World Organisation for Animal Health

TECHNICAL ITEM II

Emergency preparedness and response to peste des petits ruminants (PPR) and sheep pox and goat pox (SGP) in the region

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1. Summary

Peste des petits ruminants (PPR) and sheep pox and goat pox (SGP) are major transboundary animal diseases affecting sheep and goats, with significant implications for animal health, food security and rural livelihoods. Their recent emergence and continued circulation in Europe, particularly in South-Eastern Europe, demonstrate that the region remains at risk and that preparedness and coordinated action need to be strengthened.

Since 2024, PPR has been reported in several European Members, including Romania, Greece, Bulgaria, Hungary, Albania, Kosovo* and Croatia. SGP has shown a sustained pattern of circulation, with outbreaks reported in Europe since 2022 and extensive spread in Greece since 2024, followed by outbreaks in neighboring Balkan countries. Although affected Members have implemented control measures, including stamping-out, movement restrictions, protection and surveillance zones, and epidemiological investigations, virus circulation has not been fully stopped. The recurrence of outbreaks after periods without reported cases suggests either new introductions or undetected low-level circulation.

Epidemiological and genetic investigations indicate that animal movements, both legal and illegal, have been major drivers of disease spread. Cross-border movements, shared pastures, trade networks and informal movements associated with community and family links have contributed to transmission. Indirect transmission through vehicles, materials and people has also been identified. Genetic investigations have provided important insights into the relatedness of outbreaks, although significant gaps in sequence data limit the ability to fully reconstruct transmission pathways and identify sources of introduction.

A key lesson from the recent outbreaks is the importance of **early detection and rapid reporting**. Suspicion and reporting have sometimes been delayed by several weeks, allowing disease to spread before control measures could be implemented. Variable or mild clinical signs, including subclinical PPR infections, limited awareness among farmers and veterinarians, diagnostic challenges and weaknesses in laboratory capacity have contributed to these delays. Strengthening National Reference Laboratories, ensuring sustainable resources and expertise, and systematically considering PPR and SGP in differential diagnosis are therefore essential.

Control measures have proved effective when implemented rapidly and thoroughly, but their economic and social impacts can affect compliance. Adequate compensation mechanisms, stronger biosecurity, improved traceability and closer cooperation with police and customs authorities are important to support implementation and encourage early reporting. Vaccination should also remain an option where outbreaks prove difficult to control, particularly for SGP, taking into account epidemiological and trade considerations.

Members should therefore prioritise **risk-based surveillance, early-warning systems, diagnostic capacity, cross-border information sharing and regional coordination**. Contingency plans should be updated in light of recent experience, while collaboration with WOAH Reference Laboratories should be strengthened to support sequencing and molecular epidemiology. Continued research is also needed on transmission, pathogenesis, vaccination and environmental persistence.

Effective control of PPR and SGP will require sustained political commitment, adequately resourced Veterinary Services and coordinated action across borders. Regional cooperation through WOAH and GF-TADs will remain essential to reduce further spread and support effective disease control.

2. Introduction

Peste des petits ruminants (PPR) and sheep pox and goat Pox (SGP) are major viral transboundary animal diseases representing major threats to sheep and goat health, food security and livelihoods in many regions of the globe. PPR and SGP have emerged in recent years in Europe.

Peste des petits ruminants virus (PPRV) is a RNA virus, member of the family Paramyxoviridae, genus *Morbillivirus*. Four genetic lineages of PPR virus have been identified, but only one serotype [1]. Since its first description in the Ivory Coast in 1942, PPR has expanded to cover large regions of Africa, the Middle East and Asia [2]. PPR is mainly transmitted through direct contact with discharges from infected animals. The spread of this disease is mostly associated with animal movements. Arthropods do not play a role in their transmission. No carrier or reservoir has yet been identified. Mortality rates can be as high as 100% in naïve populations or in an immunodeficient population, but lower than 15% in local breeds in regions where PPR is endemic or if animals are in good condition [6].

Capripoxvirus sheeppox (SPPV) belongs, together with Capripoxvirus goatpox (GTPV) and Capripoxvirus lumpyskinpox (LSDV), to the genus of Capripox viruses within the family of Poxviridae. SPPV infects mostly sheep, while GTPV affects mostly goats and LSDV cattle and water buffalo. Cross species infection has however been sporadically described for SPPV and GTPV. Morbidity and mortality rates of 75 - 100% and 5-10%, respectively, are reported for SPPV in endemic regions. Mortality rates can be higher (up to 100%) in young animals or in breeds from non-endemic regions and furthermore depend on the virus strain. SPPV infections are characterized by fever to above 40°C and typical skin lesions which appear 2–5 days post infection and progress from macules to papules which become necrotic and form scabs which persist for up to 6 weeks. Lesions are also observed on the internal organs, especially on the lungs. Besides lesions, infected sheep develop mucopurulent rhinitis, conjunctivitis, difficult breathing and secondary pneumonia. Surviving sheep clear the infection, as there is no evidence of persistently infected animals. SPPV transmission mainly occurs through aerosol and direct contact between infected and susceptible animals. Indirect transmission may also occur through fomites, vehicles, and trade of hides [16]. Movement of infected sheep is a major route of disease transmission. SPPV is endemic in Africa, The Middle East and Asia. While SPPV had been introduced only a few times into European countries bordering the endemic region (e.g. Greece and Bulgaria) over the past decades, a continuous series of SPPV outbreaks has been reported since 2022 in Europe [17].

