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WORLD ORGANISATION
FOR ANIMAL HEALTH

GLOBAL STRATEGY FOR THE **CONTROL** AND **ERADICATION** OF **PPR**



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FOREWORD

Peste des petits ruminants (PPR) can severely affect small ruminants in almost 70 countries in Africa, the Middle East and parts of Asia. It is a highly contagious disease that causes USD 1.5 to 2 billion in losses each year in regions that are home to over 80% of the world's sheep and goats and to more than 330 million of the world's poorest people, many of whom depend on them for their livelihoods. The disease threatens food security and the livelihoods of smallholders and prevents animal husbandry sectors from achieving their economic potential. Reducing the number of PPR-endemic countries is therefore a shared interest and should be considered a Global Public Good.

PPR, as one of the most damaging of all animal diseases, is among the priority diseases indicated in the FAO-OIE Global Framework for the Progressive Control of Transboundary Animal Diseases (GF-TADs) 5 Year Action Plan. In response to recommendations of GF-TADs, a resolution by the World Assembly of Delegates of the OIE and recommendations of the Committee on Agriculture (COAG) and the Council of FAO, the GF-TADs Working group has developed the PPR Global Control and Eradication Strategy (hereinafter the 'Global Strategy'), which is being presented at the FAO and OIE International Conference for the Control and Eradication of *peste des petits ruminants* to be held in Abidjan (Côte d'Ivoire), from 31 March to 2 April 2015.

The Global Strategy described in this document is not a 'stand-alone' activity designed for PPR control and eradication only. It will allow progress to be made in other fields, with the strengthening of Veterinary Services as a cornerstone of the strategy which will provide the necessary enabling environment to control other animal diseases through a cost-effective combination of activities against several major diseases of small ruminants.

The lessons learned from rinderpest eradication and from a number of regions' experiences have been used thanks to the contribution, throughout the Global Strategy development process, of key selected experts, national and regional authorities, policy-makers, development partners and private industry. We wish to thank the members of the GF-TADs FMD Working Group and all those who have contributed to this Global Strategy for their excellent work.

Today, there is an increased interest in investing in animal disease control and PPR is one of the targeted diseases for many governments and their development partners. We are convinced that the joint FAO/OIE Global Strategy offers a framework with the necessary tools, methods and strategies to implement a well structured global control and eradication programme.

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The Global Strategy for the Control and Eradication of PPR has been prepared by the FAO-OIE GF-TADs Working Group (WG), composed of two the Co-chairs Joseph Domenech (OIE) and successively Vincent Martin and Eran Raizman (FAO), and the other members of the WG, Nadège Leboucq and Susanne Münstermann from the OIE and Adama Diallo (Joint Division FAO-AIEA), Giancarlo Ferrari and Felix Njeumi from FAO.

The preparation of the Global Strategy has benefited from the assistance and support of many experts and representatives of key countries, regional organisations and specialised bodies, including the following:

1. The participants in an expert meeting on PPR that was held in Rome, Italy (8-10 October 2014) to discuss the first draft of the Global Strategy: experts and professionals from individual countries, regional and international organisations, NGOs and private industry, OIE and FAO Reference Laboratories/Centres, various bodies in charge of implementing regional programmes and experts from OIE and FAO regional representations;
2. The participants in an e-Conference organised by the GF-TADs PPR WG (from 3 February to 7 March 2014) to prepare the establishment of the PPR Global Research and Expert Network (PPR-GREN);
3. The members of the OIE Scientific Commission for Animal Diseases (SCAD);
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EXECUTIVE SUMMARY

Peste des petits ruminants (PPR) is a highly contagious disease of sheep and goats caused by a *Morbillivirus* closely related to rinderpest virus and is considered to be one of the most damaging livestock diseases in Africa, the Middle East and Asia. Bearing in mind the strong negative impact that PPR can have on food security and the livelihoods of poor farmers, the main keepers of sheep and goats, the Global Framework for the Progressive Control of Transboundary Animal Diseases (GF-TADs) Global Steering Committee in 2012, the Food and Agriculture Organization of the United Nations' (FAO) Council and the Committee on Agriculture (COAG) and the World Organisation for Animal Health (OIE), in the form of a Resolution of the World Assembly of Delegates of the OIE in 2014, have all recommended the development of a PPR Global Control and Eradication Strategy (hereinafter named 'Global Strategy') and expressed a strong willingness to address the animal health problems in a systematic way, dealing with horizontal as well as more disease-specific (vertical) issues.

PART A of the Global Strategy describes the rationale for controlling and eradicating PPR and other major small ruminant diseases, the general principles and the tools to be used.

It is estimated that 330 million of the poorest people in Africa, the Middle East and Asia keep livestock, including small ruminants. Sheep and goats play an important role in the livelihoods and food security of poor families and contribute to national economic development. Identified for the first time in the early 1940s in Côte d'Ivoire, PPR has steadily expanded over the years, particularly in the last 15 years, and now affects large parts of Africa, the Middle East, Central Asia, South Asia and the People's Republic of China (China).

In the worst situations, PPR-related morbidity is as high as 100%, with a mortality rate that can reach 90%. In areas where the disease is endemic, the mortality rate may be lower, but the disease has a more insidious impact on flock productivity. Each year, PPR causes economic losses worth an estimated USD 1.2 to 1.7 billion, due to animal deaths, reduced production and the cost of fighting the disease. Approximately a third of the financial impact occurs in Africa and a quarter in South Asia. This large impact could be eliminated and it is expected that the control and eradication of PPR will improve incomes from small ruminant husbandry systems and lead to their improved profitability and productivity.

The current PPR situation is that around 70 countries have either reported infection to the OIE or are suspected of being infected. Of these, more than 60% are in Africa (including North Africa) the other infected countries being in Asia (South-East Asia, China, South Asia and Central Asia/West Eurasia including Turkey) and the Middle East. Another 50 countries are considered to be at risk for PPR. As of May 2014, 48 countries in the world were officially recognised by the OIE as PPR free.

The Global Strategy has three integrated components. While eradication of PPR (Component 1) is the ultimate goal of the Global Strategy, to be attained after a period of 15 years, the PPR Strategy cannot be a 'stand-alone' activity. The Strategy recognises that good quality Veterinary Services (VS) are indispensable for the successful and sustainable implementation of PPR (and other major transboundary disease) prevention and control activities worldwide. Therefore, strengthening the VS as a country moves towards PPR eradication will be the objective of Component 2 of the Strategy and this will in turn create more cost effective opportunities to control other priority diseases, which is the objective of Component 3.

The Strengths-Weaknesses-Opportunities-Threats (SWOT) analysis has identified numerous favourable factors for PPR control and eradication. Examples include the availability of very efficient and safe live attenuated vaccines giving inoculated animals life-long immunity and specific and highly sensitive diagnostic assays (both types of tools to be used according to the OIE international standards specified in the *OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals*), favourable epidemiological features (absence of long-term carrier state in animals and no known reservoir in wildlife or in domestic animals other than small ruminants) and growing political support for the control and eradication of PPR, following on from the successful completion of the Global Rinderpest Eradication Programme (GREP) and benefiting from the lessons learnt. In favour of the Global Strategy are:

- a) the potential for achieving economies of scale and a subsequent relative reduction of programme costs by combining PPR control with activities against other major diseases of small ruminants, and
- b) the incentives provided by the prospect of gaining official OIE recognition of PPR free status or endorsement of national PPR control programmes.

Unfortunately, there are numerous negative factors that can hamper effective control and eradication of PPR, such as the insufficient control of live small ruminant movements, poor information on the size of their populations and the absence of identification of animals in most developing countries. Vaccine delivery systems are often not very effective in reaching all small ruminant holders in certain types of production system and the VS can face numerous logistical problems, such as insufficiently developed private-public partnerships.

The required tools: in addition to the PPR vaccine and specific diagnostic assays that are already available, the following very important tools will also be used during implementation of the Global Strategy. The OIE PVS Pathway will serve to evaluate VS compliance with OIE standards, to identify the cost of the gaps to be addressed for compliance and to address other issues such as veterinary laboratories, relevant legislation and education. The PPR Monitoring and Assessment Tool (PMAT) and the Post-Vaccination Evaluation tool (PVE) have been specifically developed. The aim of the PMAT is to categorise countries according to the four different stages identified in the Global Strategy. The PVE tool will enable the effectiveness of the vaccination campaign to be evaluated, using various methods such as passive and active surveillance, including participatory disease search, serological surveys, flock productivity surveys and sociological surveys to assess livestock owners' perception of vaccination success. The Global Strategy will also establish a Global Research and Expertise Network on PPR (PPR-GREN) to build strong partnerships between researchers, technical bodies, regional organisations, well-recognised experts and development partners and to act as a forum for scientific and technical consultation and discussion.

PART B describes the successive elements of the strategy and the four main stages. The overall objective is a small ruminant sector contributing to global food security and nutrition, human health and economic growth, particularly in developing countries, thereby alleviating poverty, increasing income generation and improving the livelihoods of smallholder farmers and general human wellbeing. The specific objectives of the Global Strategy are the eradication of PPR by 2030, while at the same time, through reinforcing VS, improving animal health globally by reducing the impact of other major infectious diseases.

The expected results are described in a series of tables presenting the percentage of countries reaching the successive stages after 5 years and after 10 years, leading ultimately to global eradication of PPR after 15 years. Regarding the VS, the level of advancement for selected PVS Tool Critical Competencies (CCs) at relevant PPR stages will have been reached by countries that were not previously compliant with OIE standards on quality of VS. Lastly, the incidence of other priority small ruminant diseases will have been significantly reduced.

At national level, the strategic approach is based on four stages, corresponding to a combination of decreasing levels of epidemiological risk and increasing levels of prevention and control capabilities. The stages range from Stage 1, when the epidemiological situation is being assessed, to Stage 4, when the country can provide evidence that there is

no virus circulation either at zonal or national level, and is ready to apply for official OIE recognition of PPR freedom. The strategy recognises that situations and contexts can be very different between and even within countries. Consequently, the proposal is to begin by controlling the disease in areas where it is highly endemic and then to consolidate these control efforts by concentrating on areas where a low endemic level has been reached and where eradication is a feasible objective or is already underway. For countries already free of PPR, the Global Strategy is designed to maintain this status. The duration of each stage is variable and will depend on the context. The strategy recommends a minimum of 12 months and a maximum of three years for Stage 1, three years (from two to five years) for Stage 2 and Stage 3, and one to three years for Stage 4. For each stage, the Global Strategy describes the minimum requirements to enter the stage, the epidemiological and context (environment) situation assessments, the stage focus and specific objectives and outcomes for each of the five technical elements and the activities to be implemented. The five technical elements that characterise each stage are related to PPR diagnosis, surveillance and prevention and control systems, the legal framework in place and stakeholder involvement. The implementation of activities, in particular vaccination which is the key tool of the Global Strategy, will be regularly monitored and evaluated by the PMAT, the PVE and the OIE PVS Follow-up to ensure that efforts are achieving the expected outputs.

At regional level, the focus is on the need for regional coordination and harmonisation of national strategies and activities and on the development of strong partnerships. The regional networks, particularly for laboratories and epidemiology teams/centres, are tools of paramount importance, as clearly demonstrated during the GREP. The GF-TADs Regional Animal Health Centres (RAHCs), where regional multidisciplinary expertise would be located, can play an important role in implementing the Global Strategy at regional level, in close association with the relevant regional economic communities (RECs) or other relevant regional organisations such as the African Union – Inter-African Bureau for Animal Resources (AU-IBAR) in Africa, which are members of the GF-TADs Regional Steering Committees.

At global level, the GF-TADs governing bodies (Global Steering Committee and Global Secretariat, Management Committee) will be maintained and a new Global Secretariat for the implementation of the Global PPR Control and Eradication Programme (PPR-GCEP) will be established. The maintenance and roles of the specialised GF-TADs Working Group on PPR will be reconsidered while establishing the GCEP. The OIE and FAO PPR Reference Laboratories/Centres and the OIE and FAO Epidemiology Collaborating Centres will establish two global networks and the PPR-GREN platform will be set up. The joint FAO/IAEA Division is to play an important role in supporting laboratories at national and regional levels.

PART C explains how the GF-TADs principles and mechanisms will be used to provide coordination at both the global level (and the regional level (particularly the Regional Steering Committees in association with relevant regional organisations). A global control and eradication programme to implement the Global Strategy will be launched and a joint FAO-OIE Global Secretariat will be established to implement this programme. Monitoring and evaluation are key elements of the Global Strategy implementation and the PPR Monitoring and Assessment Tool (PMAT) will be used for that purpose. Countries will participate in (sub)regional PPR Roadmaps during which the stage ranking assessments will be agreed through an ‘acceptance process’.

The timelines of the PPR Global Strategy foresee three 5-year phases. The PMAT and the PVE (when vaccinations have been carried out) will be used on a yearly basis to monitor progress at national level and a precise evaluation of the results will be undertaken in 2020 in order to provide guidance on the continuation of the activities. The timelines for the expected results are presented globally and for each region. Regarding the VS, a table shows the number of relevant CCs and the expected compliance level for each PPR Stage.

Regarding the cost of the PPR Global Strategy, it is important to note that the costs of Component 2 (strengthening Veterinary Services) and Component 3 (combining with other diseases) have not been included in this exercise. The support to Veterinary Services is the object of specific investments after countries have evaluated their needs, particularly through the use on voluntary basis of the PVS Gap Analysis tool. The cost of combating other diseases

in combination with PPR control and eradication activities is extremely difficult to estimate since the list of priority diseases to be addressed will be defined after discussions to be held during regional and national workshops and subsequent definition of specific control strategies against other diseases. But it is also worth highlighting that the investments in supporting activities against PPR will have benefits for Veterinary Services' activities (e.g. surveillance systems) and finally for animal health improvement in all targeted countries.

The undiscounted costs for a fifteen-year Global Strategy are between USD 7.6 and 9.1 billion, with the first five years costing between USD 2.5 and 3.1 billion. The lower range is 16.5% less and would be expected in the event of a rapid decrease in PPR incidence in countries employing an effective vaccination strategy. In all the scenarios tested there are significant vaccination campaigns that could well be reduced by strong targeting of at-risk populations through careful epidemiological and economic analysis. These costs include a realistic figure for vaccine dose costs and an amount to cover vaccine delivery costs in the different scenarios. Overall, it is estimated that annual costs during the initial 5-year period will be in region of USD 0.5 billion. The PPR current annual direct impact alone is between USD 1.2 to 1.7 billion per year, and with a successful eradication programme this impact would be reduced to zero. It is important to recognise that without the strategy anything between USD 4.0 and 5.5 billion would be spent over a 15 year period on poorly targeted vaccination campaigns that are unlikely to lead to eradication.

LIST OF ACRONYMS

ARAHIS:	ASEAN Regional Animal Health Information System
ARIS:	Animal Resources Information System
ASEAN:	Association of South-East Asian Nations
ASF:	African swine fever
AU-IBAR:	African Union – Inter-African Bureau for Animal Resources
AU-PANVAC:	Pan African Veterinary Vaccine Centre
CAHWs:	Community animal health workers
CMC-AH:	Crisis Management Centre – Animal Health
CCs:	Critical Competencies (OIE PVS)
CCPP:	Contagious caprine pleuropneumonia
CEBEVIRHA:	<i>Commission Economique du Bétail, de la Viande et des Ressources Halieutiques</i>
CEMAC:	Central African Economic and Monetary Community
COAG:	FAO Committee on Agriculture
DIVA:	Differentiation between infected and vaccinated animals
ECOWAS:	Economic Community of West African States
EFSA:	European Food Safety Authority
EMPRES:	Emergency Prevention System (FAO)
EMPRES-i:	EMPRES Global Animal Disease Information System (FAO)
FAO:	Food and Agriculture Organization of the United Nations
GF-TADs:	Global Framework for the Progressive Control of Transboundary Animal Diseases
GCC:	Gulf Cooperation Council
GLEWS:	Global Early Warning System (FAO/OIE/WHO)
GREP:	Global Rinderpest Eradication Programme
GCES:	Global Control and Eradication Strategy
HPAI:	Highly pathogenic avian influenza
IAEA:	International Atomic Energy Agency
ICT:	Information and communication technologies
LIMS:	Livestock Information Management System (SADC)
NGOs:	Non-Governmental Organisations
OIE:	World Organisation for Animal Health (Office International des Epizooties)
PANVAC:	Pan African Veterinary Vaccine Centre of the African Union
PDS:	Participatory disease surveillance
PMAT:	PPR Monitoring and Assessment Tool
PPP:	Public–private partnership

PPR:	<i>Peste des petits ruminants</i>
PPRV:	<i>Peste des petits ruminants virus</i>
PPR-GCEP:	Global PPR Control and Eradication Programme
PPR-GREN:	PPR-Global Research and Expertise Network
PVE:	Post-Vaccination Evaluation tool
PVS Pathway:	Performance of Veterinary Services Pathway (OIE)
RAHCs:	Regional Animal Health Centres
RECs:	Regional Economic Communities
REMESA:	<i>Réseau Méditerranéen de Santé Animale</i> (Mediterranean Animal Health Network)
RLEC:	Regional Leading Epidemiology Centre
RLLs:	Regional Leading Laboratories
RP:	Rinderpest
RVF:	Rift Valley fever
SAARC:	South Asian Association for Regional Cooperation
SADC:	Southern African Development Community
SWOT:	Strengths-Weaknesses-Opportunities-Threats
TAD:	Transboundary animal disease
VPH:	Veterinary public health
VS:	Veterinary Services
WAEMU:	West African Economic and Monetary Union
WAHID:	World Animal Health Information Database (OIE)
WAHIS:	World Animal Health Information System (OIE)
WTO:	World Trade Organization

INTRODUCTION

Peste des petits ruminants (PPR) is a widespread, virulent and devastating disease of small ruminants. It has a significant economic impact on food security and livelihoods. PPR is therefore considered one of the most damaging of all animal diseases in Africa, the Middle East and Asia, and it is also one of the priority diseases indicated in the FAO-OIE Global Framework for the Progressive Control of Transboundary Animal Diseases (GF-TADs¹) Global level 5–Year Action Plan² (2013-2017) (17).

