available; duration would need dedicated studies.	Yes, in principle, if the encoded antigen and companion assay are selected accordingly.	Requires platform-specific quality, safety and immunogenicity data for veterinary use.
Viral-vector vaccine	Single-dose potential; no replication-competent SBV; compatible with targeted antigen delivery.	Vector selection, pre-existing vector immunity, manufacturing scale-up and insert stability require evaluation.	Experimental evidence is supportive for some vector approaches, but field duration remains insufficiently defined.	Yes, if vector and insert design allow differentiation from natural infection.	Requires assessment of vector safety, shedding, recombination risk and target-species safety.

In the original publication, the following references were incorrect or unsuitable for the statements for which they were cited. They have been corrected or replaced as follows. The numbering is retained to preserve the in-text citation sequence.

New References

2. Wernike, K.; Conraths, F.; Zanella, G.; Granzow, H.; Gache, K.; Schirrmeier, H.; Valas, S.; Staubach, C.; Marianneau, P.; Kraatz, F.; et al. Schmallerberg virus-two years of experiences. *Prev. Vet. Med.* **2014**, *116*, 423–434. <https://doi.org/10.1016/j.prevetmed.2014.03.021>.
17. Herder, V.; Wohlsein, P.; Peters, M.; Hansmann, F.; Baumgärtner, W. Salient lesions in domestic ruminants infected with the emerging so-called Schmallerberg virus in Germany. *Vet. Pathol.* **2012**, *49*, 588–591. <https://doi.org/10.1177/0300985812447831>.

20. Golender, N.; Bumbarov, V.; Assis, I.; Beer, M.; Khinich, Y.; Koren, O.; Edery, N.; Eldar, A.; Wernike, K. Shuni virus in Israel: Neurological disease and fatalities in cattle. *Transbound. Emerg. Dis.* **2019**, *66*, 1126–1131. <https://doi.org/10.1111/tbed.13167>.
21. Guis, H.; Caminade, C.; Calvete, C.; Morse, A.P.; Tran, A.; Baylis, M. Modelling the effects of past and future climate on the risk of bluetongue emergence in Europe. *J. R. Soc. Interface* **2012**, *9*, 339–350. <https://doi.org/10.1098/rsif.2011.0255>.
22. Sick, F.; Breithaupt, A.; Golender, N.; Bumbarov, V.; Beer, M.; Wernike, K. Shuni virus-induced meningoencephalitis after experimental infection of cattle. *Transbound. Emerg. Dis.* **2021**, *68*, 1531–1540. <https://doi.org/10.1111/tbed.13823>.
25. Kameke, D.; Kampen, H.; Walther, D. Activity of *Culicoides* spp. (Diptera: Ceratopogonidae) inside and outside of livestock stables in late winter and spring. *Parasitol. Res.* **2017**, *116*, 881–889. <https://doi.org/10.1007/s00436-016-5361-2>.
28. Johnson, A.; Bradshaw, B.; Boland, C.; Ross, P. A bulk milk tank study to detect evidence of spread of Schmallerberg virus infection in the south-west of Ireland in 2013. *Ir. Vet. J.* **2014**, *67*, 11. <https://doi.org/10.1186/2046-0481-67-11>.
33. Foxi, C.; Pintus, D.; Zinellu, S.; Macciocu, S.; Angioi, P.P.; Sechi, A.M.; Fiori, M.S.; Ladu, A.; Puggioni, G.; Denti, S.; et al. Assessing Schmallerberg virus disease in Sardinia (Italy) after the first epidemic episode in 2012. *Pathogens* **2025**, *14*, 349. <https://doi.org/10.3390/pathogens14040349>.
36. Wernike, K.; Aebischer, A.; Roman-Sosa, G.; Beer, M. The N-terminal domain of Schmallerberg virus envelope protein Gc is highly immunogenic and can provide protection from infection. *Sci. Rep.* **2017**, *7*, 42500. <https://doi.org/10.1038/srep42500>.
41. Stokes, J.E.; Tarlinton, R.E.; Lovatt, F.; Baylis, M.; Carson, A.; Duncan, J.S. Survey to determine the farm-level impact of Schmallerberg virus during the 2016–2017 United Kingdom lambing season. *Vet. Rec.* **2018**, *183*, 690. <https://doi.org/10.1136/vr.104866>.
42. Wernike, K.; Beer, M. Schmallerberg virus: To vaccinate, or not to vaccinate? *Vaccines* **2020**, *8*, 287. <https://doi.org/10.3390/vaccines8020287>.
45. European Medicines Agency. *Guideline on Data Requirements for Vaccine Platform Technology Master Files (vPTMF)*; EMA/CVMP/IWP/105506/2020; European Medicines Agency: Amsterdam, The Netherlands, 2024. Available online: https://doi.org/www.ema.europa.eu/en/documents/scientific-guideline/guideline-data-requirements-vaccine-platform-technology-master-files-vptmf_en.pdf (accessed on 13 July 2026).
46. Del Río, R.; Venail, R.; Calvete, C.; Barceló, C.; Baldet, T.; Lucientes, J.; Miranda, M.A. Sensitivity of *Culicoides obsoletus* (Meigen) (Diptera: Ceratopogonidae) to deltamethrin determined by an adapted WHO standard susceptibility test. *Parasitology* **2014**, *141*, 542–546. <https://doi.org/10.1017/S0031182013001935>.
47. Venail, R.; Lhoir, J.; Fall, M.; del Río, R.; Talavera, S.; Labuschagne, K.; Miranda, M.; Pagès, N.; Venter, G.; Rakotoarivony, I.; et al. How do species, population and active ingredient influence insecticide susceptibility in *Culicoides* biting midges (Diptera: Ceratopogonidae) of veterinary importance? *Parasit. Vectors* **2015**, *8*, 439. <https://doi.org/10.1186/s13071-015-1042-8>.

The authors apologize for the errors. The corrections improve bibliographic accuracy and remove or revise over-specific statements that were not adequately supported by the cited literature. With this correction, the order of some references has been adjusted accordingly. The authors state that the scientific conclusions are unaffected. This correction was approved by the Academic Editor. The original publication has also been updated.

Reference

1. Preziuso, S.; Attili, A.-R.; Storoni, C.; Di Perna, L.; Li, Y.; Cuteri, V. Schmallenberg Virus: Pathogenesis, Diagnostic Challenges, and Control Gap in Endemic Europe. *Microbiol. Res.* **2026**, *17*, 113. [[CrossRef](#)]

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.