REPORT OF THE MEETING OF THE OIE AD HOC GROUP ON PESTE DES PETITS RUMIANTS
Paris, 14–16 June 2011

1. Opening and Welcome Address

The OIE ad hoc Group on Peste des Petits Ruminants (PPR) met at the OIE headquarters from 14 to 16 June 2011. Dr Bernard Vallat, Director General of the OIE, welcomed the participants and thanked them for their contribution to OIE activities. He explained the objectives of the meeting, which were primarily to update the specific chapters on PPR of the OIE Terrestrial Animal Health Code (Terrestrial Code) (the chapter was last updated in 2000) and of the Manual of Diagnostic Tests and Vaccines for Terrestrial Animals (Terrestrial Manual) (the chapter was last updated in 2008). He called for discussions on the feasibility of a global control programme for PPR so that the OIE could be advised on the need for and viability of such an initiative and on a possible roadmap.

2. Adoption of the agenda and appointment of a chair and of a rapporteur

The Group nominated Dr Adama Diallo as chair and Dr Madhusudan Hosamani as rapporteur. The adopted agenda and list of participants are attached as Appendices I and II, respectively. Prof. Hassan Aidaros, representative of the Scientific Commission for Animal Diseases, could not attend the meeting. All participants signed a confidentiality undertaking, in line with the OIE procedures adopted at the 79th General Session of the World Assembly of Delegates to the OIE. The secretariat of the meeting was provided by Dr Joseph Domenech.

3. Adoption of the Terms of reference

The Group adopted the proposed Terms of Reference, which is attached as Appendix III.

4. Current situation of PPR in the world

The Group discussed the current disease status in the affected regions: PPR was endemic in many African countries from Northern Africa to Tanzania, in the Middle East, in Central and Southern Asia and in parts of China (People’s Rep. of).

The different PPR viruses (PPRV) that have been isolated so far in all these areas were classified into four lineages. Until 2000, lineage 4 was confined to Asia and the Middle East. However this lineage had recently been identified in Africa – in Sudan in mid-2000 and in Morocco in 2008, the first PPR outbreak in that country. PPRV infection had also been identified in both Tunisia and Algeria. This situation, together with the first discovery of the disease in Uganda, Kenya and Tanzania in 2006–2007, indicated a shift in disease dynamics on the continent. While the 2008 outbreak in Kenya was severe with high mortality being recorded, the one that occurred in Morocco was mild in nature with moderate morbidity and mortality. However it had spread very quickly throughout the country through animal trade.
The situation in India was improving as a result of progressive mass vaccination – the disease incidence has been in decline over the past 5 years. The Government of India had launched a national control programme for PPR that would be run in three phases during India’s 11th (2007–12) and 12th (2012–17) 5-year plan periods.

PPR was reported in China (People’s Rep. of) in 2008 and again in 2010.

In Central Asia, PPR was reported in Tajikistan for the first time in 2004, although it appeared that PPR might have been present in the country for a long before.

In Tajikistan’s neighbouring countries, serological surveys had demonstrated the presence of antibodies (in unvaccinated animals), suggesting endemic circulation of PPRV. In Afghanistan and Pakistan, PPR has been considered endemic since the 1990s.

In conclusion, the Group agreed that the disease was spreading in many regions of the world – Africa, the Middle East, Central and South Asia and China. It was possible that the disease had existed before, until it was recently identified in some of these affected regions, particularly in Central Asia. Indeed in the absence of proper diagnostics, the disease had often been misdiagnosed in favour of other diseases such as pasteurellosis, contagious caprine pleuropneumonia or rinderpest. It was imperative that all countries undertake surveillance for prompt disease reporting as PPR sensitive and specific diagnostic tools were currently available.

5. Review and update of the Terrestrial Code

5.1. Terrestrial Code Chapter 14.8 on Peste des petits ruminants

The Group discussed the Chapter 14.8 on PPR of the Terrestrial Code, which had not been updated since 2000.