The World Organisation for Animal Health (WOAH) and the Food and Agriculture Organization of the United Nations (FAO) have established a global strategy aimed at eradicating PPR by 2030 through strengthened surveillance, emergency preparedness, vaccination strategies, and Veterinary Service capacity development. In the Western Eurasia region, this global strategy has been operationalised through the establishment of the PPR Roadmap since 2015, followed by a series of regional Roadmap meetings to monitor progress, coordinate actions, and strengthen cross-border collaboration. Despite this global effort, PPR has continued to emerge in new regions during the last decade. The risk of emergence in Europe has been assessed for some time [8], with ways of introductions identified via North Africa and Türkiye, where endemic circulation of the disease is closest to the border. However, despite surveillance efforts, notably in the Thrace region, introduction and spread of PPR could not be avoided in Europe in 2024.

WOAH supports its Members in preventing, preparing for, and responding to transboundary animal diseases by providing a variety of complementary mechanisms. These include international standards for disease surveillance, notification, prevention and control; the World Animal Health Information System (WAHIS), which promotes transparency and provides an early warning system; capacity building programmes, such as the PVS Pathway, which strengthen Veterinary Services; a network of Reference Centres; and mechanisms for officially recognising PPR status. Regional and global coordination mechanisms further support information sharing and cooperation among Members. These areas of work are reinforced under WOAH's 8th Strategic Plan (2027-2031), particularly Strategic Orientation 2, which aims to empower Members to establish robust animal health and welfare systems with stronger capacities for disease prevention, preparedness, and emergency management.

Through an overview of the current epidemiological situation of PPR and SGP in Europe, based on reported outbreaks, field investigations and genetic analyses, this report provides a description of the chronology of disease emergence and the control measures implemented by affected Members. It also allows for an examination of the main challenges encountered during surveillance and control, including delayed detection and reporting, subclinical infections, difficulties in enforcing movement restrictions, biosecurity gaps, and the economic and social consequences of disease control measures. It also identifies key lessons learned and priority areas for strengthening disease preparedness and control, with particular emphasis on early detection, surveillance, vaccination, cross-border collaboration and research needs. Finally, the report establishes a foundation for discussions at the conference on how WOAH can provide further support to its Members in strengthening their preparedness and response capabilities, as well as identifying priorities for future regional action.

3. Emergence and epidemiological situation of PPR and SGP in Europe

The section is compiled based on WAHIS reports (https://wahis.woah.org/#/home) and presentations at PAFF committee meetings (https://food.ec.europa.eu/horizontal-topics/committees/paff-committees/animal-health-and-welfare_en) and GF-TAD meetings (https://www.gf-tads.org/)

Key messages:

- PPR and SPGP have become persistent regional threats in Southeastern Europe, with outbreaks continuing across several Members despite the implementation of control measures.
- Reappearance of PPR and SPPV after several weeks or months of absence occurred in several Member countries, **pointing to new introductions or unreported or undetected low level virus spread.**
- Epidemiological and genetic investigations indicate that animal movements have played a major role in the spread of both diseases across the region.
- Cross-border movements, including illegal movements and the use of shared pastures, represent important pathways for virus transmission and regional persistence.
- Gaps in sequence data from neighboring countries continue to limit the reconstruction of introduction and spread pathways.

3.1. Chronology of events

PPR

After a first emergence in 2016 [9], Georgia reported a second outbreak in March 2024 in the Kvemo Kartli region. Genetic analysis showed a close relationship with strains circulating in Asia [10].

In July 2024, outbreaks were confirmed for the first time in Greece and Romania. More than 80 holdings were infected in Greece until November 2024. Over 60 outbreaks were reported in Romania until September 2024 . After several months without outbreaks in Romania, a new outbreak was notified in the region of Bihor in March 2025, then in Mures, Timis and Brasov counties in June and July 2026.

Infection of holdings was notified in Bulgaria in November 2024. It was the second incursion of PPR in Bulgaria after an emergence in 2018 [11]. Outbreaks were reported in Hungary in February 2025. No additional outbreaks have been reported since then in both countries. Infection of 14 farms in multiple regions of Albania were notified in June and July 2025. After a period without reports, new outbreaks were notified in two regions in April and May 2026. Two outbreaks were reported in Kosovo* in July and September 2025, with no suspicion of further cases for the moment.

Croatia is the last country to have reported PPR cases for the first time, with 5 holdings infected between December 2025 and January 2026. No clinical signs were observed in these holdings except for abortions in one farm. Control measures were quickly implemented, with no suspicion of further cases until new outbreaks were notified in June 2026 in two other counties in the North-Eastern part of Croatia.

SPPV

During past decades, SPPV had been introduced only a few times into European countries bordering endemic regions like Türkiye, mostly in Greece and Bulgaria. Intriguingly, a continuous series of SPPV outbreaks has been reported since 2022 in Europe. Spain notified an infected sheep herd in September 2022, what represented the start of an outbreak which lasted till May 2023. Afterwards one single outbreak was reported in Bulgaria in September 2023, followed by an outbreak in October 2023 on the Greek Island of Lesvos, followed by a series of outbreaks in central Greece which lasted till March 2024. All these outbreaks were efficiently controlled, and the total number of affected herds remained limited [17, 18].