In October 2012 the GF-TADs Global Steering Committee requested that the activities of the Global GF-TADs Working Group be extended to include PPR with the task of developing a PPR Global Control Strategy and organising an international conference to launch a PPR eradication programme. This recommendation was further supported by a Resolution of the World Assembly of Delegates of the OIE, adopted in May 2014, and by the recommendations of the Committee on Agriculture (COAG) and the Council of FAO, in October and December 2014, respectively.

In 2013, the OIE and FAO jointly decided to embark upon the control of PPR on a global scale and develop a ‘PPR Global Control and Eradication Strategy’, (hereinafter named ‘Global Strategy’) with a strong willingness to address the animal health problems in a systematic way through approaching horizontal as well as more disease-specific (vertical) issues.

The task of eradicating PPR can benefit from a series of favourable elements, including the experience gained from eradicating rinderpest (RP), several favourable technical aspects (such as a battery of diagnostic and surveillance tools, effective and inexpensive vaccines that covers all known strains/lineages of the virus, no long-term virus carriers and no significant role of wildlife), the new OIE *Terrestrial Animal Health Code* chapter adopted in 2014 (with PPR becoming a disease with an official status (official recognition of PPR free status) and with the possibility of OIE endorsement of national control programmes), the direct economic impact for the owner of the animals as well as a growing political commitment from various decision-makers at national, regional and global levels to invest in a control and eradication strategy for PPR.

The underlying objective of this strategy is that through the control and eradication of PPR and other major diseases and through reinforced Veterinary Services (VS) and global animal health systems, the improvement of animal health will reduce the impact of these diseases and in so doing strengthen the contribution made by the small ruminant sector to global food security and economic growth while at the same time improving the livelihoods of smallholders and poor farmers.

¹ Global Framework for the Progressive Control of Transboundary Animal Diseases, an FAO/OIE initiative launched in 2004

² The Global Action Plan is based on the conclusions and recommendations of the meetings of the GF-TADs Global and Regional Steering Committees, the five GF-TADs Regional Action Plans and the conclusions and recommendations of key meetings that recommended the use of the GF-TADs mechanism to influence and/or implement activities

PART A. GENERAL PRINCIPLES AND TOOLS

1. RATIONALE FOR THE ERADICATION OF PPR

1.1. PPR situation in the world

Since its first identification in the early 1940s in Côte d'Ivoire, PPR has steadily expanded its geographical distribution beyond its original endemic region in Western Africa. Indeed a significant and dramatic geographical expansion of the disease has occurred over the last 15 years resulting in large parts of Central Asia, South Asia and East Asia now being endemic for PPR (Fig. 1). Currently around 70 countries have reported infection to the OIE or are suspected to be infected and another 50 are considered at risk for PPR. Out of these infected countries, more than 60% are in Africa (including North Africa) the other infected countries being in Asia (South East Asia, China, South Asia and Central Asia/ West Eurasia including Turkey) and the Middle East. As of May 2014, 48 countries were recognised as PPR free by the OIE. While these countries are historically free areas in the Americas and Europe, the OIE has established an international recognition process (as was the case with rinderpest) for other countries to follow.

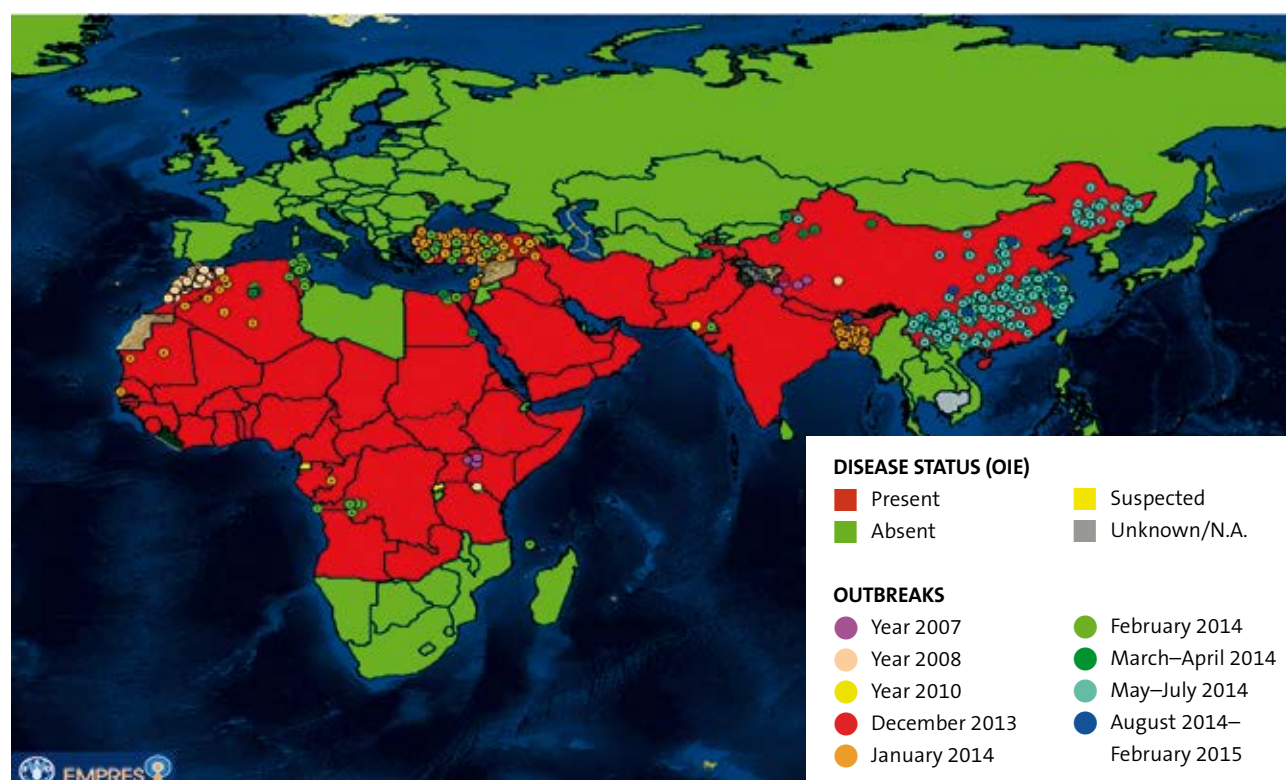


Fig. 1
Current global PPR situation and occurrence of outbreaks between 2007 and 2014
Source: OIE WAHIS and FAO EMPRES-i (12, 29)

Until 2007, the countries in Africa that were officially recognised as infected with PPR were those, apart from Egypt, lying in the belt between the Sahara and the Equator. In 2007, however, PPR caused heavy losses in the Republic of the Congo, Uganda and Kenya. From that year onwards, the disease steadily expanded southwards to cover the Democratic Republic of the Congo, Tanzania, Zambia, Angola and Comoros. In North Africa, it affected successively Morocco, Tunisia and Algeria.

1.2. Rationale

1.2.1. For *peste des petits ruminants* (PPR) (7, 10, 13, 21, 22, 23)³

■ People and small ruminants

It is estimated that 330 million poor people across Africa, the Middle East and Asia keep livestock. Small ruminants, mainly sheep and goats, play an important role in the livelihoods and food security of poor families. Small ruminants are important to those who own and manage them, providing a source of milk, meat, milk and meat products, fibre and wool. Keeping small ruminants is a way of generating cash for expenditure such as school fees as well as providing a store of wealth, rather like a mobile bank. In addition, these small ruminants have a role in returning nutrients to the soil through the production of manure for use in cropping systems.

In many systems, particularly smallholder systems, women are very important in small ruminant production, and the gender dimension needs to be taken into account.

Sheep and goats also play a critical role in the livelihoods of the traders who buy the animals and bring them to urban centres. Trade involves the use of transport and is a source of additional employment. People are also involved in running businesses to slaughter animals, dress carcasses and cure skins. In the case of Kenya, for example, the trade in small ruminants is geographically dispersed, with sheep and goats being brought into the city of Nairobi from Somalia, Ethiopia and Sudan. In Somalia, Djibouti and Ethiopia, the trade of live animals also extends into the Middle East and Arabian Peninsula, with between 3 and 4 million live sheep and goats being exported every year. Similar extensive trading systems for sheep and goats exist across other areas of the Middle East and Asia.

The largest category of beneficiaries of sheep and goat production and value chains consists of consumers, both rural and urban. There are some 5.4 billion consumers in the regions affected by PPR. Consumer demand is currently changing, with a trend towards urbanised living and increasing wealth. These consumers benefit from access to high quality food products such as milk, dairy products and meat, leather from the skins of the animals and wool and fibre for clothing. As demand rises, there is a need for improved production and supply systems to maintain reasonable prices. Fluctuations in the supply of sheep and goat products can have an impact across society and at specific times can affect the diets of many consumers.

In summary, the scale of the production, trade, processing and consumption of sheep and goats means that many people are involved and these small ruminants are important for their livelihood. In the production systems and their associated value chains, millions of people depend on small ruminants to generate revenue for their businesses and families. These people are generally poor relative to other groups in society, and are vulnerable to small changes in the production of sheep and goats.

³ These publications can be found in the list of references

■ *Peste des petits ruminants (PPR) and people*

Some 5.4 billion people live in the areas affected by PPR. In rural areas, many of them rely on sheep and goats. PPR can have dramatic impacts, not only on the families who manage and produce sheep and goats but also along well defined and complex value chains supplied by these production systems. The development of sheep and goat production and value chains requires stability. Therefore, the elimination of animal diseases in general and transboundary diseases such as PPR in particular should be a priority for decision-makers interested in making food value chains less risky for the people involved and the consumers they supply. Measures such as the control and eradication of PPR will not only improve the income from small ruminant husbandry systems, it will also reduce costs and thus will lead to improved profitability and productivity. This in turn will allow the small ruminant economy to contribute to the overall economic development of the national economy.

In rural areas many of these people either have sheep and goats or are affected by the economies these species generate in their local environments. A disease such as PPR causes direct losses in production when it occurs and costs in terms of surveillance, control and prevention. More difficult to estimate is the impact on trade: the presence of a contagious disease will quickly change the pattern of local trade and often lead to international trade embargos. These risks are difficult to quantify and even more difficult to manage, leading to underinvestment in sheep and goat production systems and, equally important, a lack of development of the trade, slaughter and processing infrastructure.

Peste des petits ruminants is a severe viral disease of small ruminants caused by a *Morbillivirus* closely related to rinderpest virus (2, 6, 19). In the worst situations, PPR-related morbidity is 100%, with up to 90% mortality. In areas where the disease is endemic, the mortality rate may be lower; yet the disease has an insidious impact, hampering the development of lambs and kids and compromising the immune defence of adult animals against other, bacterial diseases. Overall, PPR is a limiting factor to the development of healthy and thriving flocks⁴.

It is estimated that direct annual losses due to PPR are between USD 1.2 and 1.7 billion. The estimated current expenditure on PPR vaccination ranges between USD 270 and 380 million. The annual impact of PPR alone may be valued at between USD 1.45 and 2.1 billion per year. Approximately a third of the global financial burden of PPR is borne by Africa, with a further quarter borne by South Asia (Fig. 2). This burden will be removed with the successful eradication of PPR. A control and eradication programme at an estimated cost of USD 2.5 billion (undiscounted costs) over an initial 5-year period (i.e. approximately USD 0.5 billion per year) appears small in comparison. A reduction of 42% in the impact of PPR would justify the annual expenditure alone.

All the socio economic dimensions are discussed in Annex 1

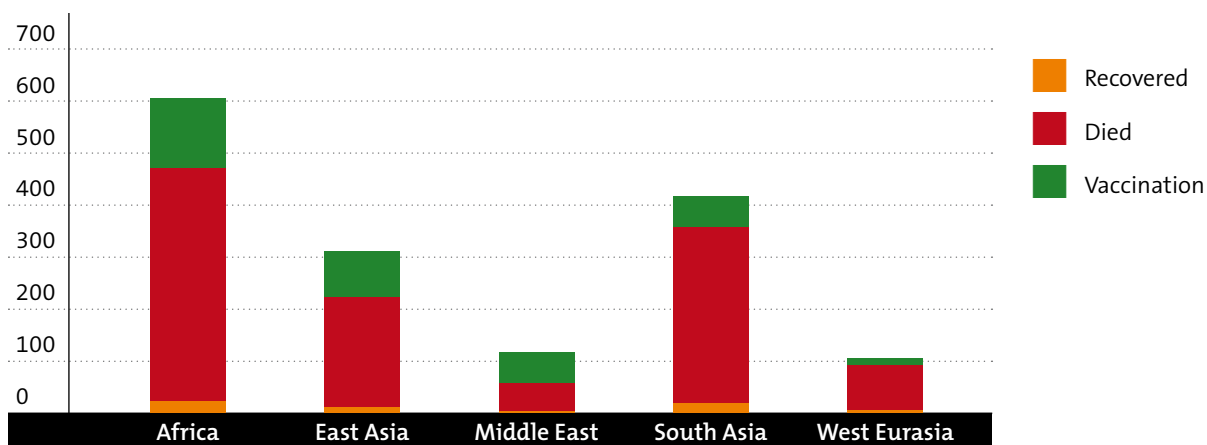


Fig. 2
Impact of PPR (USD million)

⁴ 'Flock' is used for sheep and 'herd' for goats but for the purposes of the Global Strategy, the term flock means any group of small ruminants.

1.2.2. Strengthening Veterinary Services (VS)

The OIE devotes two chapters of the OIE *Terrestrial Animal Health Code* (the *Terrestrial Code*) to the Quality of VS. The VS, as defined in the OIE *Terrestrial Code*, are comprised of public and private sector veterinarians and veterinary para-professionals (28).

Compliance with these standards on quality provides a foundation for implementing all of the other provisions of the OIE *Terrestrial Code*. This will for example increase the credibility of VS' certification for international trade. On a more general note, the quality and good governance of VS create an 'enabling environment' for improving animal and public health and enhancing compliance with SPS standards, at the national, regional and international level.

The quality of the VS depends on a set of factors, which include fundamental principles of an ethical, organisational, legislative, regulatory and technical nature. Some of them are directly related to good governance of the VS, which is a necessary condition for sustainable economic development as it promotes the effective delivery of services and improves the overall performance of animal health systems. Ultimately, the missions of the VS, insofar as they relate to the control and eradication of animal diseases and support economic development, are considered a public good, and are clearly linked to the global goal of reducing poverty and ensuring food security, thereby helping to achieving the Post 2015 Sustainable Development Goals and the UN's Zero Hunger Challenge

1.2.3. Prevention and control of other major diseases of small ruminants

There are several good reasons to combine PPR control programmes with control measures for other diseases, the principal one being the economies of scale that will be obtained through such an association of activities. The opportunities are related to the global increased perception that combating major animal diseases is a good investment for food production and increased revenues. For example, a major cost of the PPR control programme will be in transport and the time taken by technical staff to reach the target population, including smallholders, herders and pastoralists, in order to deliver the PPR vaccine and also to investigate possible PPR outbreaks. This creates an opportunity for the programme in terms of delivery of information and technologies to manage other animal health problems, particularly with regard to combined vaccinations (either multivalent vaccine or several monovalent vaccinations at the same time).

Regarding the list of diseases that could be combined with PPR, several exercises have already been carried out, such as those undertaken to define the priority diseases of the 5-Year Action Plans of the GF-TADs Regional and Global Steering Committees. Some viral and bacterial diseases are good candidates, such as sheep and goat pox, pasteurellosis and brucellosis. Combining control measures for PPR with control measures for other diseases may have particular economic significance in certain regions and farming systems. Possible examples include Rift Valley fever (RVF) or contagious caprine pleuropneumonia (CCPP) in Africa and FMD in Central Asia. It would also be worthwhile exploring whether less contagious infectious diseases that may nevertheless cause significant economic losses, such as internal and external parasites (e.g. trypanosomosis in Africa), enterotoxaemia or anthrax, should be included in combined control measures.