Dr Alejandro Thiermann, President of the OIE Terrestrial Animal Health Standards Commission, joined the Group for this agenda item. He suggested that the Group carefully examine certain other chapters in the Terrestrial Code (e.g. rinderpest, classical swine fever, foot and mouth disease [FMD]), which could be used as templates for the PPR chapter, making sure that the revised chapter remains consistent with the chapter on PPR in the Terrestrial Manual and with other horizontal chapters of the Terrestrial Code (e.g. Chapter 1.4 on animal health surveillance, Chapter 2.1. on import risk analysis).

The Group agreed that the definition of susceptible animals should be better specified. Very few PPR cases were reported in domestic animal species other than sheep and goat, but there was no proof that these other domestic species, i.e. cattle, buffaloes and camels, would have any significant role in the PPRV circulation. Given the aim of avoiding any risk for importing countries, the Group agreed to add to the definition other susceptible species such as cattle, camel, buffalo and wild small ruminants.

The Group agreed that there was no evidence, at present, that commodities could be traded unconditionally from infected country without posing a risk of introducing the virus into an importing country. Therefore the Group decided not to add any specific articles stating that commodities could be traded without appropriate conditions/treatment until relevant research evidence was made available.

Most of the proposed changes or addition of new articles address the specific conditions to be applied when importing commodities from infected countries.

The Group agreed on the proposed new amendments to this chapter.

5.2. Chapters 1.4 (Animal health surveillance) and 2.1 (Import risk analysis) of the Terrestrial Code

The Group looked at the need to revise several horizontal articles in these two chapters of the Terrestrial Code so as to better address the PPR issues.

1 The proposed amendments to the Terrestrial Code or Manual chapters will be presented in their final form by the relevant Specialist Commission for adoption by the World Assembly of Delegates to the OIE.
a) Peste des petits ruminants surveillance

The Group considered that Chapter 1.4 of the Terrestrial Code responded to the needs of PPR surveillance and did not require further amendments for the time being. This conclusion could be different if a global strategy for PPR eradication was to be developed and if PPR became a disease for which the OIE would officially recognise disease status of countries, as was currently the situation for FMD, bovine spongiform encephalopathy (BSE) and contagious bovine pleuropneumonia (CBPP) (see Section 9 of this report).

b) Import risk analysis

Similarly to PPR surveillance, the Group agreed to make no amendments to Chapter 2.1 on Import risk analysis.

6. Review of the recent research developments and research initiatives on peste des petits ruminants

Dr Geneviève Libeau introduced this item. Her presentation was followed by a discussion. The group prepared the following conclusions and recommendations:

6.1. Serological tests

Serological tests were now able to promptly detect new outbreaks of PPRV and to obtain data on the incidence and prevalence in infected areas:

– A set of ELISAs\(^2\) were available, some of them being commercialised worldwide. The H- or N-based competitive ELISA (C-ELISA) offered many advantages and had a high degree of correlation to the gold standard assay – the Virus neutralisation test.

– In addition, pen-side tests such as chromatographic strip tests had been developed and marketed for PPR as was previously done for rinderpest.

6.2. Molecular epidemiology

It would be crucial to provide laboratories with efficient tools that allow both the early detection of PPR emergence or re-emergences and conclusions to be reached on the origin of the virus through molecular epidemiological studies in connection with knowledge of animal movements:

– The conventional RT-PCR\(^3\), now widely used in laboratories, allows direct sequencing and thus genotyping of strains. Four lineages are known, historically separated according to geographical localisation, but now showing some lineage mix.

– There is a constant increase in sequence data mainly from part of the F and of the N genes of PPRV and also from the full genome.

– Real-time RT-PCR linked to ‘robotisation’ allows high throughput surveillance. Several publications on this method adapted for PPR are available.

6.3. Sampling and isolation of strains

– Simple and cold-chain-free methods, for sampling and virus identification such as dry blotted filter paper (Whatman), are very promising.

\(^2\) ELISAs: enzyme-linked immunosorbert assays

\(^3\) RT-PCR: reverse-transcription polymerase chain reaction
– New methods of isolation can reinforce PPR control efforts as they enable quicker diagnosis and virus typing for epidemiological information. A technical breakthrough was recently made using transgenic cells expressing the receptor (SLAM) of morbilliviruses (including PPRV); this method reduced considerably the lag time for these viruses.