During summer 2024, a new series of SPPV positive herds were reported in the Macedonia and Thrace region of Northern Greece. This marked the start of an outbreak in Greece which is ongoing until today. Periods with a high number of reported outbreaks were interspersed with periods indicating reduced spread. The disease spread over most of the country and more than 2200 infected herds have been reported so far. The outbreak

in Greece has been succeeded by reported SPPV outbreaks in neighboring Balkan countries. Bulgaria reported intermittent outbreaks since autumn 2024 with the highest number occurring in the Plovdiv Region. Romania reported first outbreaks in June 2025 and although the total number of reported outbreaks remains limited, affected herds have been reported from distinct regions of the country. Affected animals exhibited the typical clinical signs associated with an SPPV infection, including high fever, heavy ocular and nasal discharge, and prominent skin nodules on their heads, abdomens, mammary glands, and genitals. Serbia was next to report 3 outbreaks in autumn 2025 and one additional outbreak was reported during summer 2026. Since January 2026, SPPV outbreaks have also been reported by North Macedonia. First, a limited number of outbreaks occurred in the north of the country, but the number of outbreaks is increasing since July 2026 and affected herds are now also found in the center and east of the country. Finally, Kosovo has reported 4 outbreaks since April 2026.

3.2. Control measures applied

All Members affected by PPR and SPPV in Europe since 2024 have implemented control measures in accordance, or, in the case of non-EU-Members, in close alignment with EU Regulation 2020/687 for category A diseases, including the stamping-out of affected flocks, safe disposal of carcasses, movement restrictions with implementation of protection and surveillance zones, epidemiological investigations, etc. Only Bulgaria reported some delays in the culling of animals from some infected herds due to protests and legal challenges.

Some Members went beyond measures required by the European Commission, notably by extending zones with animal restrictions to whole regions while investigating the presence of more outbreaks. For SPPV, Greece implemented larger restrictions zones and prolonged the time of movement restrictions than legally obliged and made pre-slaughter saliva testing compulsory. In all Members, the number of outbreaks reported reduced drastically after implementation of the control measures, and sometimes no more outbreaks were reported for several months. It confirms that the measures are efficient when thoroughly implemented. However, re-appearance of PPR or SPPV has been reported in some Members after several weeks or months, pointing to new introductions or unreported or undetected low-level virus spread.

In reaction to the SPPV and PPRV spread, some Members, like Romania, Greece and Bulgaria reported strengthened cooperation with police and custom authorities to prevent illegal animal movements.

Georgia is the only Member to have implemented a vaccination campaign for PPR as additional measure to control the disease emergence in 2024 and continues prophylactic vaccination against SPGP. Türkiye has been implementing vaccination since the early 2000's and has applied a risk-based strategy since 2020. The number of outbreaks reported nationally have reduced in following years in Anatolia since the start of this strategy, but the disease has not yet been fully controlled. Türkiye is also implementing SPPV vaccination. Nevertheless, breakthrough infections are being reported.

No SPPV or PPR vaccines have a European market approval. PPR vaccination within the European Union is normally prohibited, although it may be used by Members in line with specific EU regulations. The Animal Health Law also foresees in the possibility to implement vaccination against SPPV in the response to outbreaks. However, despite the availability of an emergency vaccine bank at the European Commission, no EU Member States or neighboring third country has requested vaccination against SPPV or PPR to date. Studies by EFSA support the implementation of SPPV vaccination in heavily infected countries together with the other control measures to stop virus spread.

3.3. Insights from field and genetic investigations on the recent emergence in Europe

PPR

The EURL-PPR performed sequencing analyses on PPR virus samples collected in 2024 and 2025 from outbreaks in Romania, Greece, Bulgaria, Hungary, Albania, Kosovo*, and Croatia, in collaboration with Veterinary Authorities and National Reference Laboratories. The results confirm that all outbreaks in Europe have a common origin. The European strains are closely related to virus sequenced isolated in North Africa and in the Horn of Africa [12]. The exact origin cannot be defined because of lack of recent virus sequence data from these and other regions where PPR is endemic. The results are pointing towards a continuous circulation of PPR in Europe since its introduction in 2024.

Analyses provide strong support for a first introduction in Eastern Romania followed by a spread to other Members in the region. This introduction could be associated with the extensive role of the region as a hub for

small ruminant trade. Combined genetic and field investigations show that many spreading events in Europe were linked to animal trade movements that took place before restrictions were put in place, or after their removal. This is notably the case for multiple transmission events from Eastern Romania to Greece and from Western Romania to Hungary. The emergence of PPR in Kosovo* could be clearly related to PPR circulation in Albania, with investigations pointing towards illegal movement of infected animals from Albania to Kosovo*. Investigations in the field suggest that some farms may have been infected through indirect contact with infected animals, possibly via trucks or people visiting multiple farms. Most tellingly, a secondary outbreak in Hungary could be definitely traced to hay moved from a primary infected holding, suggesting transmission from virus particles carried on the vehicle, food, or staff.

Despite the sequencing effort, analyses show that there are big gaps in the virus dataset, most likely associated with undetected regional circulation. Therefore, the dynamic of transmission, notably the emergence in Albania and Croatia, cannot be fully resolved.

SPPV

Poxviruses are composed of a long linear dsDNA molecule with a length of ~151 kb. Similar to other poxviruses, SPPV has a slow mutation rate and is a slowly evolving virus. Therefore, sequencing of the entire genome increases the chance of observing variations between isolates when sampled over short time intervals. The number of whole genome SPPV sequences in the GenBank database is however very limited.