It is important to note, however, that combining activities to control and eradicate PPR with activities against other diseases could be considered counterproductive because they could dilute the focus on PPR eradication. When defining Component 3 of the Global Strategy, it will be necessary to consider this risk very carefully and maintain a good balance between the possible positive and negative consequences of such approaches. The regional and national analysis will be the only way to confirm the extent to which addressing several diseases together is appropriate to the local contexts.

1.3. General principles and SWOT analysis

1.3.1. General principles

The Global Strategy⁵ will operate according to the following underlying principles⁶:

- **To address the disease at source:** Since PPR may also be introduced into countries that are currently PPR-free and have a significant population of small ruminants, it is likely to be a win-win situation if control measures targeted at the source of the problem are supported by countries at risk.
- **To adopt a progressive risk-based approach:** This approach has to be flexible enough to adapt the strategy to national and regional circumstances, particularly with regard to the socio-economic contexts.
- **Focus on pastoral and agro-pastoral production systems:** PPR is more widespread in pastoral and agro-pastoral production systems than in production systems with a predominance of crop agriculture in dry sub-humid and humid regions. Moreover PPR is regularly being introduced or re-introduced into these mixed crop-livestock farming systems from pastoral and agro-pastoral systems. For these two reasons, the control programmes will be focused on the latter.
- **Global political support** from national governments and regional and international communities as well as financial investment from governments and their development partners are key elements for the success for implementation of the Global Strategy.
- **All stakeholders to be involved:** Another condition is to ensure full engagement of all stakeholders (livestock producers and owners, traders, civil society, etc.) in the design and implementation of disease surveillance and reporting as well as of disease control, including biosecurity measures. In addition to Veterinary Services and farmers, the role of NGOs should be taken into consideration.
- **Communication is key:** To obtain strong effective involvement of farmers and other actors, communication campaigns will have to be designed and implemented.
- **A delivery system capable of reaching all producers:** The chances of PPR eradication success are related to the possibility of reaching the vast majority of small ruminants, particularly for vaccination, and this can be a challenge in smallholder village production systems in crop-based humid zones (because of the low density of small ruminants) or in very remote or insecure areas. The quality and adaptability of the delivery systems will be a key element of strategy implementation and all possibilities should be considered, including the use of veterinary paraprofessionals and community-based animal health workers, provided that appropriate legislation and veterinary supervision are in place.

⁵ It is important to note that there is no opposition between the words 'control' and 'eradication'. Control means progressive fight against the disease in certain areas/production systems within a country and, where the control methods are implemented, the expected result is to eliminate (i.e. eradicate) the virus from the targeted small ruminant populations. The word eradication is used when implementing control measures with the expected result being the elimination of the virus from an entire country or region (i.e. several countries).

⁶ The underlying principles can be either principles that FAO and the OIE decide to follow when defining the Global Strategy (e.g. addressing the disease at source or using a risk-based approach, focusing on pastoral and agro-pastoral systems, using rinderpest experience, country centred strategy, etc.) or external conditions that will be essential for the successful implementation of the Strategy (political commitment, financial support from governments and donors, etc.).

- **Improving animal health is a global public good** and all countries need to contribute to the control of highly contagious diseases such as PPR, since if a single country is incapable of controlling an animal health crisis it endangers animal lives and human livelihoods throughout the world.
- **The costs of control and eradication activities are to be shared** according to the situation along the control and eradication pathway. Costs are essentially borne by the owners during the control stages (Stage 2, no eradication objective, 'private good' approach) but the activities become highly subsidised during Stage 3, when vaccination for example becomes compulsory (eradication objective, 'public good' approach).
- **An appropriate institutional environment through good governance of VS and the use of OIE standards:** On the governance and institutional aspects, an appropriate environment for animal disease control through the use of OIE standards is an important requirement. This applies to the VS (use of the PVS Pathway to guide countries) and to more technical issues such as surveillance and the quality of vaccines and diagnostic tests. **It also applies to the import and exports of animals;** countries should not introduce small ruminants without strictly observing the relevant OIE *Terrestrial Code* standards, in order to avoid introducing the disease, even to countries that are not PPR-free.
- **The lessons learnt from rinderpest eradication,** particularly with regard to the regional and international coordination dimensions (8, 25) and from past or on-going PPR control programmes in certain countries or regions, must all be taken into account. Some lessons could also be taken from the response to avian influenza H5N1 crises.
- **Use of existing international and regional organisations and development of partnerships for implementing the Global Strategy at all levels:** The governance and implementation of the Global Strategy is to be built on existing international (OIE, FAO, GF-TADs, IAEA) agencies and relevant regional organisations (RECs) instead of creating new structures. Other partnerships, such as with existing subregional projects, donors, civil society and the private sector (vaccine production firms, international unions of private veterinarians, etc.) will be established or strengthened.
- **Use of incentives to promote PPR control and eradication:** The use of incentives to support the Global Strategy and to encourage livestock-keeper participation can be based on several elements, such as the combination of PPR vaccinations and other field activities with control activities against other small ruminant diseases of importance to animal keepers. This is one of the reasons why a specific component on this type of combination is included in the Global Strategy, with the expectations of a broad benefit against other infectious diseases of small ruminants. Achieving official OIE recognition of PPR free status or endorsement of national PPR control programmes is also a powerful incentive particularly for the National VS and to some extent for export-oriented farms and traders.
- **A country-centred strategy:** Even if a regional approach with co-ordination at the global level are indispensable, it is worth recalling that most activities will be carried out at the national level.
- **Capacity building** at national, regional and global levels has to be a major element of the Strategy.
- **More advocacy through socio-economic analyses:** Advocacy for increased investment in PPR control should be primarily based on cost-effectiveness analyses of the control programmes, to assess their impact, especially for smallholder farmers and for rural development.
- **Monitoring and evaluation activities are indispensable** to assess the Global Strategy implementation achievements and to adjust or update the control methods and strategies accordingly, to ensure optimal performance.

1.3.2. SWOT analysis

STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
Component 1 – PPR control and eradication			
<ul style="list-style-type: none"> - Very effective and safe live attenuated vaccines - Effective diagnostic tests, which are already available - Absence of carrier state in animals - No known reservoir in wildlife or in domestic animals other than small ruminants (i.e. that could play a significant role in the epidemiology of the disease) - Available OIE international standards to be used in support of the PPR strategy 	<ul style="list-style-type: none"> - Increasing mobility of live small ruminants for trade - Lack of reliable information on size of small ruminant populations; need to carry out regular census - Lack of individual identification of small ruminants in most countries - Vaccine delivery systems often not very effective to reach small ruminant holders in certain production systems* - Difficult to sustain flock immunity due to high turnover in a given sub-population - Requirement of cold-chain for vaccine not always in place - Absence of DIVA (differentiation between infected and vaccinated animals) vaccines and companion diagnostic assays - Lack of private and non-governmental stakeholder involvement e.g. private veterinarians, community animal health workers - Vaccine delivery hampered by insufficiently developed private-public partnerships (PPP) - Insufficient understanding by livestock owners of the benefits of preventing and controlling animal diseases - Limited preparedness of owners to pay for health services due to limited individual economic value of sheep and goats as compared to cattle 	<ul style="list-style-type: none"> - Growing political support for control and eradication of PPR - Use of rinderpest eradication experience - Possibilities for economies of scale and subsequent relative reduction of the programme costs through combination of PPR prevention and control with activities against other major diseases of small ruminants - Possible incentives through official OIE recognition of PPR free status and endorsement of national control programmes - Increasing role of NGOs in certain countries for animal production development 	<ul style="list-style-type: none"> - Political instability and security problems. An infected country under crisis constitutes a permanent threats to neighbouring countries (current cases in Middle East, North Africa and surrounding regions) - Lack of transparency by some countries regarding their PPR situation

* e.g. in marginalised extensive production systems and/or smallholder systems with limited access to public or private services and with limited political influence, or in some cases in nomadic systems

STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
Component 2 – Strengthening Veterinary Services (VS)			
<ul style="list-style-type: none"> - Experience gained from recent crises, e.g. highly pathogenic avian influenza (HPAI) H5N1 or FMD in Europe - Recognition of the role of VS - OIE standards on the quality of VS - Availability of a well-recognised pre-operational tool (PVS Pathway), already implemented in many countries to guide investments for VS reinforcement - Political willingness to strengthen VS - GF-TADs mechanism existing at global and regional level - Improved access to ICT 	<ul style="list-style-type: none"> - Prevalence and incidence of animal diseases - Weak VS in some countries - Other priorities than animal health and veterinary public health in some countries' political agenda - Weak role of consumer stakeholders - Weak network of private practitioners - Lack of professional organisations (producers and consumers, notably) - Lack of appropriate marketing systems and poor internal economic linkages between the agricultural and industrial sectors 	<ul style="list-style-type: none"> - VS are a global public good, eligible for public investment and international aid - Growing global demand for animal protein - Important livestock development potential - Strong potential for extensive livestock breeding - Possible access to higher value markets - World Trade Organization (WTO) accession by an increased number of countries - Donor interest in strengthening VS - Private investments in animal health and food safety - Possibilities to develop PPPs by using para-professionals and community animal health workers (CAHWs) in some specific contexts under veterinary supervision 	<ul style="list-style-type: none"> - Impact of governance on the delivery of VS in the development context - Long land borders (risk of TAD incursion), particularly with countries at risk - Possible lack of transparency - Vulnerability of herders in the pastoral sector
Component 3 – Prevention and control of other major diseases of small ruminants			
<ul style="list-style-type: none"> - Some already mentioned for PPR and VS e.g. experience gained from previous crises, recognition of the role of VS, PVS Pathway available, GF-TADs mechanism in place at global and regional levels - Political willingness to control diseases - Vaccines available for certain diseases - Improved access to ICT - OIE standards for many animal diseases 	<ul style="list-style-type: none"> - Some already mentioned for PPR and VS, e.g. VS to be improved, lack of appropriate delivery systems and PPP, other priorities than animal health and veterinary public health (VPH), weak roles of some stakeholders (producers and consumers, private veterinarians, etc.) - lack of sufficiently effective vaccines for some diseases - No multivalent vaccines available to allow combined vaccination against several diseases in one inoculation of the animal at the same body site. - NB: this could be seen as an opportunity for vaccine producers and researchers to develop new products) 	<ul style="list-style-type: none"> - Some already mentioned for PPR and VS, e.g. growing global demand for animal protein, livestock development potential, possible access to higher value markets, donor interest in animal production and improved control of animal diseases, PPP for improvement of the efficacy of animal health systems, etc. 	<ul style="list-style-type: none"> - Some already mentioned for PPR and VS, e.g. good governance of VS, lack of border controls (particularly with countries at risk), vulnerability of pastoral herders - Some small ruminant diseases are not considered priorities for control - It may sometimes be considered that the other diseases to be included could compromise the progressive control of PPR** - Lack of transparency by some countries regarding their animal disease situation - Emergence of new diseases due to climate change, ecosystem modification, etc.

** risk of losing the focus on PPR control and eradication and thus being less effective, or problems due to different vaccination protocols according to each disease, which could lead to confusion among the owners

2. REGIONAL SITUATIONS^{7,8}

East Asia, South-East Asia, China and Mongolia

The first incursion of PPR into China occurred in 2007. Since the end of 2013, 22 of the 31 provinces in China have been infected. Culling and vaccination (300 million doses) have been conducted in 27 provinces and this has significantly reduced the number of outbreaks.

The Association of South-East Asian Nations (ASEAN) member countries of the South-East Asia region and Mongolia are not infected.

South Asia

In South Asia, a regional roadmap was formulated in 2011 by the SAARC member countries. Almost all the SAARC countries have reported PPR infection. Vaccination campaigns are implemented in high-risk areas. Some countries, such as Afghanistan and Pakistan, benefit from strong FAO technical support.

Central Asia

In Central Asia⁹ few countries are or have been infected but the exact situation is not always well known. Vaccination has been used in several countries and there is a need for greater harmonisation and coordination of all PPR control and eradication programmes.

Turkey is heavily infected. Vaccination is being implemented and one of the major challenges is to prevent any disease incursion into Europe, a region that is totally PPR free at present.

Middle East

The PPR situation in this region is favourable but some countries are infected and the precise situation in some others should be better assessed. Surveillance is ongoing in all countries and awareness is increasing. Nevertheless, during an FAO-OIE GF-TADs workshop held in 2014 a number of limiting factors were identified, such as the lack of regional epidemiosurveillance and laboratory networks, inadequate control of small ruminant movements and insufficient communication. A PPR regional strategy will be formulated and the Gulf Cooperation Council (GCC) Secretariat is currently developing a specific GCC PPR control strategy.

In three countries of the Middle East (Iraq, Syria and Yemen) with large small ruminant populations, the current political disturbances are hindering the surveillance and control programmes for PPR as well as for other major diseases. This represents a major risk to neighbouring countries.

⁷ More details are given in Annex 2

⁸ The list of countries in each of the regions or sub-regions is largely based on the membership of the Regional Commissions of FAO and OIE and that of the relevant Regional Economic Communities. The lists and maps are shown in Part C, Paragraph 2.

⁹ This region groups together Turkmenistan, Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan and Caucasus countries (Georgia, Azerbaijan and Armenia). For epidemiological reasons, some countries in the Middle East (Syria, Iran) and South Asia (Afghanistan, Pakistan) regions as well as Turkey are linked to Central Asian countries and are consequently invited to participate in 'West Eurasia' regional meetings.

■ Europe¹⁰

There is no circulation of PPR virus in Europe and 29 countries in the region have an OIE-recognised official free status. Due to the increased risks of introduction related to the expansion of PPR in neighbouring regions in recent years, such as in North Africa and Turkey, the European Food Safety Authority (EFSA) has published a report in 2015 (5) assessing the risk of introduction of PPR into the European Union.

■ North Africa

PPR is currently present in some countries in the North Africa region, where the situation has evolved in recent years. The disease occurred for the first time in Morocco in 2008, with a virus belonging to lineage IV (a virus present notably in South Asia and the Middle East) and the same lineage IV is also present in Tunisia and Algeria and is widespread in Egypt. According to serological surveys it is suspected but not officially reported in Libya. In Mauritania, PPR is due to virus lineage II.

Morocco started implementing a mass vaccination campaign in 2008 and this continued in 2010-2011. The results demonstrated that PPR can be controlled through mass vaccination campaigns. Designing and implementing a regional PPR control strategy in North Africa is of crucial importance and regional policies and activities in the field of animal health are coordinated by the Mediterranean Animal Health Network (REMESA: *Réseau Méditerranéen de Santé Animale*) platform.

■ Eastern Africa

In Eastern Africa all countries are infected and a regional strategy has been developed. Currently, vaccination campaigns are mostly conducted in response to disease outbreaks but wider campaigns have been conducted in several countries such as Kenya and Somalia with the active support of FAO, AU-IBAR and the relevant regional organisations.

■ Southern Africa

Most countries in Southern Africa are currently free from PPR. Following the introduction of PPR in a few countries, the Southern African Development Community (SADC) developed a regional PPR control strategy in 2010 in order to immediately contain/control PPR virus circulation in these countries, to prevent the disease from spreading to adjoining countries and ultimately to achieve the eradication of PPR from the SADC region. South Africa is officially recognised by the OIE as PPR free.

■ Central Africa and West Africa

All countries in Central and West Africa are infected and they are facing multiple constraints in controlling and eradicating PPR. At a regional level, the relevant RECs (Economic Community of West African States [ECOWAS], Central African Economic and Monetary Community [CEMAC], Commission Economique du Bétail, de la Viande et des Ressources Halieutiques [CEBEVIRHA], Western African Economic and Monetary Union [WAEMU], etc.) and other regional organisations need to increase their political commitment as well as their financial and technical support together with their development partners. FAO has implemented several national projects supporting activities relating to laboratory diagnosis (together with AIEA), surveillance and other field operations, vaccine production (together with AU-PANVAC: Pan African Veterinary Vaccine Centre) and formulation of national strategic plans. A pilot field project funded by the Bill & Melinda Gates Foundation was carried out by the OIE in Ghana and

¹⁰ Geographical Europe (and not countries belonging to the FAO or OIE Regional Commissions for Europe).

Burkina Faso to identify the major constraints hampering successful implementation of vaccination programmes, to improve the production and availability of quality control vaccines (with AU-PANVAC) and to establish a regional vaccine bank. The lessons learned have contributed to the definition of this Global Strategy.

In Africa, the support of AU-IBAR is crucial and in 2014 the AU adopted a continental strategy for PPR control (1, 3).

At the global, regional and national levels, FAO and the OIE support regional organisations and member countries, in association with IAEA with regard to laboratory matters. The OIE's adoption of new articles relevant to PPR for the *Terrestrial Code* means that it is now possible for a country to apply for official OIE recognition of freedom from PPR or for OIE endorsement of its national control programme. FAO has published a 'Position paper' in 2014 (11) and has implemented various national development projects. At regional and international level the two organisations are working together within the framework of the GF-TADs initiative to advocate and provide the appropriate expertise in support of their members.

3. REASONS WHY THERE ARE THREE WELL-INTEGRATED COMPONENTS

Eradication of PPR is the ultimate goal of this Global Strategy, to be attained after a period of 15 years.