All these tests would be allow better assessments to be made of the extension of the disease into new areas or the certification of freedom from the disease.

6.4. **Standardisation of genotyping**

Improved standardisation would be needed to ease the comparison of all the data produced. For example, protocols should be well defined for the genotyping of strains, currently made using two genes of the virus, the nucleoprotein (N) and the fusion protein (F). The criteria for categorising to which lineages the virus isolates belong should also be harmonised. Today the two main laboratories (CIRAD and IAH Pirbright) use different criteria.

6.5. **Diagnostic tools - transfer of technology**

– As the laboratory confirmation of clinical cases is compulsory it is essential that diagnosis rely on validated, sensitive and specific tools that are currently available worldwide.

– The transfer of technology to more laboratories with the aim of improving skills should be supported, including increasing the testing capacity and implementing proficiency tests.

6.6. **Vaccine developments for improved control of PPRV**

– The conventional live attenuated PPR vaccines, including PPRV Nigeria 75-1 and PPRV-Sungri 96, have been used worldwide with high efficacy in sheep and goat populations, providing at least 3 years immune protection after a single dose immunisation. The Nigeria 75/1 vaccine strain had proven effective, regardless of the lineage type circulating in a particular country/region.

– To carry a control programme to a successful conclusion in the long term (PPR eradication), it will be highly beneficial to develop and use vaccines along with new-generation companion diagnostic tests that would enable differentiation of infected from vaccinated animals (DIVA). Some preliminary steps have already been taken including whole genome cloning and definition of markers, but few laboratories work on PPR reverse genetics. This research should be encouraged.

– Combined vaccines to target several major diseases of small ruminant species should be developed such as Capripox-PPR vaccine, which also serves as a marker vaccine.

– Improvement of the stability and of the production of the conventional PPR vaccines is needed. The process of thermostability was initiated in PANVAC for the rinderpest and PPR vaccines (production of the Xerovac). Another initiative for PPRV thermostabilisation is currently being implemented between NVI (Ethiopia) and IBET (Portugal). The process is an output of the European MARKVAC project. Transfer is foreseen to other laboratories.

– Improvement of the criteria for evaluating vaccine potency with a virulent challenge is indispensable. A scoring system adapted to infectious doses rather than lethal doses of challenge virus should be defined (see Section 8 of this report). The potency test will also benefit from the development of a small animal model (transgenic mice expressing the receptor of PPRV).
6.7. Therapy developments

- Biological antivirals based on RNA interference have been developed for potential treatment during PPRV infection. The *in vitro* tests of these new reagents have been successful and the *in vivo* tests are on-going. This research should continue.

- To improve *in-vivo* studies on PPRV infection and on vaccine efficacy or antiviral activity, murine models are planned to be developed, especially by creating transgenic mice bearing the PPRV SLAM receptor. This study has to be encouraged.

6.8. Conclusion

In order to improve the control of PPR there is a need to develop research with international support as a component of a project on global strategy to control PPR.

7. Selection of vaccines used against PPR in regard to the global eradication of rinderpest

The Group considered that the vaccine strains that had been widely used for mass immunisation in Africa, India and in several other countries in Asia and the Middle East were effective. They would not pose any problem with regard to possible differentiation with rinderpest virus infection.

Considering the global eradication of rinderpest in its natural setting and the risk of accidental release of the virus from laboratory sources, FAO and OIE will, among other post-eradication activities, ensure approval for a small number of centres able to produce rinderpest vaccine (see Resolution No. 18 of the OIE 79th General Session and its appendix). The vaccines used in case of a rinderpest emergency would be the currently available rinderpest vaccine and the Group did not discuss the issue of selection of PPR vaccines in regard to the global eradication of rinderpest.

8. Review and update of the *Terrestrial Manual*

The Group discussed and proposed a revision to Chapter 2.7.11 on PPR of the *Terrestrial Manual*.

Section A (Introduction) was updated with regard to susceptible animals, worldwide situation, mortality and morbidity.