The phylogeny obtained for all available WGSs of SPPV supports the existence of two main clades, A1 and A2, and one unsupported cluster, A3, which roughly correspond to three geographic regions. Clade A1 includes strains and derived vaccines from Asia, including Russia, but excluding the Middle East. Clade A2 includes strains from the Middle East, Europe, and Northern Africa. Cluster A3 includes the single field isolate from sub-Saharan Africa (Nigeria) and three vaccine strains that were used in Saudi Arabia in response to an outbreak.

The EURL for capripox viruses has collaborated closely with the national reference laboratories (NRLs) of all European countries which have experienced SPPV outbreaks since 2022 to determine the WGS of circulating strains, with the goal to get insight in the origin of the outbreaks and introduction routes.

Five SPPV WGSs were determined from samples collected from the three seemingly unrelated outbreaks in Spain, Greece and Bulgaria between 2022 and spring 2024. All five belonged to clade A2, which includes strains historically circulating in the Middle East and Northern Africa. The sequence divergence was low among the isolates, with a total of only 29 variable positions [17].

Subsequently, the WGS was determined from the SPPV outbreak that started in the summer of 2024 in Greece and spread over several Balkan countries. Sequences were determined from strains present in Greece, Bulgaria, Romania, Serbia, and North Macedonia. For Greece, strains were determined from samples collected with more than a year interval and from different regions in the country. All obtained WGS were almost identical and cluster together in clade A1 within a subclade containing sequences from Turkiye and Saudi Arabia. This makes it highly likely that the same strain is spreading all over the Balkan and that the outbreaks in different Members do not represent unrelated introductions from endemic regions.

The sequencing efforts allowed to get insights in the circulating strains in Europe, the relatedness of several outbreaks, and to confirm the fit-for-purpose of available diagnostic tests. Nevertheless, to increase the chance of using whole genome sequencing to pinpoint the origin of an introduction and identify potential introduction and transmission routes, there is a need for more regular and dense surveillance in under-sampled areas of the world. It should however be kept in mind that the slow evolution of these stable DNA viruses make that molecular epidemiology will not allow to identify farm-to-farm transmission routes, as is sometimes possible for RNA viruses [17].

4. Challenges reported during surveillance and control efforts

Key messages:

- Delayed detection and reporting, sometimes by several weeks, have reduced the opportunity for early intervention and allowed viruses to circulate before control measures were implemented.

- Subclinical or atypical infections, particularly for PPR, together with limited awareness and diagnostic challenges, make early recognition of infection particularly difficult.
- Although stamping-out and movement restrictions are effective when fully implemented, their economic and social impacts can lead to resistance, delayed implementation and prolonged restrictions.
- Compensation schemes should be a part of contingency plans
- Weak biosecurity, illegal animal movements and limited communication or trust between livestock owners and Veterinary Services further complicate disease control.
- Vaccination barriers remain to exist, while it could be a critical control measure when other measures proof to be insufficient

4.1. Challenges related to early detection and preparedness

A major challenge identified in Members impacted during the ongoing emergence of PPR and SPPV in Europe was the delay in the detection and/or reporting of suspicions in the field, sometimes up to 4-6 weeks. Many SPPV outbreaks were only reported when dead animals were already present or when serologically positive animals without remaining clinical signs were found during laboratory surveillance activities, indicating that the virus was already present for a considerable time on those farms. From the moment reports of suspicions reached the competent authorities, all evidence shows that responses were swift and adequate, with mostly rapid laboratory confirmation by national reference laboratories (NRLs) and implementation of control measures. However, the time needed to report suspicions led to extensive onwards spread of the disease before disease control measures were implemented, as was notably observed for PPR in Romania and Greece.

Reasons for the delays to report suspicions were multiple during the emergence in Europe:

a) Lack of knowledge and awareness of the disease by field veterinarians, notably because the disease had never been present and was not known to circulate in neighboring countries. Also knowledge on the correct samples to collect to make a correct diagnosis is sometimes missing. For SPPV for example, biopsies of nodules or crusts provide a much better matrix for virus detection than blood and swabs.

b) For PPR, limited mortality at the onset of infection did not alarm livestock owners, especially in large holdings where some level of mortality is often expected, especially if the environment context is stressful to animals (heatwave, transport).

c) Not all Members have an NRL with a long-term appointment, making that capacity building and acquiring necessary expertise can be challenging. Also, sufficient funding of NRLs to allow adequate testing and flexible acquirement of diagnostic reagents is not always guaranteed.

d) Exclusion testing is not systemically implemented in NRLs. As clinical signs of PPR and SPPV can sometimes be similar to other diseases like FMD, BTV, and others, not each sample is systemically tested for all of these etiological agents when no prior information of disease presence is available. This makes that other potential causes may be investigated before the possibility of PPR or SPPV infection is explored. Tellingly, PPR detection in Croatia was made possible thanks to the systematic parallel testing for PPR during investigation of BTV suspicions

e) Secondary bacterial infections, often associated with PPR pathogeny, also can lead to mis-diagnosis followed by antibiotic treatment. Such treatment can lead to apparent recovery of animals which will continue to shed and transmit the PPR to surrounding animals and establishments unknowingly.