The PPR strategy cannot, however, be a ‘stand-alone’ activity. The PPR Global Strategy recognises that good quality VS are indispensable for the successful and sustainable implementation of PPR (and other major TADs) prevention and control activities, in addition to their other mandates and activities such as food safety, prevention of antimicrobial resistance or animal welfare. Effective VS are the cornerstone of the PPR ‘enabling environment’. Therefore, VS capacity must be strengthened as a country moves towards eradication and this will be the objective of Component 2 of the Global Strategy. This in turn will create more cost-effective opportunities to control other priority diseases, which is the objective of Component 3. This will be attained through appropriate combinations of activities such as vaccinations against other major diseases, epidemiological investigations, diagnostic activities and treatments.

Strengthening the VS and controlling PPR and priority diseases come together with reciprocal, spin-off benefits, and therefore the Global Strategy includes these three components:

1. PPR control and eradication,
2. Strengthening Veterinary Services,
3. Improving the prevention and control of other major diseases of small ruminants.

4. TOOLS

4.1. Information systems

■ OIE WAHIS-WAHID (29)

The World Animal Health Information System (WAHIS) is an internet-based computer system that processes official data on animal diseases in real-time and then informs the international community. Access to this secure site is only available to authorised users, namely the Delegates of OIE Member Countries and their authorised representatives, who use WAHIS to notify the OIE of relevant animal disease information. The system has two components:

- an early warning system to inform the international community, by means of ‘alert messages’, of relevant epidemiological events that have occurred in OIE Member Countries, and
- a monitoring system in order to monitor OIE-Listed diseases (presence or absence) over time.

The WAHID Interface provides access to all data held within the OIE’s WAHIS. A comprehensive range of information is available from (i) immediate notification and follow-up reports submitted by countries notifying and providing updates on exceptional epidemiological events occurring in their territory; (ii) six-monthly reports indicating the health status of OIE-Listed diseases in each country/territory; (iii) annual reports providing health information and information on a country’s veterinary personnel, laboratories, vaccines, etc.

■ FAO EMPRES-I (12)

The FAO Emergency Prevention System (EMPRES) Global Animal Disease Information System (EMPRES-i) is a web-based application designed to support Veterinary Services by facilitating regional and global disease information.

EMPRES-i aims to clarify disease events worldwide that FAO receives information on from a wide variety of sources. For verification purposes, EMPRES as well as the FAO/OIE/WHO Global Early Warning System (GLEWS) use not just official but also unofficial sources of information. This information is used to generate and disseminate early warning messages. It is also fed into the EMPRES-i database and presented (after validation) in a structured and digested format to the public: disease events database, mapping/graphing tools.

EMPRES-i provides updated information on global animal disease distribution and current threats at national, regional and global levels. It also provides access to pathogen genetic information as well as publications, manuals and other resources, such as lists of reference laboratories and contact details of Chief Veterinary Officers (CVOs).

Under the Disease Events tab, EMPRES-i enables users to access and retrieve information easily on animal disease outbreaks/cases throughout the world according to user-defined search criteria (disease, date, species, location, etc.). Data can then be easily exported in the two available formats (PDF and Excel) for further analysis.

In addition to these international tools there are information systems in place at regional level (e.g. the ARIS: Animal Resources Information System (ARIS) in Africa, the Livestock Information Management System (LIMS) in the SADC region, and the ASEAN Regional Animal Health Information System (ARAHIS) in South East Asia), and some new methods are being developed such as mobile phone application technologies (e.g. SMS, ‘EpiCollect’) and social media, etc., which will ultimately play a critical role in sensitisation, reporting and data collection.

4.2. PPR Monitoring and Assessment Tool (PMAT)

The PPR Monitoring and Assessment Tool (PMAT) is a companion tool to the Global Strategy.

The aim of the PMAT is to categorise countries according to the four different stages (Assessment Stage; Control Stage; Eradication Stage; Post-Eradication Stage) identified in the Global Strategy, which correspond to a combination of decreasing levels of epidemiological risk and increasing levels of prevention and control.

The PMAT also guides and facilitates the efforts of countries that have embarked on prevention and control activities for PPR. Notably, it gives PPR-endemic countries guidance and milestones based on epidemiological and activity-based evidence.

The PMAT can be used either for self-assessment by the country or for external independent assessment by external experts (country visits) at the request of the country. The results of the assessments (using the PMAT) are reviewed and discussed during the annual regional GF-TADs PPR regional roadmap meetings and serve to establish the country's GF-TADs PPR Stage.

A full description of the PMAT is provided in Annex 3.3.

4.3. Post-Vaccination Evaluation (PVE)

Vaccination is the key to preventing and controlling PPR in high risk or endemic areas. In order to evaluate the effectiveness of the vaccination campaign, several approaches can be used, details of which are described in Annex 3.4. Participatory techniques to assess livestock owners' perception of vaccination success and other parameters as well as serological surveys at a defined time period after vaccination can be used for this purpose.

If sero-monitoring is chosen as a method to assess the effectiveness of vaccination, the objectives can vary, depending on a country's epidemiological situation, budget and needs. More details are given in the Annex with the description of different protocols to assess the following objectives or a combination thereof:

- immune response to vaccination
- population immunity at a given point in time
- changes in population immunity over time where PVE is implemented over a sequence of vaccination campaigns.

Just as for the vaccination campaign itself, conducive preconditions such as stakeholder sensitisation need to be put in place before vaccination and PVE.

An appropriate disease surveillance system to detect virus incursion or virus circulation, particularly in unvaccinated parts of the national flock, should be in place to adequately interpret the PVE results. Different surveillance strategies can be used according to particular epidemiological circumstances.

4.4. Vaccines

One of the key conditions for the success of the global rinderpest eradication programme was the use of a rinderpest vaccine that was highly efficacious in protecting animals against all rinderpest virus strains. A similar tool also exists for the prevention and control of PPR. Indeed, efficient live attenuated PPR vaccines are available that can induce lifelong protective immunity in vaccinated animals (see Annex 3.2).

Currently, more than 20 manufacturers produce PPR vaccine. Therefore, it will be of the utmost importance for the products of all these manufacturers, before their use in the field, to be certified as meeting OIE vaccine quality standards (24) to ensure their efficacy. In that regard, the certification body should be an independent institution such as the African Union Pan-African Veterinary Vaccine Centre (AU-PANVAC), which ensures the quality control of various veterinary vaccines, including PPR vaccine, in Africa. PANVAC is an OIE and FAO Collaborating/Reference Centre for quality control of veterinary vaccines.

Current PPR virus (PPRV) attenuated vaccines are thermolabile and to avoid their thermal inactivation they require uninterrupted maintenance of the cold chain until their application to the animal. The currently commercially available vaccines are in freeze-dried form and they are stable for at least two years at 2°C to 8°C and for several years at -20°C. Once the vaccine is reconstituted, it needs to be utilised as soon as possible, but not later than 30 minutes after dilution. Most of the PPR-endemic regions have a hot climate and they usually have poor infrastructure to maintain the cold chain needed to preserve vaccine potency and efficacy. To address this constraint, many research laboratories have succeeded in improving the freeze-drying conditions in the presence of cryoprotectants to obtain a thermostable PPR vaccine product. It is expected that the continued transfer of these newer technologies to vaccine manufacturers will improve the quality of the final products delivered in the field.

Consideration should be given to the constitution of regional vaccine banks to ensure vaccine availability in case of emergencies. The OIE has established vaccine banks using the concept of virtual rolling stocks (32): the supplier (vaccine production companies selected through calls for tender based on international standards) produces the vaccines when needed or a limited physical stock of vaccines remains with the supplier and is renewed on a rolling basis under terms and conditions contractually defined with the OIE. This concept enables the rapid supply of an emergency stock of vaccines to infected countries in order to vaccinate animal populations at risk and to progressively achieve eradication wherever possible. The concept can also serve the purpose of delivering quality vaccine for the annual control programmes, in a non-emergency situation.

The vaccination protocols and delivery systems to be used in this Global Strategy are presented below (see Part B).

4.5. Surveillance

The primary objective in carrying out surveillance is to understand the epidemiological situation in a country or zone and to help define its current PPR stage. Establishing and/or strengthening surveillance for PPR is therefore an absolute priority to achieve the following objectives:

- early detection of the appearance of the disease or virus incursion
- demonstration of the absence of clinical disease or infection with PPRV
- determination and monitoring of the prevalence, distribution and occurrence of the disease or infection

Passive surveillance is the most likely way in which an introduction of the disease might be detected. However, it is advisable also to incorporate active surveillance elements (e.g. structured non-random surveillance, including targeted or risk-based surveillance) in the national control programme. Methods other than sero-surveillance, such as syndromic surveillance, participatory disease search (20), a sentinel system and wildlife and abattoir surveillance, should also be considered (27).

Should serological surveillance be employed, a description of the different protocols for the detection of virus incursion and/or demonstration of absence of disease or infection, as well as the application of different surveillance methods in different situations, is given in Annex 3.5.

Surveillance as well as PVE programmes need to be coordinated with diagnostic services in order to guarantee smooth delivery of field samples to the laboratories, use of validated or at least proficiency-tested tests of known sensitivity and specificity and quick turn-around time for reporting of results to epidemiologists and veterinary administrations. Strong links between the epidemiology teams and field staff and with the laboratories involved in diagnosis need to be established at national level.

4.6. Laboratory diagnostics

As with many diseases, the primary diagnosis of PPR is made by field animal health workers (veterinarian, technician, etc.). It is therefore of the utmost importance that the necessary steps are taken to inform them about PPR clinical and pathological findings and differential diagnosis with similar diseases. However, PPR clinical diagnosis should be always considered as provisional until laboratory confirmation. Since the mid-1980s, the diagnosis of PPR has constantly been improved by benefiting from advances in biotechnology, bioinformatics and miniaturisation of electronic devices. Tools are now available for rapid and specific diagnosis of PPR at different skill levels of the diagnostician and depending on the equipment available in the test laboratory:

- pen-side tests for diagnosis in the field by specialised and non-specialised diagnosticians
- serum-based tests (ELISA) for the detection of antibody or the virus
- PPR virus identification by nucleic acid amplification (RT-PCR)
- virus isolation and genotyping at a well-equipped laboratory or at FAO and OIE reference or collaborating laboratories.

Given that a programme must be cost-effective, control of other priority diseases of small ruminants should be included and the diagnostic laboratories need to be strengthened not only for diagnosis of PPR but also for those diseases simultaneously. The *OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals* provides (26) internationally agreed diagnostic laboratory methods (prescribed and alternative diagnostic tests). (A more detailed description of the laboratory diagnostic tools is provided in Annex 3.1.)

4.7. Regional and international laboratory networks

Considering the transboundary nature of PPR, its control requires a regional strategy. This will imply close collaboration and coordination of activities between countries in a given region. To achieve this objective, regional networks are the best structure for diagnostic laboratories and should include regular exchange of information, meetings and workshops to harmonise techniques and to evaluate the result of proficiency testing (quality control of the diagnostic work being undertaken in the national laboratories members of the network). In each regional network at least one national laboratory will be designated by the members of the network as the lead regional laboratory with agreed mandates and missions to coordinate with other national laboratories in the region. The networks will be supported by the Joint FAO/IAEA Division, an OIE Collaborating Centre for animal disease diagnosis, in close liaison with OIE and FAO PPR reference laboratories/centres to ensure that validation and transfer of appropriate technologies, training, virus characterisation, organisation of proficiency testing, etc. are properly implemented.

The OIE and FAO reference laboratories/centres¹¹ will establish an international network in the field of PPR and other diseases of small ruminants in order to support the regional and national networks.

4.8. Regional and international epidemiology networks

At regional level, epidemio-surveillance centres and networks play an important role in monitoring the regional situation and conducting disease intelligence studies on PPR and other realms regarding small ruminant health of regional concern.

The aim of establishing regional epidemiology networks is to share information and strengthen collaboration on different aspects of surveillance (i.e. early detection, early warning and rapid response) and to support national epidemiology teams and networks. To achieve this aim, specific regional meetings will be conducted periodically, at least once a year, to enhance personal and technical relationships. These meetings will also provide training and expertise, harmonise methods and support coordination of strategies and activities. More specifically, whether on a daily basis or during regional meetings, information sharing will include:

1. Early detection of the appearance of the disease.
2. Methods for assessing the health status of a population.
3. Definition of the priority geographical areas for disease control and prevention activities, including vaccination strategies and risk assessment.
4. Mapping small ruminant value/market chain for targeted surveillance and intervention activities.
5. Provision of information to plan, prioritise and conduct research.

¹¹ The OIE recognises Reference Centres which are either 'OIE Reference Laboratories', whose principal mandate is to function as a world reference centre of expertise on designated pathogens or diseases, and 'OIE Collaborating Centres', whose principal mandate is to function as a world centre of research, expertise, standardisation of techniques and dissemination of knowledge on a given specialty. Similarly, FAO recognises Reference Centres, which can be reference laboratories or specialised centres on specific specialities. The FAO Reference Centres recognise 18 technical areas for which FAO requires appropriate expertise. In 2014, the OIE recognised three PPR Reference Laboratories and FAO recognises two of these as Reference Centres on PPR laboratory diagnostic and research.

At international level the OIE Collaborating Centres and the FAO Reference Centres on epidemiology¹² will establish an international network in the field of PPR and other diseases of small ruminants in order to support the regional and national networks and centres/teams.

4.9. Global Research and Expertise Network on PPR (PPR-GREN)

Excellent tools exist such as vaccines and diagnostic tools but the global strategy supports research particularly to increase vaccine thermotolerance, to develop DIVA vaccines and their accompanying diagnostic assays or combined vaccines against several diseases. More research is also needed in the fields of epidemiology, socio-economics and delivery systems. More details are given in Annex 4.

At global level, FAO and the OIE are establishing the Global Research and Expertise Network on PPR (PPR-GREN) which will build strong partnerships between researchers and technical bodies, regional organisations and well-recognised experts and development partners. It will also play an important advocacy role with policy-makers at national, regional and international levels. To prepare this PPR platform, an electronic conference involving 307 subscribers was held in 2014. The concept of including other important diseases of small ruminants was largely supported as well as establishing a strong research group as a major component of the platform. PPR-GREN will operate under the FAO/OIE GF-TADs PPR Working Group and will be primarily a forum for scientific and technical consultation and discussion.

4.10. OIE Standards and the Performance of Veterinary Services (PVS) Pathway

The OIE's standards specific to PPR are contained in the current Chapter 14.7. of the OIE *Terrestrial Animal Health Code* (28) and Chapter 2.7.11. of the OIE *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals* (26). PPR is a disease for which countries can apply to the OIE for official recognition of their PPR free status and for endorsement of their national PPR control programmes. In addition to PPR-specific standards, there are a number of horizontal chapters which are applicable to PPR and other highly contagious infectious diseases. For example, there are chapters related to surveillance and notification, risk analysis and the quality of VS, as well as other general recommendations. There are also chapters or individual articles relating to disease prevention and control, trade measures, import/export procedures and veterinary certification, VPH and the legal framework (veterinary legislation). More information on the relevant articles is given in Annex 3.6.

During the years 2006 to 2010, the OIE progressively developed a global programme for the sustainable improvement of a country's VS' compliance with OIE international standards, namely the OIE PVS Pathway¹³ (30, 31). This is a voluntary, comprehensive and multi-staged process (to be embarked upon at the country's request) which involves:

¹² See footnote No. 11

¹³ A detailed presentation of the PVS Pathway can be found in the 'Global Foot and Mouth Disease Control Strategy – Strengthening animal health systems through improved control of major diseases' (Component 2), published in 2012 (14)

the systematic evaluation of VS with regard to international standards (initial OIE PVS Evaluation). The important steps in the process are five-year costed investment plans based on integrating the OIE PVS Evaluation findings with national priorities (PVS Gap Analysis); assistance in the development and/or modernisation of national veterinary legislation (OIE PVS Veterinary Legislation Support Programme); review and improvement of the Veterinary Laboratory network (OIE PVS Pathway Laboratory mission) and capacity (OIE Laboratory Twinning Projects); strengthening and harmonising veterinary education establishments to align them with the corresponding OIE guidelines (OIE Veterinary Education Establishment Twinning Projects); ensuring excellence of the veterinary profession in the private sector by setting standards and establishing measures regarding education and licensing (OIE Veterinary Statutory Body Twinning Projects); and, lastly, a consistent mechanism for the monitoring and evaluation of progress of all components (regular OIE PVS Evaluation Follow-up missions).

The outputs of the various steps in the OIE PVS Pathway are key development instruments for the preparation of national, sub-regional/regional and global programmes aimed at strengthening the VS.

4.11. Other tools that can be used for PPR and other diseases

Several other tools can be used for PPR and other diseases, such as the FAO-OIE Crisis Management Centre – Animal Health (CMC-AH) (16) to undertake emergency response country activities to assist the VS, Ministries of Agriculture/Livestock or, in the case of zoonoses, enabling the coordinated response between relevant health agencies as well as the FAO-OIE-WHO Global Early Warning System (GLEWS) (15) platform to carry out disease intelligence work.