In Section B (Diagnostic techniques), heading 1 (Identification of the agent), the Group revised slightly the text to take into account recent technical developments (ELISA, RT-PCR, virus isolation). Regarding Section C (Requirements for vaccines and diagnostic biologicals), heading 4 (batch control), the Group discussed the problem of the definition of the LD$_{50}$ (50% lethal dose) to be used for vaccine potency tests. This challenge dose being difficult to reproduce, it was recommended that researchers work on an ID$_{50}$ (50% infectious dose), which could include the definition of a clinical scoring system (1996 and 2000 editions of the *Terrestrial Manual* mentioned the use of 50% goat infectious doses for vaccine potency tests). For the time being, the Group agreed not to revise this section of the *Terrestrial Manual*.

The amended chapter was passed on to the Biological Standards Commission.

9. Need for and feasibility of launching a global PPR control strategy and/or a global initiative with appropriate partners to eradicate the disease

The presentation and discussion on the current PPR situation in the world (see Section 4 of this report) led the Group to conclude that there was a need to increase efforts to control the disease.
The Group received information on several initiatives currently being prepared or implemented in various regions. In Africa, the AU-IBAR had prepared and published a Pan-African strategy for the progressive control of PPR, which was presented on different occasions such as during the latest Regional GF-TADs Steering Committee for Africa, held in Nairobi, Kenya in 2011.

The Group took note of the situation and the on-going discussions among SADC member countries. A recent meeting had been held in Shingula, Zambia, from 7 to 8 June 2011 and a set of recommendations were produced. PPRV infection was spreading from Eastern Africa towards Southern Africa, and several SADC member countries were already infected (Tanzania, Congo, and possibly northern Zambia). Further discussions would take place during a forthcoming meeting of SADC epidemiology and laboratory networks and also during a meeting of SADC Directors of Veterinary Services. A regional control strategy could be proposed that might include vaccination and the establishment of a protection zone between Tanzania and Congo in one side and Zambia, Mozambique, Malawi and Angola on the other.

The situation in Northern Africa and particularly in the Maghreb region was summarised by Dr Malik Jamal. The spread of the PPRV lineage 4 with several countries being infected had stimulated debates regarding a possible regional strategy to eradicate the disease. A regional FAO TCP was being implemented and other regional meetings would take place with the collaboration and support of the OIE and FAO Sub-Regional Offices. Dr Hosamani reported on the disease situation in India and on the control programme currently implemented, based on massive vaccination during the past 3 years followed by more targeted vaccination campaigns. The use of efficacious vaccines and improved diagnostic tests was expected to significantly contribute to India’s control strategies. However, to achieve the desired objectives of the control programme, the Veterinary Services needed to be strengthened to improve its capacity for rapid reaction and to instigate proper surveillance systems in the country.

Dr Giancarlo Ferrari described on-going discussions on PPR in FAO. A presentation calling for proactive PPR control action had been given by Dr Peter Roeder during the GREP workshop held in Rome on 14 October 2010. FAO had made a suggestion to the OIE to develop a PPR global strategy in the context of the FAO/OIE GF-TADs as was currently being done for the global control of FMD.

The conclusions of the Group’s discussions were the following:

- Considering the PPR situation in the world and the discussions on the initiatives already underway in various regions, the Group recommended that a global PPR control strategy be considered.

- Considering the availability of effective tools to control PPR, such as vaccines and diagnostic tools, along with the epidemiological characteristics of the disease, with the marginal role played by wildlife, the Group considered that PPR control and eradication programmes were feasible at the regional and eventually the global levels.