f) For PPR, some cases were associated with limited or no symptoms at all, and could be detected only after sampling and laboratory testing. Clear examples of such subclinical transmissions were identified in 2024 and 2025 outbreaks in Romania, with some holding linked through epidemiological investigation to infected farms but with no animals showing clinical signs. Random sampling for serology and PCR showed that all animals tested were positives. Interestingly some animals with subclinical infections did start to show symptoms and some level of mortality after transport to a slaughterhouse, suggesting that clinical signs can appear in a stressful context, probably in association with immunosuppression. Lastly, the emergence of PPR in Croatia in 2025 could only be detected because of an unprecedented level of abortions in one farm, with no symptoms reported in any animal of the other 4 holdings identified as infected though epidemiological investigation and laboratory testing.

g) The human factor plays a role in the delayed reporting of suspected SPPV and PPR suspicions. The limited communication and lack of trust between animal holders and Veterinary Services, sometimes driven by the poor acceptance of strict control measures in some regions, led to delayed reporting of sick animals or mortality in some cases.

As mentioned under point 2.2, renewed outbreaks of both PPR and SPPV occurred in several Members after a time interval of several weeks or months after initial cases were controlled. This points to new introductions or unreported or undetected low-level spread. Therefore, intensive surveillance could be implemented to detect the true extent of viral spread. In this perspective, Greece implemented an extensive surveillance program within protection, surveillance and further restricted zones between 7 May and 10 June 2026, leading to the detection of a limited number of additional SPPV positive holdings.

Transparent and adequate reporting of cases appear to have been implemented through ADIS and WAHIS platforms during emergence of PPR and SPPV in Europe, leading to implementation of increased surveillance measures at regional level. Likely, it did contribute to limiting the spread of both diseases to some extent. As we move towards an endemic circulation of PPR and decreased acceptability of control measures (see below), the risk of delayed or incomplete reporting does increase.

4.2. Challenges related to control efforts

Control measures implemented to stop PPR and SPPV circulation (stamping-out, movement restrictions) are efficient but have economic and social costs that have led in some regions or countries to opposition by livestock owners, associations, or the civil society, and to political pressure against the measures. Notably, stamping-out measures could not be implemented in all infected holdings in Bulgaria due to protest, leading to prolonged restrictions. The lack of a compensation scheme in some Members such as Albania or Georgia, also render implementation and acceptation of stamping-out measures more difficult.

Contact tracing was key in identifying new outbreaks in many Members. Epidemiological links were diverse, highlighting the challenge of such investigation. Links included trade links, family relationships, sharing of pasture, movement of products, transmission by wool shearing teams, milk collection vehicles, etc. In many instances, epidemiological links could not be clearly identified between outbreaks, and the origin of the infection remains unresolved.

Illegal animal movement within countries or across borders are considered as main transmission routes, especially around religious festivities. For SPPV, both Greece and North Macedonia reported a close collaboration between the veterinary authorities and the police to enforce the control measures and check their implementation. Further to challenges related to animal movements and other transmission routes mentioned above, the poor implementation of internal and external biosecurity often observed in the sector of small ruminants facilitates virus spread and disease transmission.

In some cases, as more outbreaks were identified after notification of first incursion, areas with animal movement restrictions have been extended. Some restrictions also had to be extended in time until the disease could be controlled. Impact of movement restrictions on livestock owners are multiple, leading to poor acceptability and the need for tight controls with the support of local authorities. Issues were notably lack of feed, necessity to use shared pasture, national and international demands for meat and live animals associated with religious events, milk production. Such pressures were most felt in regions relying heavily on economic income associated with small ruminant productions, such as Romania for export of live animals and meat, or Greece for cheese production.

Animals may also have been in summer pastures when PPR infections are reported in an area. Animals from multiple holdings may mix or be in close contact in such summer pastures. They are often located in hard-to-reach, mountainous regions, and can be at the border between two countries, as it is the case for Albania and Kosovo*. Such context has made surveillance and control efforts more difficult. In face of this situation, Kosovo* authorities have implemented additional clinical surveillance activities on animals moving back to their holding after the summer period. The use of common grazing is also an important risk factor for transmission, especially for SPPV due to the high persistence of the virus (reported up to 6 months) in the environment when present in scabs and shaded pens.

PPR infections have also been associated with reduction of animal prices, increasing the risk of purchase and illegal cross-border movements of animals. Field investigations suggest that low prices in Albania have led to illegal movement and incursion of the disease in Kosovo*. Risks of cross-border movement for PPR and SPPV

have also been associated with community ties, with farmers having family and/or business relations installed in another country.

Another challenge, certainly for SPPV, seems to be related to the decision whether or not to implement vaccination as a complementary control measure in regions or countries experiencing extensive outbreaks which are not stopped by other measures. To provide guidance in this matter, EFSA was tasked with assessing available vaccines and vaccination strategies for controlling and potentially eliminating SPPV in South and Eastern Europe. Their study concluded that live attenuated vaccines are commercially available, widely used in endemic regions in Africa and Asia, and generally provide at least 80% protection against infection, morbidity, and mortality. Safety concerns are minor and mainly limited to specific strains or susceptible breeds. . Modelling indicated that vaccinating only affected regions without movement restrictions risks viral escape and prolongs the epidemic, while nationwide or regionally prioritized vaccination, especially combined with movement control, can contain and eliminate the epidemic more quickly. The modeling results emphasized that no single measure is sufficient; a combination of rapid detection, targeted culling, movement restrictions, and vaccination provides the most effective path to SPPV elimination [19]. Despite the clear outcome of this study, none of the affected Members decided to go forward with vaccination, possible due to uncertainty about the impact on trade of animals and animal products and associated economic losses.