The specific tools to be used for diseases other than PPR will be defined at the regional and country levels after the countries and regions have decided on priority diseases to be addressed.

Candidate small ruminant diseases to be combined with PPR interventions, such as sheep and goat pox, brucellosis, FMD, pasteurellosis, Rift Valley fever (RVF) or contagious caprine pleuropneumonia (CCPP), have their own specific tools relating to their control, such as the relevant OIE standards in the *Terrestrial Manual* and the *Terrestrial Code*, diagnostic assays (diagnostic laboratories), surveillance with specific protocols (sampling methods, etc.), vaccines and legislation.

Specific monitoring and/or evaluation tools, including post-vaccination monitoring (PVM) or Post Vaccination Evaluation Tool (PVE), could be developed for diseases other than PPR (monitoring and evaluation tools already exist for FMD, the Progressive Control Pathway [PCP] (18), and a PVM system is being prepared).

5. RESEARCH NEEDS

While very effective tools already exist for the control of PPR, investment in further research will be invaluable to facilitate the campaign and speed up the course of the programme (see also Annex 4).

The attenuated vaccines currently in use do not enable the differentiation between vaccinated and infected animals. Thus, research should be carried out to develop a vaccine that would make differentiation possible. This would be particularly useful at stages of the campaign where disease surveillance will be implemented simultaneously with vaccination. Another PPR area of research is the development of a multi-disease discriminatory assay and non-infectious diagnostic reagents. As it is planned in the PPR Strategy to encourage vaccination against other small ruminant diseases along with PPR, it is important that diagnostics for the simultaneous surveillance of PPR with those diseases be made available. A multi-disease diagnostic assay will also be needed during the final stages of the eradication programme when PPR-like disease clinical syndromes will have to be investigated to confirm the presence or absence of PPR and to give the owners correct diagnostic results and advice on curative or prophylactic treatments.

To finalise the development of a thermotolerant vaccine, some urgent applied research and transfer of technologies should be undertaken. Oral, aerosolisation or eye drop vaccine administration should also be investigated.

There is also a need to undertake research on the issues regarding the necessary level of immunity to break the PPR virus transmission cycles. Classically this level is considered to be 80% but this percentage appears to be very difficult to obtain and some recent field experiences have shown that 70% could be satisfactory. A precise knowledge of the level of immunity needed to break the PPR virus cycle should be included in the list of research priorities.

Another research area to be encouraged is in the epidemiology field, in order to better assess the potential epidemiological role of other domestic animals or wildlife species. Research should also address the socioeconomics of PPR, in particular in the delivery systems domain, and the impact of the disease and the cost-benefit ratio of control and eradication programmes. Generally speaking, an evaluation of the results of the various approaches and models that will be used during implementation of the Global Strategy would provide a wealth of information for the overall improvement of small ruminant health and intervention measures for other diseases.

PART B. **THE STRATEGY**

1. OBJECTIVES AND EXPECTED RESULTS

1.1. Overall and specific objectives, purpose

The overall objective is a small ruminant sector contributing to global food security and nutrition, human health and economic growth, particularly in developing countries, thereby alleviating poverty, increasing income generation and improving the livelihoods of smallholder farmers and general human wellbeing.

The specific objectives of the Global Strategy are:

a) the eradication of PPR by 2030, which requires:

- in infected countries, achieving a progressive reduction of the incidence and spread, leading to final eradication of PPR;
- in non-infected countries, maintaining the officially recognised PPR free status.

While at the same time:

b) reinforcing Veterinary Services

c) improving animal health globally by reducing the impact of other major infectious diseases.

The purpose is to establish the capacity of stakeholders and VS to control and eradicate PPR and control other small ruminant diseases.

1.2. Expected results

Three types of results (corresponding to the three components) are expected:

a) On PPR

- Effective specific surveillance systems are in place in affected countries and countries at immediate risk (and more general surveillance in all countries)
- Laboratory capacity for PPR diagnosis is established
- Effective vaccination systems are used, with outreach to all livestock holders
- Eradication of PPR worldwide in 15 years. It is expected that after five years around 60% countries have reached Stage 3 or 4, almost all the others (around 40%) are implementing a control programme and less than 5% are still at Stage 1. After 10 years more than 90% of countries are at Stage 3 or 4 which means that in these countries cessation of PPRV circulation is almost achieved.

b) On Veterinary Services

- A minimum of 'level of advancement 3' for selected Critical Competencies (CCs; CC levels are from 1 to 5; see below) in relevant PPR stages has been reached by countries that were not compliant with OIE standards on quality of VS
- OIE standards on quality of VS are at least maintained at the same level by countries that were already compliant with OIE standards on quality of VS.

c) On other small ruminant diseases

- The incidence of other priority small ruminant diseases¹⁴ is reduced significantly.

¹⁴ The identification of diseases will be done at regional and national level at a later stage.

2. THE STRATEGY AT NATIONAL LEVEL

2.1. Major features

- 1. The strategy addresses endemic and free countries at risk:** the Global Strategy recognises that differences in risk of disease or infection occur between (and within) countries, and that, within a region, countries are at different stages in managing risk of infection. As a result, the Global Strategy proposes to first control the disease in highly endemic areas and then to consolidate these control efforts where a low endemic level has been reached and where eradication is feasible or already effective. For countries already free of PPR, the Global Strategy proposes to maintain this status through the tripod 'early detection – early warning – rapid response' and a robust risk analysis to understand the potential pathways for the (re)introduction of the disease.
- 2. Planning for emergency.** If there is inadequate advance planning, national VS will face a disease emergency with insufficient capabilities to respond immediately. Preparedness programmes for animal disease emergencies, such as the incursion of PPR, are the key to mounting early effective action in the face of an emergency. Defining a preparedness programme is an important core function of public VS.

Preparedness planning, including the development and approval of contingency plans for identified highthreat diseases, enables VS to be far better technically equipped to cope with a disease emergency, to take decisions and to release government funds more quickly and to obtain the effective cooperation of farming communities since they will have been involved during the planning preparation. In this regard, it is important that the national authorities establish a forum of all relevant stakeholders where plans and concerns are addressed: i.e., a National PPR Committee.

Contingency plans will address specific diseases that are considered to represent the greatest threat but also unanticipated disease occurrences or unknown new emerging diseases (9).

- 3. The Strategic Approach of the Global Strategy** is based on four different Stages: The four stages correspond to a combination of decreasing levels of epidemiological risk and increasing levels of prevention and control. The Stages range from Stage 1 – where the epidemiological situation is being assessed, to Stage 4 – when the country can provide evidence that there is no virus circulation either at zonal or national level, and is ready to apply for the OIE official country status of PPR freedom (Fig. 3). On the contrary:
 - A country where there are insufficient and unstructured data to understand the true risk for PPR and where no appropriate epidemiological investigations are undertaken and where no prevention and control programme is present, cannot be categorised in any of the four stages (i.e. is 'below Stage 1').
 - A country with an official OIE PPR status cannot be categorised either in any of the four stages (i.e. is 'beyond Stage 4'). A country is entitled to apply to the OIE for official recognition of PPR free status at the end of Stage 4.

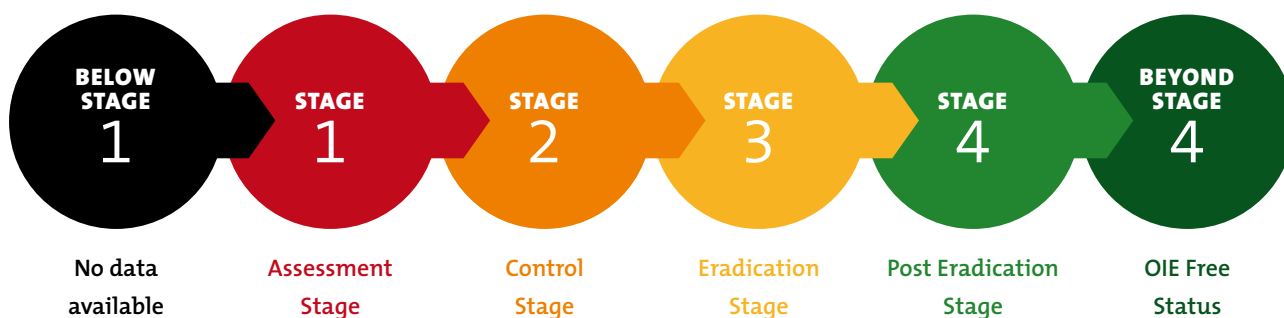


Fig. 3
The Progressive Step-wise Approach for the prevention and control of PPR

4. **A regular step-wise approach** but fast-track procedures allowed: the usual progression is to move from one Stage (n) to the Stage immediately after (n+1); this will be the case for most countries where PPR is endemic, notably in developing countries which may not have the resources to tackle the disease straightaway on a national scale. However, for countries willing to eradicate PPR more rapidly, there is a fast-track procedure allowing them to move from Stage 1 to Stage 3, Stage 2 to Stage 4 and Stage 1 to Stage 4 (Fig. 4). Whatever the path, Stage 1 is unavoidable to understand the situation and decide the relevant steps forward towards eradication.

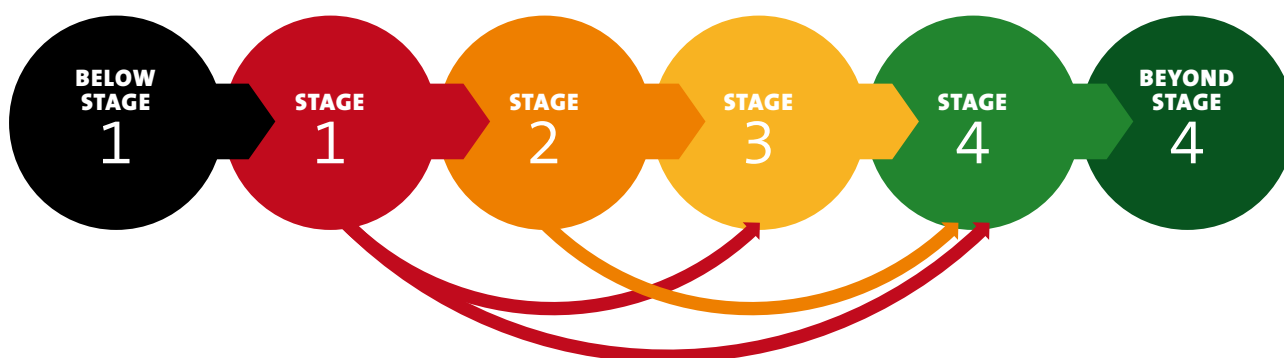


Fig. 4
Fast-track procedure

The diagram shows the progression across the four Stages and illustrates the possibility, when appropriate investment is made, to move directly forward two or even three Stages.

5. **Compliance with a higher stage (n+1) supposes compliance with the preceding stage (n) requirements;** for countries using the fast-track procedure, the compliance with the preceding Stage (n+1 or n+2, respectively) remains fully valid except for some prevention and control measures, the application of which is likely to be related to the presence or absence of the virus as determined in Stage 1.

6. **Stage durations are variable and depend on the context:** the speed of progression is according to each country's decision and possibilities, depending on the epidemiological situation, the capacity of the VS and the political commitment with appropriate investments. However, the Global Strategy foresees the following duration for each Stage:

- Stage 1 → minimum 12 months and up to 3 years
- Stage 2 → 3 years (from 2 to 5 years)
- Stage 3 → 3 years (from 2 to 5 years)
- Stage 4 → 24 months and up to 3 years.

- 7. Five technical elements characterise each stage:** categorising a given country at a given Stage (= to a specific level of risk) is the result of a combination of the five technical elements described below:



PPR Diagnostic system(s) – effective control of PPR requires that basic reliable laboratory diagnostic services are operational within individual countries (preferred option) or are outsourced. The capability of field veterinarians and their skill in recognising PPR and initiating a differential diagnostic procedure should be part of the overall diagnostic system.



PPR Surveillance system(s) – surveillance is key to understand PPR epidemiology in a country as well as to monitor progress in the control and eradication efforts. Along the Stages of PPR efforts to control and eradicate the disease, the surveillance system is likely to become more and more complex. In any case, comprehensive surveillance activities imply a thorough understanding of the production and trading systems (value chain).



PPR Prevention and control system(s) – PPR prevention and control measures are a combination of different tools, which can include vaccination, improved biosecurity, animal identification, movement control, quarantine and stamping out. These individual tools are likely to be applied at different levels of intensity while an individual country is moving along the pathway.



Legal framework in place for PPR prevention and control – PPR legislation is the cornerstone that provides the Veterinary Services with the necessary authority and capability to implement PPR surveillance, prevention and control activities. For each Stage it should be guaranteed that the legislation framework in place is consistent with the types of activities due to be carried out.



Stakeholders' involvement on PPR – true progress in PPR prevention, control and eventually eradication cannot be achieved without serious involvement of relevant stakeholders in all sectors (private and public veterinarians, para-professionals, livestock keepers and their community-based animal health workers, traders, NGOs and other development partners). This implies defining their roles and responsibilities at each Stage – the control efforts are likely to be a combination of public and private contributions. This also implies strong awareness and communication strategies directed to all these different actors.

- 8. Vaccination is a key tool to control and eradicate PPR in endemic countries** (or smaller geographical areas or farming systems). The principles to reach appropriate immunity, the vaccination protocols and the delivery systems are presented in the paragraph 2.2 below.
- 9. The implementation of activities** and their impacts are measurable: the set of activities to be implemented in each Stage relates to these five main elements listed above. Activities in each Stage are appropriate to mitigate the risk in accordance with the evidence provided in the preceding Stage or to new evidence provided by the continuous monitoring of the epidemiological situation and progress achieved. Activities and their impacts are indeed measurable in each Stage (PMAT). The implementation of all activities should enable countries to achieve the progressive decrease in the incidence of PPR to the point at which the disease can be eliminated from the domestic animal populations (and wildlife if relevant). Control/eradication activities are regularly monitored to ensure that efforts are providing the expected outputs.
- 10. Vaccination and other control and eradication measures are implemented following combined public good and private good approaches:** the public good nature of the activities implemented increases as the countries move along the stages towards eradication, particularly with regard to vaccination.

- In Stage 1, no official control activities are foreseen by the official public services. Nevertheless, a private owner who wants to protect his/her flock, particularly in endemic regions, should not be prevented. In this case it will be done on a purely private good basis, without any public subsidies. The VS will be involved in controlling that the vaccine and the delivery system (private veterinarians or technicians) are complying with the OIE quality standards. The epidemiological investigations and surveillance are an official public VS responsibility and are public goods.
- In Stage 2, the control activities, particularly vaccination, will be implemented or overseen by the VS in the targeted geographical areas or production systems. This will be done via a public-private partnership and in line with the methods defined in the national control plan. Nevertheless, in the nontargeted areas and production systems, a private owner can implement vaccination on a purely voluntary and private basis, with the same conditions as described above for Stage 1 (more precise information on the vaccination protocols is given below).
- In Stages 3 and 4, all PPR activities are led by the Veterinary Services (with the exception of biosecurity measures at farm level) and are considered to be public goods. Identification of flocks and gradually of individual animals will be implemented in Stages 3 and 4.

11. The public-private good dimension; the costs of implementing the Strategy are shared, the biggest share, however, being supported by public funds: when the vaccinations are not compulsory but decided on a voluntary private basis (private good), the cost is supported by the owner. However, when it becomes compulsory, the public good dimension implies that the costs are shared and that a certain level of public subsidies is considered. The percentages of cost sharing between the owners and the public budget will depend on the epidemiological and economic situations and a precise study will have to be undertaken while preparing the national control and eradication plans. Certain control, eradication and preventive measures, such as surveillance, have to be subsidised and compensation will be paid to the owners in the case of animal culling for disease control purposes. Public funds may not be easily available and buy-in and commitment at country level accompanied by advocacy from the start is critical.

12. Efficient animal health systems, and in particular VS, are indispensable to achieve PPR eradication: efficient VS are indispensable for the successful and sustainable implementation of PPR (and other major TADs) prevention and control activities. Therefore, VS capacity must be reinforced as the country moves along the PPR Stages ('progressive institutionalisation of PPR prevention and control'). Regarding other stakeholders who are not strictly speaking included in the VS¹⁵, including in particular the owners' associations and traders, their partnership with the VS and their involvement in control activities will increase along the PPR Stages. Some development partners such as NGOs can play an important role in the field in certain countries.

The OIE PVS Evaluation tool will be used to assess the level of VS compliance with OIE standards on the quality of VS (initial PVS), and at a second stage, to assess the progress made over time (PVS Follow-Up). Out of the 47 existing Critical Competencies (CCs) of the OIE PVS evaluation tool¹⁶, 33 are clearly

¹⁵ Veterinary Services are defined in the OIE *Code Glossary* (28). They are composed of the governmental and non-governmental organisations that implement animal health and welfare measures and other standards and recommendations in the *Terrestrial Code* and the OIE *Aquatic Animal Health Code* in the territory. The Veterinary Services are under the overall control and direction of the Veterinary Authority. Private sector organisations, veterinarians, veterinary professionals or aquatic animal health professionals are normally accredited or approved by the Veterinary Authority to deliver the delegated functions. The Animal Health Systems can be composed, in addition to the Veterinary Services described above, of other owners associations and traders and of representatives of producers and farmers communities (animal health workers).