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4 AU-IBAR: African Union-Inter African Bureau for Animal Resources
6 GF-TADs: Global Framework on the control of Transboundary Animal Diseases
7 P. Bastiensens et al. (2011), Perspectives de l’OIE sur la Peste des Petits Ruminants, PPT présentation. Atelier de développement de stratégies pour freiner l’avancée de la Peste des Petits Ruminants dans la région SADC, 7 – 8 juin 2011, Chingola, Zambia
8 SADC: South African Development Community
9 SADC Shingola PPR meeting, Zambia, 7-8 June 2011, Resolutions on PPR
10 Regional Workshop on the control of PPR in Maghreb (2008), Recommendations, Rabat, Morocco, 13-14 Nov. 2008
11 FAO TCP: Food and Agriculture Organization of the United Nations Technical Cooperation Programme
12 M. Hosamani, PPR control strategies in India, PPT presentation, Paris, 16 June 2011
13 GREP: Global Rinderpest Eradication Programme
Considering the success of the GREP of FAO and the on-going work carried out jointly by FAO and OIE to develop a global FMD control strategy, the Group recommended that a global initiative to control PPR be further discussed using the GF-TADs mechanism and building on the necessity to develop and improve national as well as regional and international coordination. The GREP model should be used along with methods that were or are being applied to avian influenza or FMD control and eradication. The GF-TADs Global Steering Committee had already addressed this PPR control issue and had recommended to consider the establishment of a specific PPR GF-TADs Working Group (meetings held in Rome in June 2009 and in Paris in October 2010). If a global initiative was to be considered, an appropriate partnership would become crucial and would have to be put in place with, in addition to OIE and FAO, other partners such as IAEA14, regional organisations, donors, private stakeholders (companies, producers organisations, etc.), research organisations, and international and regional organisations’ member countries.

The Group further recommended that OIE considers the possibility of developing the necessary tools that would become indispensable and would provide incentives to support the implementation of a global strategy. Among such tools would be the development of:

- A specific OIE PPR Eradication Pathway, as had been done for global rinderpest eradication.
- A specific procedure to assess and certify the official PPR free status of countries or zones, which would require the establishment of an OIE ad hoc Group on PPR status and the necessary provisions in the Terrestrial Code, including guidance on preparing country dossiers.
- Additional articles in the specific PPR Chapter 14.8 of the Terrestrial Code to support an eradication strategy using an eradication pathway, particularly in the field of surveillance.

If the Scientific Commission at its September 2011 meeting recommended continuing to work on a PPR control strategy and initiative, and on an OIE official pathway, the PPR ad hoc Group would be ready to meet again towards the end of 2011 or the beginning of 2012. Should this be the case, participation of experts from the OIE ad hoc Group on Epidemiology and, eventually, from the OIE Working Group on Wildlife Diseases, would be desirable.

10. Finalisation and adoption of the draft report

It was not possible to adopt a finalised draft report during the meeting because of the time spent on several items of the agenda, particularly on the revision of the Chapter of the Terrestrial Code. The Group agreed to circulate a full report by email for final adoption. The Chairman thanked the Rapporteur and all participants in the ad hoc Group for their active participation and productive discussions.

14 IAEA: International Atomic Energy Agency
Appendix I

MEETING OF THE OIE AD HOC GROUP ON PESTE DES PETITS RUMINANTS

Paris, 14 - 16 June 2011

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Agenda 

1. Opening and Welcome Address
2. Adoption of the agenda and appointment of a chair and of a rapporteur
3. Adoption of the Terms of reference
4. Current situation of PPR in the world
5. Review and update of the Terrestrial Code
6. Review of the recent research developments and research initiatives on PPR
7. Selection of vaccines used against PPR with regard to the global eradication of rinderpest
9. Need for and feasibility of launching a global PPR control strategy and/or a global initiative with appropriate partners to eradicate the disease
10. Finalisation and adoption of the draft report

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MEETING OF THE OIE AD HOC GROUP ON PESTE DES PETITS RUMINANTS

Paris, 14 - 16 June 2011

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Appendix III

MEETING OF THE OIE AD HOC GROUP ON PESTE DES PETITS RUMINANTS

Paris, 14 - 16 June 2011

Terms of Reference

1. Update on the current situation of peste des petits ruminants (PPR) in the world

2. Review the recent research developments and research initiatives of PPR

3. Review and update the Terrestrial Code and the Terrestrial Manual Chapter on PPR

4. Advise the OIE on the selection of vaccines used against PPR with regard to the global eradication of rinderpest

5. Advise the OIE on the need for PPR specific surveillance guidelines

6. Advise the OIE on the need for and feasibility of launching a global PPR control strategy and/or a global initiative with appropriate partners to eradicate the disease

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