A recent FAO report on PPR highlighted the same critical bottlenecks that hinder effective eradication and control:

- Reporting & Compensation: Insufficient or delayed compensation programs lead to widespread under-reporting of outbreaks by farmers and field veterinarians.
- Epidemiology & Borders: Porous borders, shared pastures, and mass animal movements during religious festivals facilitate disease spread, which is further complicated by subclinical cases of PPR.
- Vaccination Barriers: Members remain reluctant to vaccinate due to severe trade restrictions, a lack of EU-approved vaccines, and political sensitivities, even though emergency vaccination is legally permitted under EU law.

5. Lessons learned and priority areas for effective control

Key messages:

- Strengthening awareness, early warning, risk-based surveillance and appropriate sampling is essential to reduce delays in detecting and reporting PPR and SPGP.
- If unexpected or unexplained new outbreaks continue to emerge in a Member country, it might be necessary to implement adequate, large-scale, surveillance programs to assess the true extent of SPPV and PPR.
- Improved enforcement of animal movement controls, stronger biosecurity and enhanced cooperation with police and other relevant authorities are needed to reduce transmission risks.
- Vaccination should be considered as an additional control option where conventional measures prove insufficient, with vaccination strategies prepared in advance and communicated with neighbouring Members.
- Enhanced regional collaboration, including timely information sharing on disease occurrence and animal movements, is essential to improve preparedness, early detection and coordinated control across borders.

5.1. Early detection and preparedness

Delays in reporting of suspicions highlight that there is an urgent need for more awareness of farmers and field veterinarians in Europe about the possible symptoms of PPR and SPPV, the risk of confounding factors, and the right sampling and storage procedures. Reducing the time of reporting suspicions and collecting samples for laboratory testing will have a major impact on the capacity to stop the circulation of both diseases in Europe.

At the same time, permanent NRLs should be appointed and employ well-trained staff. Also, sufficient funding should be guaranteed and agile purchasing procedures in place to make that diagnostic reagents and kits can be acquired without delays when necessary. Having seen that multiple pathogens and other causes can lead

to similar disease symptoms, exclusion testing schemes should be put in place dependent on the regional epidemiological situation.

As sequencing of circulating strains has shown to be helpful to validate diagnostic tests and helped to understand disease introduction and spread pathways, the collaboration between NRLs and international reference laboratories for PPR and SPPV should be encouraged to build capacity in this domain or ensure the swift exchange of samples to allow sequencing and support molecular epidemiology.

Field and genetic data suggest that PPR and SPPV are probably circulating undetected in multiple countries in Southeastern Europe and that the risk of further spread to other countries in Europe and beyond remains real. Strengthening surveillance is therefore critical, including reinforcing live animal trade traceability, testing animals originating from affected or at-risk areas even without clinical signs, and systematically sampling holdings based on risk factors such as trade intensity (legal and illegal), epidemiological links with currently or previously infected areas and biosecurity levels in place. It might be necessary to implement adequate, large-scale, surveillance programs to assess the true extent of SPPV and PPR spread in some regions or countries.

Although sheep with typical clinical signs for PPR and SPPV were observed during the outbreak, this was not the case in all affected animals. Especially for PPR this emergence has been characterised with observation of a wide variety of symptoms, all typically associated with PPR, but not expected to be seen with such differences in severity. This diversity is well documented in endemic regions [13] and from infection experiments [14,15], but factors influencing host susceptibility and pathogenesis are not well understood. Based on field observation, it seems that we can expect limited symptoms in herds kept in good health and living conditions. This is a clear priority for research, notably the impact of stress on PPR pathogenesis.

Subclinical transmissions likely play a role in the current hidden circulation of PPR. Surveillance must be improved and adapted to this issue. Samples should be collected from animals in farms with strong epidemiological links with other confirmed infected farms, even if no clinical symptoms are observed. Samples could be taken more regularly from sheep and goats which have died for apparently other reasons to ensure that they do not represent PPR infections.

Serological samples and testing will lead to false positive results because tests are not 100% specific. The WOAH reference laboratory network and the EURL-PPR have produced recommendations on how to investigate false positive results and rule out outbreaks.

5.2. Control measures

Strong Veterinary Services that are adequately staffed and have sufficient budget are key to responding quickly and thoroughly when disease suspicions are reported and confirmed. As the current outbreaks of PPR and SPPV have shown that control measures could not always be implemented or are not completely adhered, collaboration with the police should be put in place to reduce illegal animal movements and ensure law enforcement.

Control measures (stamping-out, movement restrictions, investigations in surveillance and protection zones) have proved to be efficient if they can be applied thoroughly, with full government and public support. The difficulty of enforcing restrictions during an outbreak with limited or no mortality or clinical signs has been an issue faced by multiple Members and that we should expect to be continuing while PPR and SPPV are circulating in Europe. Decision-makers and veterinary authorities should discuss how best to address this issue to ensure adequate response to PPR and SPPV outbreaks adapted to the context. Also, fair compensation schemes that will apply in case of stamping out should be discussed and implemented, as this will stimulate early reporting of suspicions.