¹⁶ Edition 2013

linked to the prevention and control of PPR at national level (hereafter named ‘PPR relevant CCs’)¹⁷. Besides, these CCs are particularly relevant to achieving the outcomes of a specific PPR Stage and therefore the reinforcement of the VS is sequenced and tailored to the relevant PPR Stage needs and timeframe.

For each of these PPR-relevant CCs, five levels of compliance with the OIE standards on quality of VS are established, ranging from no compliance at all (level 1) to full compliance (= level 5). In most cases, level 3 qualifies the country as having sufficient compliance with OIE standards and this level will be the one targeted for most PPR relevant CCs; for a few of them, however, targeting level 2 or level 4 may be more appropriate. A basic principle is that once a level is reached for a given CC, it cannot regress, regardless of the relevance of the CC in further PPR Stages.

13. Strategy implementation will be evaluated/monitored using the two previously mentioned tools, the OIE PVS Evaluation tool and the PPR Monitoring and Assessment tool (PMAT): the evaluation/monitoring of the progressive reinforcement of the VS and of the control and eradication of PPR are carried out using these two distinct tools. While it is not deemed relevant to merge the two tools, the evaluation/monitoring of the VS and of PPR control activities are worth conducting in parallel, the levels of advancement of the OIE PVS CC being considered as relevant and important conditions to move along the PPR Stages¹⁸. The required level of advancement of each of the CCs specific to a given PPR Stage should be met as early as possible in the Stage, if possible at the very beginning though this is not a requirement to enter the Stage.

14. Final considerations: as a result of these different points, each Stage is described in the next Section by the boxes illustrated in Fig. 5, keeping in mind that a country is categorised in a given Stage according to the five technical elements listed in point 6. It is also important to note that for each Stage, the three components forming the basis of the Strategy are presented in an integrated manner, namely Component 1 on PPR specific activities; Component 2 on strengthening Veterinary Services (‘enabling environment’); and Component 3 on the combined control for other diseases of local priority.

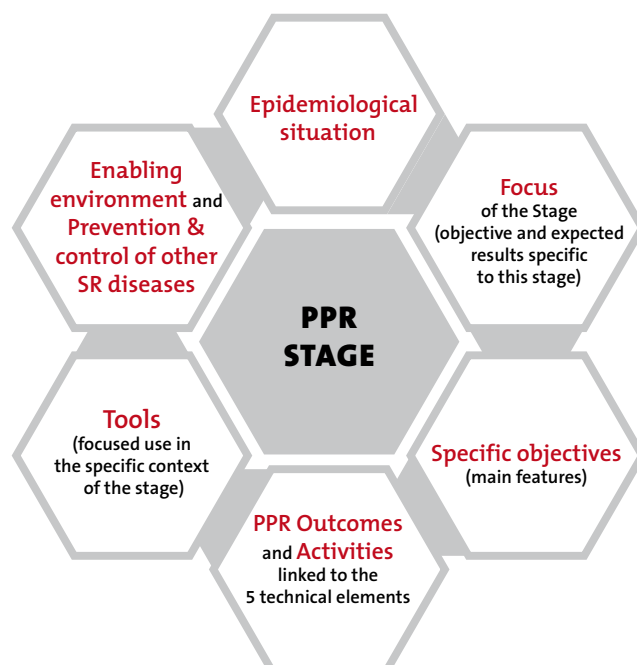


Fig. 5
Sections for each PPR stage

¹⁷ *Caveat:* despite the selection of these 33 PPR relevant CCs, when a country decides to have an OIE PVS Evaluation, the exercise is conducted in full, using all 47 CCs. The focus is, however, placed on the results of the PPR-relevant CCs for a country engaged in the eradication of PPR.

¹⁸ This will be defined in Volume 1 of the GF-TADs global control strategy against major TADs (to be published in 2015).

2.2. Vaccination

2.2.1. Vaccination protocols for PPR

Regarding vaccination protocols, theoretically 100% of the small ruminant populations above three months old should be vaccinated and the vaccination protocols will take into account the type of production systems (in addition to population dynamics and movement patterns).

To facilitate the calculation of the number and cost of vaccination programmes, over ten classical production systems described in several documents (Ref. International Livestock Research Institute (ILRI), FAO 1996) have been merged to form three major systems for small ruminants: the pastoral and agro-pastoral systems in hyper-arid, arid, and semi-arid zones and the mixed crop-livestock farming systems with a predominance of agriculture in dry sub-humid and humid zones.

The following principles will be applied:

- the vaccination will be implemented during two successive years followed by the vaccination of new born animals during one or two successive years;
- in hyper-arid, arid, and semi-arid pastoral and agro-pastoral systems (marked parturition season determined by the availability of forage resources in natural rangelands), a single vaccination campaign should be implemented each year, i.e. at the beginning of the dry season, just before the parturition peak;
- in dry sub-humid and humid mixed crop-livestock farming systems (in which livestock farming is not a major production activity and forage resources and agricultural by-products are more abundant, leading to the absence of a marked parturition season), two vaccination campaigns should be implemented each year to maintain high immunity coverage in small ruminant flocks. The period of vaccination has to be adapted according to the agricultural calendar and, consequently, availability of the farmers;
- in peri-urban production systems, a single vaccination campaign or two campaigns should be implemented each year according to the animal turnover in the flock.

Maintenance of an overall 80% of protection in the targeted population will require a thorough understanding of the population dynamics (i.e. rate of yearly restocking) and may, in turn, dictate the vaccination schedule to be adopted.

The objectives of vaccination campaigns for diseases such as PPR are classically to reach a postvaccination 80% immunity at flock, geographical area or farming system level in order to break the epidemiological virus maintenance and spread cycle. To obtain such a percentage the vaccination coverage should be almost 100% of small ruminant populations above three months old. These assumptions are in fact based on rinderpest experiences and publications but there have been multiple examples of rinderpest virus elimination without reaching such high immunity levels. Besides, very few scientific publications provide evidence to suggest that such levels of immunity are needed to stop PPR virus maintenance and spread. Moreover, the recent experience of Morocco with PPR eradication has shown that 70% immunity was sufficient to eliminate virus circulation in the country (ref). Also, several field experiences and epidemiological research (4) have shown that 80% protection might not always be reached under actual field conditions, even when the vaccination campaign has been correctly implemented. Therefore, while considering that 80% protection remains the option of the Global Control and Eradication Strategy, the design of the PostVaccination Evaluation (PVE see Annex 3.4.) methodology for serological surveys (e.g. sample size) and for the interpretation of the results will be based on a 70% level of immunity.

2.2.2. Vaccine delivery systems

In order to deliver a sufficient quantity of good quality vaccine to the field, several factors need to be considered:

- › the quality of the vaccines received at the national point of entry;
- › the cold chain that needs to be maintained throughout the different vaccine delivery stages, from central purchase point to distribution centres and to the vaccinators in the field;
- › the size of vaccine vials to reduce cost and wastage (smaller vials for smallholder production systems and larger vials for large flocks);
- › a realistic estimation of the required vaccine quantity, in order to provide vaccinators with a sufficient quantity to achieve the desired vaccine coverage;
- › the organisation of delivery to the vaccinator teams and to the flock level.

Implementation of mass vaccination is a major challenge in most developing countries, particularly in remote areas and in village smallholder husbandry systems. Furthermore, recent animal censuses are often not available and the official size of the small ruminant population may be very different from the true figure.

Vaccination will be supervised and often carried out by the public VS. The partnership with private veterinarians holding a 'sanitary mandate' or 'accreditation' (i.e., a contract between the official VS and the private veterinarians who are accredited or approved by the veterinary authority to deliver the delegated functions) is to be developed or is already a common practice in many developed countries and in some intransition countries. The participation of private veterinary para-professionals and of representatives of producers and farmers communities (animal health workers) can be a very effective means of reaching small ruminants in some difficult areas (e.g. remote or insecure areas), when the density of animals is very low such as in smallholder village production systems in crop-based humid zones and/or to facilitate revaccination of young stock when required. This partnership needs appropriate legislation and veterinary supervision to be in place.

Depending on the stage of a given country, vaccination can be a private or a public initiative, targeted at high risk areas or covering the entire population.

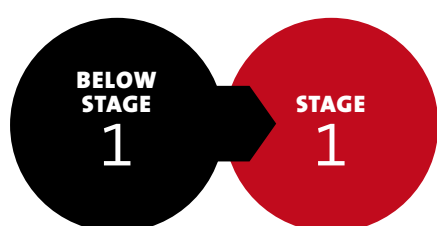
Regardless of the approach, the goal should be to reach the maximum vaccination coverage in the shortest possible time.

For this purpose, the vaccination campaigns need to be carefully planned and executed. Training of teams and logistics, including the cold chain, are essential. Communication is also very important, not only at a national level or using the official channels, but also in identifying the local communication networks (radio programmes, production of TV ads, sponsoring public relation activities, religious or celebratory gatherings). Ignoring them might result in frustration and the dissemination of negative information with respect to vaccination campaigns or other activities. Furthermore, a major challenge is to correctly identify relevant socio-technical networks to be considered for animal health and the delivery of animal health care. When the public VS or private veterinarians are not present to meet the animal health needs of the farmers in remote, insecure or low animal density areas, local stakeholders often take over (e.g. community animal health workers, pharmacies, traders, NGOs, development projects, etc.). Their use for communication and implementation of the PPR vaccination campaigns would be possible under veterinary supervision since these stakeholders can disseminate the right messages regarding the reliability/safety of the PPR vaccine. Furthermore, farmers will fully participate in the vaccination campaigns if they get full support of their usual providers of animal care.

Therefore, vaccination campaigns should be preceded by a very thorough preparatory stage encompassing all these issues and using a participatory approach with the farmers, animal-health stakeholders and local authorities. The participation of communication specialists working with sociologists with a good knowledge of local actors is a key condition during this stage. Post-vaccination evaluations will consider these aspects in order to identify the critical points of the vaccination campaigns in order to take corrective actions to improve subsequent campaigns.

2.3. Description of the PPR Control and Eradication Step-wise Approach

2.3.1. Entering the strategy channel – Stage 1



Minimum requirements:

- 1. An Assessment Plan is available and endorsed by the Veterinary Authorities** to gain a better epidemiological understanding of the presence, distribution and (possibly) main risk factors associated with PPR in the country. The objectives, outputs and activities of the Assessment Plan can be derived directly from the outcomes that need to be fulfilled in Stage 1 in order to move to a higher Stage.
- 2. The country commits to joining the (sub)regional PPR Roadmap**

■ **STAGE 1**) Epidemiological and context (environment) situation assessments

■ Stage 1 epidemiological situation

For countries entering the PPR control and eradication step-wise approach, at the beginning of Stage 1 the precise epidemiological situation is unknown or poorly known. PPR is most likely to be present, but due to poor surveillance and weak laboratory diagnostic capacity, it has not been reported. In this situation, there is no structured information available on the presence and distribution of PPR that would possibly lead to the formulation of effective control activity¹⁹.

The proposed duration of Stage 1 is one to three years. It should be a relatively short period (one year) to allow control activities to start as soon as possible, but long enough to obtain a proper assessment, which will be the basis for the control Strategy.

At the end of Stage 1 the epidemiological situation will be known based on *(i)* the occurrence or not of the disease expressed through clinical manifestations and *(ii)* the identification or not of the presence of infection using diagnostic tests, and will allow the conclusion to be drawn that:

- The country appears to be free of PPR, meeting or not the criteria of 'historically free' (see Article 1.4.6. of the OIE *Terrestrial Code*); or
- PPR is present in the country (epizootically and enzootically).

¹⁹ When a country is supposed or known to be free, even without specific PPR epidemiological surveillance programmes in place, it is ranked in stage 3 or 4 and the objective will be to document the freedom and to submit a dossier to the OIE for possible official recognition of PPR free status, following the provisions of Chapters 1.6. and 14.7. of the OIE *Terrestrial Code* (see below). The countries that are in a position to apply for PPR free status on a historical basis, according to *Terrestrial Code* Article 1.4.6., need to fulfil the OIE relevant criteria but without PPR-specific surveillance.

■ Stage 1 focus

To gain a better epidemiological understanding of the presence of PPR

In Stage 1, the main objective is to acquire elements for a better understanding of the presence (or possibly the absence) of PPR in the country, its distribution among the different farming systems and, ultimately, its impact on these systems. The generation of this information is an essential pre-requisite in order to reach a decision on what next needs to be done: it is important to distinguish whether the country will adopt the decision to implement activities with the initial aim to eradicate PPR only in specific sectors or geographical zones, recognising that the virus may still be circulating in other sectors/areas (Stage 2), or to eradicate PPR in the entire territory (Stage 3). The assessment phase may also demonstrate the absence of PPR, and in this case the country can directly move to Stage 4, applying for an OIE official free status.

Recommended Stage 1 duration: from one year up to three years.

■ Stage 1 specific objectives (Component 1)

Diagnostics	To establish laboratory diagnostic capacity mainly based on ELISA methods
Surveillance	To implement monitoring activities and evaluate socio-economic impacts
Prevention and control	To lay the ground for the implementation of prevention and control activities
Legal framework	To assess the animal health legal framework with a focus on PPR
Stakeholder involvement	To engage stakeholders for their agreement and concurrence on the PPR control and eradication objectives (notably in terms of transparency)

■ Stage 1 PPR outcomes and activities (Component 1)

Outcome 1 (diagnostic System) The laboratory diagnostic capacity of the country is established (activities will largely depend on the status of the laboratory facilities, equipment and expertise already available in the country). A – in-country laboratory diagnostic capacity is established	A1.1 (A)	Assess throughout the country existing laboratory facilities candidates to be designated as the National Laboratory that will be responsible for testing field samples. This process should lead to identify at least one laboratory that will act as leading laboratory for PPR
	A1.2 (A)	Assess throughout the country existing laboratory facilities to be designated as peripheral units to receive and prepare samples before they are sent to the designated leading laboratory/ies
	A1.3 (A)	Establish (or review) ELISA diagnostic procedures for antigen and antibody detection
	A1.4 (A)	Train peripheral units' staff to manipulate PPR samples before they are sent to the leading laboratory for testing
	A1.5 (A)	Test samples (using basic ELISA techniques) and document them (if the laboratory has just started its activities)
	A1.6 (A)	Design a Laboratory Information and Management System (LIMS) if not already existing (no specific indicators are built for this activity)

B – laboratory diagnosis is outsourced internationally	A1.1 (B)	Formulate Standard Operating Procedures on how to handle field samples (if not already existing)
	A1.2 (B)	Train all staff involved in the reception of field samples to receive, record, manipulate, package and ship the field samples received
	A1.3 (B)	Collect and ship samples to an OIE or FAO reference laboratory
Outcome 2 (Surveillance System) A surveillance system is progressively established; however, at this stage, active surveillance should be fully operational allowing an understanding of how PPR may be introduced and/or maintained and what its impact is. The monitoring/surveillance system will include implementation of specific field surveys based on serology and/or participatory disease surveillance (PDS) or some other approaches. The case definition for a possible and likely case of PPR is developed (to serve as basis for building the reporting system and for delivering training to field veterinarians).	A2.1	Formulate/design and implement an overall monitoring/surveillance system (with its active and passive components)
	A2.2	Develop related Procedures for each component (continuing vs. <i>ad hoc</i> surveys) of the surveillance system, as well as Forms to register data
	A2.3	Implement a post-assessment evaluation Form to quantify the clinical and (possibly) the socio-economic impact at this Stage. Visit confirmed clinical outbreaks for such purposes
	A2.4	Design (and possibly implement already at this Stage) an information system in support of surveillance activities (each component and sub-component of the system should be managed through an information system)
	A2.5	Train veterinary officers from central and peripheral level on value chain and risk analysis
	A2.6	(VS) Identify risk hotspots and transmission pathways using the value chains and risk analysis principles
Outcome 3 (Surveillance Systems) The ability of field veterinarians to relate health events to PPR is improved. Organisation of a well-distributed Field Veterinary Network throughout the territory as well as the education of field veterinarians to recognise PPR and make a differential diagnosis are essential aspects in order to capture clinical events that may match the case definition of a possible case of PPR and ensure that such cases are adequately further investigated.	A3.1	Train field veterinarians to increase their awareness about PPR and its differential diagnosis (training should also address collection, storage and submission to the closest delivery place in proper condition and to avoid potential spoiling of test results).
	A3.2	Provide incentives for the installation of private veterinarians in remote areas to capture PPR clinical events
Outcome 4 (Prevention and Control system) A national PPR Committee is established to coordinate all activities related to PPR prevention and control measures. The Committee should be headed by the Central Veterinary Services and include representatives of other ministries / agencies involved in PPR control (Environment; Interior; etc.) as well as private veterinarians (Veterinary Statutory Bodies and Veterinary Association) and all actors involved in small ruminant production. No official prevention activity is foreseen in Stage 1	A4.1	Define the modus operandi and tasks of the National PPR Committee
	A4.2	Organise meetings of the PPR Committee and prepare meeting reports
	A4.3	Formulate/design and implement a Standard Operating Procedure for a response mechanism (appropriate to this Stage) in case of a suspected/confirmed outbreak <i>(In order for such procedures to be fully implemented, it is necessary that awareness material be prepared and distributed to livestock keepers (see Stage 1 Outcome 6).</i>

Outcome 5 (Legal Framework) The legal framework is improved during this Stage to ensure that the Veterinary Services have the authority to take actions that may be needed in the following Stages; in particular, PPR is a notifiable disease in the domestic animal population and suspected/confirmed cases in the wild animal population are also notified to the Veterinary Authorities.	A5.1	(National PPR Committee) Establish specific Working Groups (involving competent authorities, legal experts and relevant stakeholders) to evaluate gaps in the veterinary legislation with regard to PPR that may need to be addressed
	A5.2	(WGs). Propose concrete amendments to update the legal framework conducive to efficient PPR prevention and control

Outcome 6 (Stakeholders' involvement in PPR control) A communication campaign is organised to inform all stakeholders on the vision and on the required actions and why they are put in place. The objectives of the campaign are to promote, stimulate and provide incentives for PPR control measures. Field veterinarians may serve as the means for disseminating the campaign material as well as some other development partners such as NGOs.	A6.1	Prepare/develop communication material to inform stakeholders on PPR control and ultimately the eradication Vision
	A6.2	Disseminate the material to all stakeholders involved in PPR prevention and control activities

■ Stage 1 specific use of tools²⁰ (Component 1)

› Surveillance (→ focused on active surveillance)

The surveillance in Stage 1 has three objectives:

1. to assess the health status of the small ruminant population, including collection of baseline data
2. to define the priority areas for PPR control and prevention activities
3. to determine the prevalence, distribution and occurrence of PPR (disease and infection).