Evidence of indirect transmission through vehicles, material or people, highlights the need to enhance awareness of livestock owners of the importance to apply biosecurity measures to protect their flocks from disease introduction, notably if they have interactions or trade links with farms or regions infected by PPR or SPPV. Overall, the level of biosafety in the small ruminant sector should be increased.

Decision-makers must keep in mind that vaccination can be part of the solution in a context where the disease proves to be difficult to control. Safe and efficacious live attenuated vaccines for PPR and SPPV are commercially available. The EU holds a PPR and SPPV vaccine bank for emergency response, although it is not sufficient to cover country-wide vaccinations. PPRV and SPPV vaccines are available from multiple vaccine production companies and government laboratories in Africa, the Middle East, Asia, Russia and Tukiye. There

are however no commercial vaccines authorised for use in Europe. Vaccination plans should be designed and discussed timely, so they can rapidly be deployed if a decision to vaccinate is made. Transparent communication with neighboring countries about vaccination campaigns is needed to ensure adapted surveillance strategy at regional level.

5.3. Cross-border collaboration

Legal or illegal cross-border animal movement and pastures along national borders have likely played a major role in the spread of PPR and SPPV in Europe, as elsewhere,. Efforts for early detection and control of the disease will be made more efficient if Members share information on disease occurrence and animal movement. Information sharing is especially important for Members sharing borders with closely related communities, increasing the risk of informal movement and disease transmission.

Regional surveillance programs focusing on PPR, SPGP and other transboundary animal diseases have taken place in the past, but they have mostly concentrated on a threat of cross-border introduction, notably between Europe and Türkiye. The emergence of PPR in Southeastern Europe and Georgia suggest that the risks of introduction may rest elsewhere, in association with trading activities. New regional surveillance programs could be planned, considering risks associated with trading activities.

WOAH is currently working on a standardised methodology designed to help competent veterinary authorities to regulate, monitor, and restrict livestock movements to prevent the spread of transboundary diseases like PPR and SPPV. Officialisation of this framework and its implementation in the region should be beneficial to reduce cross border disease spread.

5.4. Research gaps

Significant areas of uncertainty in understanding and knowledge about PPR and SPPV exist especially in relation to pathogenesis, immunology, and epidemiology. More profound knowledge is needed in areas such as the identification of factors involved in the variation of host susceptibility, determinants of pathogenicity, and induced humoral and cellular immune responses. For PPRV, the potential importance of indirect transmission of virus, and the transboundary transmission dynamics, notably in complex multispecies systems, need further study. More information is needed on the effectiveness and cost-benefits of intervention strategies, especially vaccination, to inform national control programs. The development of marker vaccines and companion serological DIVA tests for PPR and SPPV would probably stimulate the use of vaccination as a control measure.

More research is needed on PPRV and SPPV environmental persistence and duration thereof, to better assess the potential for indirect transmission and orientate biosecurity measures in areas at risk.

Genetic investigations have provided important insights in the dynamics of PPR and SPPV emergence in Europe, but more impact could be generated from such studies when more sequences would become available from other Members where these viruses are currently circulating, notably in Northern and the Horn of Africa, Asia and Türkiye. All Members should be encouraged to generate genetic data, with support available from reference laboratories, and inform the global control effort.

5.5. Conclusions

PPRV and SPPV have emerged in recent years in Southeast Europe and, despite the implementation of coherent control measures based on stamping out and movement restrictions, virus circulation has not been stopped. Legal and Illegal animal movements and pastures along national borders continue to be one of the principal drivers of disease transmission, a conclusion supported by epidemiological and laboratory findings, and emphasise the need for Members to work together to address this issue.

Experience from recent outbreaks together with information shared between affected Members through WOAH GF-TAD Europe and other regional coordination mechanisms resulted in the conclusion that key elements to control these outbreaks include strengthening surveillance, early warning systems, and diagnostic capacity to ensure PPR and SPGP detection. PPR and SPPV should be consistently considered in differential diagnoses in the region, as the diseases can be overlooked by veterinarians or farmers. Enhanced awareness campaigns, cross-border cooperation, and continuous reporting through platforms such as WAHIS and GF-TADs, should be reinforced. Education and awareness campaigns should target veterinarians, farmers, and all relevant stakeholders to improve biosecurity, timely detection and response. National contingency plans should be updated based on recent outbreak data, transmission risk assessments, and aligned with WOAH international

standards. Sustainable financial and human resources of Veterinary services and National Reference laboratories are essential to support prevention, early detection, control, and eradication activities. Laboratory capacity should be increased and expertise strengthened to minimise inconclusive or false-positive results. Samples should be shared with reference laboratories for genetic sequencing and epidemiological analyses to guide control measures effectively. Finally, Members should consider vaccination strategies if other control measures show to be insufficient.

References

1. Parida S, Muniraju M, Mahapatra M, Muthuchelvan D, Buczkowski H, Banyard AC (2015) Peste des petits ruminants. Veterinary Microbiology. 181:90-106.

2. Bataille A, Baron MD (2024) Rinderpest and peste des petits ruminants: state of play in disease eradication efforts. Rev Sci Tech. Special Edition:43-52.

3. Rahman A-U, Dhama K, Ali Q, Hussain I, Oneeb M, Chaudhary U, Wensman JJ, Shabbir MZ (2020) Peste des petits ruminants in large ruminants, camels and unusual hosts. Veterinary Quarterly. 40:35-42.