The reporting system – based only on passive surveillance – is likely to be too weak in Stage 1 to collate the required information and this is why an active component must be designed in the Assessment Plan and implemented in Stage 1. A better epidemiological understanding of PPR (and of its impact) can be reached through different methodologies:

- a) participatory disease surveillance (PDS);
- b) serology;
- c) a combination of PDS and serology (valuable for retrospective studies);
- d) post-assessment visits to confirmed PPR outbreaks to evaluate its impact, are all to be seen as components of the overall monitoring/surveillance system to be implemented in Stage 1.

²⁰ In this section, only those tools whose utilisation varies in the different Stages are mentioned; this concerns namely: (i) surveillance; (ii) vaccination, including post-vaccination monitoring; and (iii) OIE standards relevant to PPR. All the other tools referred to in Part A Paragraph 4 are used in the same way regardless of the Stage.

In order to formulate the working hypothesis on how PPR virus is introduced/maintained, it is relevant at this Stage that information generated through the surveillance system is complemented with information generated through a combination of value chain and risk analysis to better identify and characterise hotspots and transmission pathways for PPR virus (it is likely that these activities will need to be introduced and external support may be required).

】 (no vaccination)

It is in fact assumed that before entering Stage 1 and during Stage 1, the country does not have any structured response mechanism in place. Emergency vaccination and stamping out may not be considered among the appropriate options. However, control activities can be implemented on a voluntary private basis and may be limited to biosecurity and vaccination measures at the level of individual farms, particularly in the case of commercial farms surrounded by endemic areas.

■ Stage 1 enabling environment (Component 2)

In Stage 1, the VS must have the necessary authority to comprehensively assess the PPR epidemiological situation – in domestic animals and in some circumstances wildlife – throughout the national territory as well as to identify the main risk factors for its introduction, maintenance and spread. Twelve Critical Competencies are relevant to support the PPR-specific activities of Stage 1. The most important competencies to acquire and/or implement for Stage 1 are therefore the capacity linked to active surveillance (CC II.5.B) and risk analysis (CC II.3). The VS should demonstrate an up-to-date knowledge in these fields (CC I.3). Consultations with stakeholders to support national PPR control and eradication efforts are also essential in the early steps of the eradication process. For all Stage 1 PPR-relevant CCs, the level of advancement to target is level 3, except for the competence related to access to veterinary laboratory diagnosis (CC II.1.A), where level 2 suffices as PPR is to be included among the major diseases of national economic importance. The countries will most likely have recourse to private veterinarians (in particular for vaccination activities foreseen in Stage 2) under official delegation (CC III.4) and therefore their licensing and registration is an important pre-requisite. At this Stage, a National PPR Committee should be established and it may appoint specific Working Groups to follow the different components of the Global Strategy. This National PPR Committee will address specific requests from stakeholders.

OIE PVS CRITICAL COMPETENCIES		TARGETED OIE PVS LEVEL OF ADVANCEMENT	
CC I.2.A	Professional competencies of veterinarians	3	The veterinarians' practices, knowledge and attitudes usually allow undertaking all professional/technical activities of the VS (e.g. epidemiological surveillance, early warning, public health, etc.).
CC I.3	Continuing education (CE)	3	The VS have access to CE that is reviewed annually and updated as necessary, but it is implemented only for some categories of the relevant personnel.
CC II.1.A	Veterinary laboratory diagnosis – Access to veterinary laboratory diagnosis	2	For major zoonoses and diseases of national economic importance, the VS have access to and use a laboratory to obtain a correct diagnosis.
CC II.1.B	Veterinary laboratory diagnosis – Suitability of national laboratory infrastructures	3	The national laboratory infrastructure generally meets the needs of the VS. Resources and organisation appear to be managed effectively and efficiently, but their regular funding is inadequate to support a sustainable and regularly maintained infrastructure.
CC II.3	Risk analysis	3	The VS compile and maintain data and have the capability to carry out risk analysis. The majority of risk management measures are based on risk assessment.
CC II.5.B	Epidemiological surveillance and early detection – Active epidemiological surveillance	3	The VS conduct active surveillance in compliance with scientific principles and OIE standards for some relevant diseases, apply it to all susceptible populations, update it regularly and report the results systematically.
CC III.2	Consultation with interested parties	3	The VS maintain a formal consultation mechanism with interested parties.
CC III.3	Official representation	3	The VS actively participate in the majority of relevant meetings.
CC III.4	Accreditation / authorisation / delegation	3	The public sector of the VS develops accreditation/authorisation /delegation programmes for certain tasks, but these are not routinely reviewed

OIE PVS CRITICAL COMPETENCIES		TARGETED OIE PVS LEVEL OF ADVANCEMENT	
CCIII.5.A	Veterinary Statutory Body – authority	3	The VSB regulates veterinarians in all relevant sectors of the veterinary profession and applies disciplinary measures
CCIII.5.B	Veterinary Statutory Body – capacity	3	The VSB is an independent representative organisation with the functional capacity to implement all of its objectives
CC IV.1	Preparation of legislation and regulations	3	The VS have the authority and the capability to participate in the preparation of national legislation and regulations, with adequate internal and external quality in some fields of activity, but lack the formal methodology to develop adequate national legislation and regulations regularly in all domains.

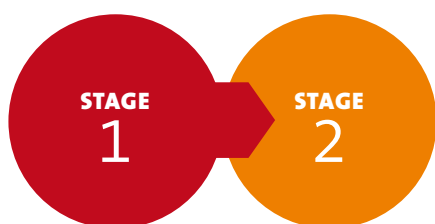
■ Stage 1 Combining control activities with other diseases (Component 3)

The implementation of field activities aimed at building information on PPR can offer a unique opportunity also to investigate other diseases of small ruminants (and possibly other species). If, for example, serum samples are collected as part of the PPR activities, those sera could also be tested for other diseases.

Besides, some activities implemented in Stage 1 are actually not PPR specific and can serve the purpose of any other prevention and control programmes:

- outcome 1.A → activity 1.1; 1.2; 1.6
- outcome 1.B → activity 1.1; 1.2
- outcome 2 → activity 1.1; 1.2
- outcome 3 → activity 2.5; 3.2.

2.3.2. Moving from STAGE 1 to STAGE 2



Minimum requirements:

1. All activities of Stage 1 are successfully completed
2. A comprehensive Report is produced capturing the findings of Stage 1 and should include:
 - (i) the identification of specific ‘hotspots’ defined by the combination of high PPR impact, high risk of spread to other areas or of regular (re)introduction of new infected animals and their mapping in the country;
 - (ii) risk factors for the presence of PPRV and subsequent risk pathways;
 - (iii) a detailed value chain analysis of the small ruminant sector.
3. A comprehensive risk-based Control Strategy (CS1) is developed based on the outcomes of activities carried out in Stage 1 and includes Components 1, 2 and 3 of the Global Strategy.

STAGE 2 Control Stage

Stage 2 epidemiological situation

All activities carried out while in Stage 1 have led to its being established that PPR is widespread/endemic in the country, where the virus is continually circulating. However, the results of the epidemiological investigations will also have shown that the prevalence, incidence and socio-economic impacts of PPR differ from one area or production system to another and that high-risk areas ('hotspots') may exist in the country. In some cases, the production and marketing profiles could identify areas or production systems where, even if PPR is not important, prevention and control measures are needed. This information will allow the identification of areas and/or production systems where control activities should take place in priority.

Stage 2 focus

To control both PPR clinical disease and infection in a specific area or production system

A risk-based Control Strategy has been formulated and will be implemented during Stage 2 in areas or production systems identified based on the outcomes of the activities carried out in Stage 1. However, if any new PPR epidemiological event appears in the non-targeted areas or production system, the control activities of Stage 2 will be extended to include them as well.

The control phase will be mainly based on a targeted vaccination programme aimed at controlling the disease, which means that the virus may be eradicated from the targeted small ruminant populations but without the aim of eradicating the disease nation-wide, foreseen in Stage 3.

Recommended Stage 2 duration: average three years (from two to five years).

Stage 2 specific objectives (Component 1)

DIAGNOSTICS	To strengthen the laboratory capacity through the introduction of bio-molecular methods for a better characterisation of field strains
SURVEILLANCE	To implement surveillance incorporating a response mechanism and risk mitigation measures
PREVENTION AND CONTROL	To implement targeted vaccination campaigns – on an area or production system basis – and thereby, manage secondary prevention in the whole country
LEGAL FRAMEWORK	To improve the legal framework to support the implementation of control activities in targeted sectors
STAKEHOLDER INVOLVEMENT	To actively involve stakeholders in increased reporting and in targeted sectors in the implementation of vaccination campaigns

Stage 2 PPR outcomes and activities (Component 1)

<p>Outcome 1 (Diagnostic system) The laboratory diagnostic system works with a higher level of efficiency than in Stage 1 as possible shortcomings identified are now being solved; in addition, the system is further improved by introducing the use of bio-molecular techniques to obtain a characterisation of field virus isolates.</p> <p>The assumption used is that molecular epidemiology may provide additional insights into PPR distribution and dissemination pathways.</p> <p>Should this not be a feasible option, a link with an international reference laboratory is established to which representative samples can be sent.</p> <p>Characterisation of field virus isolates – and more generally the upgrading of laboratory capacity – is facilitated by the involvement of one or several national laboratories in the Regional Laboratory Network (when existing).</p>	A1.1	Train laboratory staff in bio-molecular testing methods and equip at least one laboratory, if the use of biomolecular testing is an option
	A1.2	Establish and regularly update Standard Operating Procedures for biomolecular testing
	A1.3	Establish written protocols to define criteria to select samples eligible for being processed using biomolecular techniques
	A1.4	Test all submitted samples meeting the eligible criteria for bio-molecular testing
	A1.5	Participate in international proficiency test led by either an International Reference Laboratory or a Regional laboratory designated as leading laboratory in the regional network
<p>Outcome 2 (Surveillance System) The surveillance system is further strengthened:</p> <p>– notably in its passive surveillance component</p> <p>– to capture any possible event linked to PPR.</p> <p>New components are now added into the system, namely: (i) passive surveillance in slaughterhouses and markets; (ii) passive surveillance in wildlife through functional external coordination with the Ministry in charge of wildlife/environment/hunters' organisations (some wild animals may act as sentinels, indicating any spill-over of PPR virus from domestic small ruminants); and (iii) involvement in the (sub-)Regional Epidemio-surveillance Network (when existing).</p>	A2.1	Train inspectors in slaughterhouses to increase their awareness of PPR and its differential diagnosis (training should also address sample collection, storage and submission to the closest delivery place in proper condition and to avoid potential spoiling of test results)
	A2.2	Design a procedure to improve external coordination with MoE and other organisations involved in wildlife management (notably for improved reporting of PPR cases in wildlife)
	A2.3	Organise an awareness campaign on PPR for hunters
	A2.4	Participate in Regional Epidemio-surveillance Network activities (when existing); feed the Network with appropriate sets of data
<p>Outcome 3 (Prevention and control system) A targeted vaccination campaign is implemented.</p> <p>The government has decided to allocate some financial resources to the PPR vaccination programme in the targeted area or sub-population (vaccination in other zones may remain a private initiative). The targeted vaccination zone or subpopulation may evolve during Stage 2, notably upon detection of clinical outbreaks outside the initial targeted zone and constantly taking into account the results of the monitoring system in place.</p>	A3.1	Formulate/design field vaccination Procedures (according to the strategy adopted by the country) for this purpose, the National PPR Committee appoints a specific Working Group
	A3.2	Train field vaccination teams
	A3.3	Implement field vaccination (according to the strategy adopted by the country)
	A3.4	Conduct PPVE with collection of data for evaluating the results of the vaccination programme and monitor the whole vaccination chain accordingly

<p>Outcome 4 (Prevention and control system) Additional measures are put in place to ensure the success of the vaccination campaign.</p> <p>In particular, <i>(i)</i> all outbreaks are investigated to <i>(a)</i> clearly understand why clinical outbreaks may be observed in the sectors/zones covered by the vaccination, and <i>(b)</i> assist in deciding if the vaccination sectors/zones needs to be extended or not (in this case, it will remain limited to what is indicated in Stage 1); and <i>(ii)</i> animal movements (within the country at this Stage) are controlled to ensure that the 2 sub-populations with a different health status as a result of the vaccination campaign remain separate; however, some countries may not be in a position to efficiently regulate animal movement. In such a case, it could be feasible to manage the obligation of introducing only vaccinated animals (or animals to be vaccinated) in those sectors/areas where targeted vaccination is on-going.</p>	A4.1	Design an outbreak investigation Form to collate the following information: <i>(i)</i> possible date of introduction of the virus into the infected premises; <i>(ii)</i> possible means of introduction; and <i>(iii)</i> potential spreading
	A4.2	Conduct investigations for all detected/reported outbreaks, whether in or outside the vaccination sectors/zones
	A4.2	Implement movement controls between the vaccinated/non-vaccinated sectors/zones, in close collaboration with other Services involved (police notably)

<p>Outcome 5 (Legal framework) The legal framework is enforced to fully support the prevention and control activities foreseen in Stage 2.</p>	A5.1	Organise meetings of specific working groups (mixed VS, other authorities, and stakeholders) to better understand the impact of control measures (including financial aspects) on stakeholders and upgrade the legislation framework to support field control activities
	A5.2	Propose concrete amendments to update the legal framework conducive to efficient PPR prevention and control

<p>Outcome 6 (Stakeholder involvement) The Stakeholders fully contribute to the control efforts foreseen in Stage 2.</p> <p>This notably implies that the stakeholders <i>(i)</i> facilitate the vaccination operations in the field – for instance by gathering the animals and handling them; <i>(ii)</i> respect the movement restrictions within the country; and <i>(iii)</i> ensure the early reporting of suspected clinical outbreaks to the VS; at this Stage, early reporting of suspected clinical outbreaks – in particular in the targeted vaccination areas/ production systems – is critical to adjust the control measures already put in place.</p> <p>Awareness and communication are key.</p>	A6.1	Prepare and disseminate informative material to increase awareness among livestock keepers and thereby facilitate reports of suspected cases.
	A6.2	Prepare communication material to explain and convince (advocacy) all stakeholders particularly farmer that control of PPR is needed
	A6.3	Organise meetings with the livestock keepers and their partners active in the field (NGOs, etc.)
	A6.4	Should wildlife be identified among the issues to be addressed, organise meetings involving wildlife specialists and other stakeholders (such as hunters)

■ Stage 2 specific use of the tools²¹ (Component 1)

】 Surveillance (→ mostly passive surveillance)

The surveillance in Stage 2 has two objectives:

1. to provide early detection of PPR appearance;
2. to monitor the prevalence, distribution and occurrence of PPR (disease and infection).

The passive component of the surveillance system will be fully operational through the Field Veterinary Network and surveillance in slaughterhouses and markets; the active component of the preceding Stage is unlikely to be carried out with the same level of intensity.

At this stage surveillance has to provide evidence that the health status of the sub-population targeted for vaccination is clearly different from the one that remains unvaccinated and thus elements of analytical epidemiology are introduced into the overall surveillance system.

Nota bene: sero-surveillance should not be used as an active surveillance method in vaccinated populations. It is used for PVE purposes in vaccinated populations to evaluate vaccination programme effectiveness.