4. Pruvot M, Fine A, Hollinger C, Strindberg S, Damdinjav B, Buuveibaatar B, Chimeddorj B, Bayandonoi G, Khishgee B, Sandag B, Narmandakh J, Jargalsaikhan T, Bataa B, McAloose D, Shatar M, Basan G, Mahapatra M, Selvaraj M, Parida S, Njeumi F, Kock R, Shiilegdamba E (2020) Outbreak of Peste des Petits Ruminants among Critically Endangered Mongolian Saiga and Other Wild Ungulates, Mongolia, 2016–2017. Emerg Infect Dis. 26:51-62.

5. Adedeji AJ, Milovanovic M, Dogonyaro BB, Adole JA, Samson M, Omoniwa DO, Olubade-Olatokunbo T, Emmauel LL, Ijomanta JO, Karaye KK, Igomu EE, Omileye A, Ignatius HO, Adamu P, Allendorf V, Hoffmann B, Meseko C, Dietze K (2025) Can pigs add another "P" to the PPR? Serological evidence of frequent Peste des petits ruminants infections in pigs in Nigeria. Vet Res. 56:49.

6. Baron MD, Diallo A, Lancelot R, Libeau G (2016) Peste des Petits Ruminants virus. In: Kielian M, Maramorosch K, Mettenleiter TC (eds), Advances in Virus Research Volume 95. Academic Press, pp 1-42.

7. WOAH, FAO (2015) Global control and eradication of PPR. https://www.fao.org/3/i4477e/i4477e.pdf.Accessed on 30 July 2025.

8. Parida S, Muniraju M, Altan E, Baazizi R, Raj GD, Mahapatra M (2016) Emergence of PPR and its threat to Europe. Small Ruminant Research. 142:16-21.

9. Donduashvili M, Goginashvili K, Toklikishvili N, Tigilauri T, Gelashvili L, Avaliani L, Khartskhia N, Loitsch A, Bataille A, Libeau G, Diallo A, Dundon WG (2018) Identification of peste des petits ruminants virus, Georgia, 2016. Emerging Infectious Diseases. 24:1576-1578.

10. Donduashvili M, Baisonashvili T (2024) Peste des petits ruminants emergence in Georgia. Workshop of the EURL-PPR network, 15-16 October 2024 https://eurl-pprciradfr/ Presentation available upon request.

11. WOAH (2018) World Animal Health Information System. https://wahis.woah.org/#/in-review/2941. (accessed on 28 Jan 2025).

12. Guendouz S, Kwiatek O, Kirtzalidou A, Katsifa A, Gianniou M, Ancuceanu C, Ghiță M, Mortasivu CL, Zdravkova A, Kostov I, Ivanova E, Bărbuceanu F, Tasioudi KE, Bataille A (2025) Genomic analysis of peste des petits ruminants virus in Europe: Common origin for emergence in Greece, Romania, and Bulgaria. Infection, Genetics and Evolution. 132:105774.

13. Couacy-Hymann E, Bodjo C, Danho T, Libeau G, Diallo A (2007) Evaluation of the virulence of some strains of peste-des-petits-ruminants virus (PPRV) in experimentally infected West African dwarf goats. The Veterinary Journal. 173:178-183.

14. Enchery F, Hamers C, Kwiatek O, Gaillardet D, Montange C, Brunel H, Goutebroze S, Philippe-Reversat C, Libeau G, Hudelet P, Bataille A (2019) Development of a PPRV challenge model in goats and its use to assess the efficacy of a PPR vaccine. Vaccine. 37:1667-1673.

15. Eloiflin RJ, Grau-Roma L, Python S, Mehinagic K, Godel A, Libeau G, Summerfield A, Bataille A, García-Nicolás O (2022) Comparative pathogenesis of peste des petits ruminants virus strains of difference virulence. Vet Res. 53:57.

16. WOAH. Terrestrial Manual Chapter 3.4.12. Lumpy skin disease

17. Breman FC, Haegeman A, Philips W, Krešić N, Hoffman S, De Keersmaecker SCJ, Roosens NHC, Agüero M, Villalba R, Miteva A, Ivanova E, Tasioudi KE, Chaintoutis SC, Kirtzalidou A, De Regge N. Sheeppox virus genome sequences from the European outbreaks in Spain, Bulgaria, and Greece in 2022-2024. Arch Virol. 2024 Oct 30;169(11):234. doi: 10.1007/s00705-024-06165-6.

18. Villalba R, Haegeman A, Ruano MJ, Gómez MB, Cano-Gómez C, López-Herranz A, Tejero-Cavero J, Capilla J, Bascuñan MV, De Regge N, Agüero M. Lessons Learned from Active Clinical and Laboratory Surveillance during the Sheep Pox Virus Outbreak in Spain, 2022-2023. Viruses. 2024 Jun 27;16(7):1034. doi: 10.3390/v16071034.

19. European Food Safety Authority (EFSA); Tsviatko Alexandrov, Ieva Baltusyte, Alessandro Broglia, Paolo Calistri, Simon Gubbins, Nick De Regge. Sheep and goat pox: vaccines and vaccination scenarios to control the epidemics in Greece and Bulgaria in 2025. EFSA J. 2026 Feb 26;24(2):e9928. doi: 10.2903/j.efsa.2026.9928. eCollection 2026 Feb.

(*) *This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ opinion on the Kosovo declaration of independence.*