】 Vaccination

The vaccination strategy may have two main components:

- a) a normal control component, targeting a specific zone where PPR is endemic or at high risk, or a specific sub-population at higher risk or of higher commercial value to be vaccinated on a regular basis;
- b) an emergency component (associated with movement control) consisting of the delivery of vaccine upon detection of clinical outbreaks, either in the area/production system already vaccinated (investigations will be undertaken to determine the reason(s) for the failure of the vaccination measures) or in the area/production system not yet vaccinated.

The recommended vaccination protocols described above apply to all animals of flocks being vaccinated during two successive years followed by the vaccination of new born animals during one or two more years. Vaccination campaigns will be implemented as follows: one vaccination campaign per year in hyper-arid, arid, and semi-arid pastoral and agro-pastoral systems, twice yearly campaigns in mixed crop-livestock farming systems and a single or two vaccination campaigns, depending on the animal turnover in the flock, in peri-urban systems.²²

】 Post-Vaccination Evaluation

PVE (which is to be considered as a sub-component of the overall surveillance system) will require implementation of specific activities that are not only limited to the evaluation of the immune response in animals that have received the vaccine. These activities will include active disease search and passive outbreak reporting as well as the implementation

²¹ In this section, only those tools whose utilisation varies in the different stages are mentioned; this concerns namely: (i) surveillance; (ii) vaccination, including post-vaccination monitoring; and (iii) OIE standards relevant to PPR. All the other tools referred to in Part A Section 5 are used in the same way regardless of the Stage.

²² It is highly improbable to determine what exact percentage of the total population will be targeted since the local situations are very diverse. However, to be able to calculate the cost of the vaccination programmes in the Global Strategy, an estimation of a targeted population to be vaccinated during Stage 2 is within the range of 20% to 50% of the national small ruminant population

of a monitoring system to check that all along the vaccine delivery system (from purchase, consignment of vaccine custody by field operators to its final administration to the animals) the cold chain is maintained and there are no failures that could affect the efficacy and effectiveness of the vaccination campaigns. Details are given in Annex 3.4.

■ Stage 2 Enabling environment (Component 2)

In Stage 2, the VS must have the necessary authority and capacity to put in place effective control measures, based mostly on a targeted vaccination campaign. Fifteen CCs are relevant to support the PPR specific activities of Stage 2. The most important competencies to acquire and/or implement for Stage 2 are therefore the capacity linked to disease prevention, control and eradication (CC II.7), and passive surveillance (CC I.6.B, II.5.A et II.8.B) supported by a robust chain of command (CC I.6.A) and data management system (CC I.11). Also of paramount importance is the ability to access adequate and sustainable physical (CC I.7) and financial (CC I.8) resources as the VS embark on a multi-annual eradication programme. In Stage 2, countries can start envisaging zoning as the targeted vaccination campaigns, movement control, etc will allow establishing sub-populations with clear different health status (CC IV.7). Level of advancement 3 is in most cases targeted; however, the long term ambitious eradication objective requires level 4 for four CCs (funding and communication aspects are of particular importance).

OIE PVS CRITICAL COMPETENCIES			TARGETED OIE PVS LEVEL OF ADVANCEMENT
CC I.1.A	Professional and technical staffing of the VS – Veterinarians and other professionals	3	The majority of veterinary and other professional positions are occupied by appropriately qualified personnel at local (field) levels
CC I.1.B	Professional and technical staffing of the VS – Veterinary para-professionals and other technical staff	3	The majority of technical positions at local (field) levels are occupied by personnel holding appropriate qualifications
CC I.2.B	Competencies of veterinary para-professionals	3	The training of veterinary para-professionals is of a uniform standard that allows the development of only basic specific competencies
CC I.6.A	Coordination capability of the VS – Internal coordination (chain of command)	3	There are internal coordination mechanisms and a clear and effective chain of command for some activities
CC I.6.B	Coordination capability of the VS – External coordination	3	There are formal external coordination mechanisms with clearly described procedures or agreements for some activities and/or sectors
CC I.7	Physical resources	3	The VS have suitable physical resources at national, regional and some local levels and maintenance and replacement of obsolete items occurs only occasionally
CC I.8	Operational funding	4	Funding for new or expanded operations is on a case-by-case basis, not always based on risk analysis and/or cost benefit analysis.
CC I.11.	Management of resources and operations	4	The VS regularly analyse records and documented procedures to improve efficiency and effectiveness
CC. II.5.A	Epidemiological surveillance and early detection – passive epidemiological surveillance	3	The VS conduct passive surveillance in compliance with OIE standards for some relevant diseases at the national level through appropriate networks in the field, whereby samples from suspected cases are collected and sent for laboratory diagnosis with evidence of correct results obtained. The VS have a basic national disease reporting system.
CC II.7	Disease prevention, control and eradication	3	The VS implement prevention, control or eradication programmes for some diseases and/or in some areas with scientific evaluation of their efficacy and efficiency
CC II.8.B	Ante- and post mortem inspection at abattoirs and associated premises	4	Ante- and post mortem inspection and collection of disease information (and coordination, as required) are undertaken in conformity with international standards for export premises and for all abattoirs producing meat for distribution in the national and local markets
CC III.1	Communication	4	The VS contact point for communication provides up-to-date information, accessible via the Internet and other appropriate channels, on activities and programmes.
CC III.6	Participation of producers and other interested parties in joint programmes	3	Producers and other interested parties are trained to participate in programmes and advise of needed improvements, and participate in early detection of diseases.

OIE PVS CRITICAL COMPETENCIES		TARGETED OIE PVS LEVEL OF ADVANCEMENT	
CC IV.2	Implementation of legislation and regulations and compliance thereof	3	Veterinary legislation is generally implemented. As required, the VS have the power to take legal action/initiate prosecution in instances of non-compliance in most relevant fields of activity.
CC IV.7	Zoning	3	The VS have implemented biosecurity measures that enable it to establish and maintain disease free zones for selected animals and animal products, as necessary

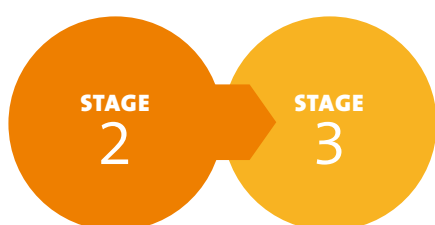
■ Stage 2 Combining control activities with other diseases (Component 3)

In relation to other diseases of small ruminants, it is difficult to anticipate to what extent those sectors or zones targeted for PPR may be complemented by prevention and control activities for other diseases. It is important, however, to emphasise that since vaccination against PPR is going to be the main tool, a preliminary evaluation on the feasibility of combining this with the administration of other vaccine can be considered. The discussions/consultations carried out with the livestock keepers may also be a good opportunity to discuss animal health (or welfare) issues more broadly.

Besides, some activities implemented in Stage 2 are actually not PPR specific and can serve the purpose of any other prevention and control programmes:

- outcome 1 → activity 1.5
- outcome 2 → activity 2.1; 2.2; 2.4
- outcome 3 → activity 3.1; 3.2; 3.4
- outcome 4 → activity 4.1.

2.3.3. Moving from STAGE 2 to STAGE 3



Minimum requirements:

1. All activities of Stage 2 are successfully completed
2. A national **Eradication Strategy** is developed with Components 1, 2 and 3 of the Global PPR Strategy.

Nota bene: the Eradication Strategy is a continuation/reinforcement of the Control Strategy established at the end of Stage 1 but in a more aggressive way, aimed at eradicating PPR in the entire territory (or zone).

■ STAGE 3) Eradication Stage

■ Stage 3 epidemiological situation

At the beginning of Stage 3, the occurrence of clinical disease in the sub-population covered by the vaccination programme carried out in Stage 2 is expected to be nil. In the sub-populations not covered by the vaccination programme, there are three possible scenarios:

1. there is no PPRV circulation,
2. cases/outbreaks occur only sporadically (as the programme is expected to have a secondary preventive effect in non-vaccinated animals in the surrounding area), or
3. the situation remains endemic (but with a small socio-economic impact, otherwise these sub-populations would have been chosen to be part of the targeted Stage 2 vaccination programme).

In the last two scenarios, strong control measures will need to be implemented. In the first scenario, strong preventive measures and emergency response capabilities have to be put in place.

At the end of Stage 3, no clinical outbreaks can be detected in the whole territory and diagnostic tests also indicate that the virus is no longer circulating in the domestic animal and wildlife populations.

■ Stage 3 focus

To achieve the eradication of PPR from the national territory of the country

The country has the capacity and resources to move towards an eradication programme. Whether this should be based on extending the vaccination to other production systems or to other geographical areas not yet covered under Stage 2 or possibly on strategies not based on vaccination will be decided by evaluating the results of Stage 2. Moving towards eradication may mean that the country will gain the capability and resources to adopt a more aggressive control strategy to suppress virus replication in those premises where new clinical outbreaks may be detected.

At this Stage, the country is moving towards eradication and any health events that could be related to the presence of PPR virus need to be promptly detected and reported and appropriate measures immediately put in place to control them. The country must develop and have the capacity to implement the contingency plan that forms part of the eradication strategy. If a new risk of introducing PPRV in the area or production system arises, the results of the surveillance system and of epidemiological analysis must identify and qualify the risks and appropriate measures should be rapidly implemented to mitigate the risk of introduction. Risk analysis and risk assessment guides and handbooks are available (24).

Recommended Stage 3 duration: average three years (from two to five years).

■ Stage 3 specific objectives

DIAGNOSTICS	To further strengthen laboratory capacity to support eradication through the introduction of a laboratory quality assurance system
SURVEILLANCE	To strengthen surveillance incorporating an emergency response mechanism
PREVENTION AND CONTROL	To achieve eradication, either by extending vaccination to areas/production systems not yet vaccinated or by adopting a more aggressive policy to suppress virus replication in identified outbreaks
LEGAL FRAMEWORK	To further improve the legal framework to support prevention and risk mitigation at population level, including the risk of PPR introduction from abroad, and possibly accommodate a compensation mechanism
STAKEHOLDER INVOLVEMENT	To fully involve stakeholders in establishing procedures for accessing compensation funds in the event of PPR outbreaks

Stage 3 PPR outcomes and activities (Component 1)

<p>Outcome 1 (Diagnostic system) The Laboratory starts to develop a quality assurance scheme.</p> <p>Laboratory maintains at least the same level of activities as in the previous Stage, while putting Quality Assurance in place, at least for all laboratories used by the Veterinary Services. A strong link with an international reference laboratory is also maintained.</p>	A1.1	Implement a quality control system in the central laboratory and its branches constituting the laboratory network in the country, and develop all procedures related to the manipulation and testing of samples for PPR virus according to the standards of a quality assurance scheme
	A1.2	Implement collateral procedures to ensure that stocks of reagents, laboratory devices, equipment, etc. are purchased following quality assurance procedures in all the laboratory/ies involved in the diagnosis of PPR
<p>Outcome 2 (Surveillance system) The surveillance system has been further upgraded and includes specific components addressing early warning.</p> <p>The surveillance system continues to operate as indicated in previous Stages but in addition, its sensitivity is increased in Stage 3: (i) information on neighbouring countries (or on countries from which animals/goods are imported that may carry the virus) is now routinely collected; (ii) high resolution surveillance may target specific sub-groups (newborn animals not yet vaccinated) or cattle as proxy indicators of virus circulation; (iii) the activities to detect cases in wildlife are increased.</p>	A2.1	Establish procedures to capture PPR health events in neighbouring countries or countries from which animals are imported. <i>The group dedicated to qualitative Risk Assessment already identified in Stage 1 should conduct this work</i>
	A2.2	Design and implement surveillance in those subpopulations or areas where the events can be captured and misinterpretation is minimised
	A2.3	Increase the collection of sero-surveillance data from wildlife and other susceptible species
<p>Outcome 3 (Prevention and control system) A more aggressive control strategy is in place aimed at eradication and possibly supported (if feasible) by a stamping-out policy (linked to a compensation scheme).</p> <p>It may be that either (i) a whole area or country vaccination programme or (ii) a targeted vaccination programme will be implemented as part of a more aggressive control strategy. In both cases it is expected that the control policy will lead to eradication. The vaccination programme is defined according to the results of Stage 2 vaccination (Post-Vaccination Evaluation [PVE]) and continuous surveillance.</p> <p>In case of (ii), an emergency preparedness and contingency response plan are now also implemented, possibly linked to a stamping-out policy, to control promptly a clinical outbreak of PPR in the infected premises and to reduce the infectious period at flock level.</p> <p>Breeders are encouraged to reinforce the biosecurity measures at farm level (this may be linked to the level of compensation in the event of stamping out); biosecurity is also reinforced in live markets.</p>	A3.1	Implement vaccination campaigns in areas where virus still circulates (in already vaccinated areas and/or in unvaccinated areas) according to the results of continuous monitoring and evaluation of the results of Stage 2. All vaccinated animals will be identified at the same time
	A3.2	Conduct surveillance activities and PVE with collection of data for evaluating the results of the vaccination programme and monitor the entire vaccination chain accordingly
	A3.3	Develop a contingency plan in case of (ii), officially endorsed and approved by the Veterinary Authorities. <i>The National PPR Committee will assign a group of experts (which could be supported by international experts if required) to formulate such a contingency plan</i>
	A3.4	Test the correct application of the contingency plan through field simulation exercises as part of the activities to maintain a high level of awareness
	A3.5	Carry out prompt preliminary precautionary measures once a suspicion is raised (they are withdrawn if the outbreak is not confirmed or are immediately followed up if the outbreak is confirmed)
	A3.6	Implement prompt measures to contain virus spread once an outbreak is confirmed (whether this should be based on animal movement restrictions, culling or emergency vaccination, or a combination of these, is a country policy choice)
	A3.7	Design and implement field procedures to officially close an outbreak and lift the restrictions put in place to be done by the National PPR Committee
	A3.8	(Voluntary) Submit a national control programme to the OIE for official endorsement, in accordance with the provisions of the OIE <i>Terrestrial Animal Health Code</i> (Chapters 1.6. and 14.7)

<p>Outcome 4 (Legal framework) The veterinary legislation includes clear provisions for: (i) compensation for small ruminants culled for disease control purposes (should stamping-out be adopted as one of the control policies), and (ii) improved biosecurity in live markets and at farm level. The PPR legal framework is properly enforced.</p> <p>Implementation of an identification system for small ruminants is an asset to improve their traceability and movement control.</p>	A4.1	Develop a procedure to compensate farmers whose animals were culled for disease control purposes. <i>(The National PPR Committee may appoint a Specific Working Groups to develop such a procedure)</i>
	A4.2	Carry out studies on how to improve biosecurity in live animal markets and at farm level and how biosecurity can impact on stakeholders <i>The National PPR Committee may appoint Specific Working Groups to do this</i>
	A4.3	Carry out feasibility studies to implement an animal identification system
	A4.4	<i>Propose concrete amendments to update the existing legal framework conducive to supporting the new control measures foreseen in Stage 4 (compensation scheme, biosecurity, animal identification); in addition, legal provisions for suspending/stopping the vaccination are also included</i>

<p>Outcome 5 (Stakeholder involvement) Stakeholders are actively consulted for the compensation arrangements and are involved in the identification of their animals.</p> <p>Stakeholder involvement at this Stage is essential and, as in the previous stages, there is sufficient evidence that stakeholders have been duly involved in sharing control programme overall outcomes and that they have been part of the decision process to move towards eradication. Communication continues to be a key element.</p>	A5.1	Establish a specific procedure (by the National PPR Committee) to address issues raised by a specific group of stakeholders concerning matters relating to PPR control/eradication that may impact on their business activities
	A5.2	Address specific requests from stakeholders (by the National PPR Committee, with the possible support of Working Groups)
	A5.3	Distribute communication material, use media and other oral means and organise specific meetings aimed at updating all stakeholders, including development partners active in the field (e.g. NGOs), where the country stands in its national efforts towards eradication and ensure their full and sustained support

■ Stage 3 specific use of tools²³ (Component 1)

› Surveillance (→ a combination of active and passive surveillance but with a special focus on passive surveillance to detect new outbreak occurrences)

The surveillance in Stage 3 has three objectives:

1. to provide early detection of possible PPR appearance;
2. to explain the reasons for this new introduction of the virus, to monitor the results of the immediate response and to give guidance for possible refining of the prevention and emergency response plan if appropriate;
3. to demonstrate the absence of PPR clinical disease or infection.

› Vaccination

In Stage 3, the vaccination strategy will depend on the outcomes of Stage 2. The pivotal role played by the monitoring and evaluation tools (PMAT and PVE) is again highlighted. The possible scenarios will be dependent of the monitoring and evaluation results²⁴.

- › If the situation is or has become endemic in the entire area or production system not targeted in Stage 2, an area- or production system-wide vaccination programme is to be implemented during two successive years followed by vaccination of new born animals during one or two successive years.

²³ In this section, only those tools whose utilisation varies in the different Stages are mentioned; this concerns namely: (i) surveillance; (ii) vaccination, including post-vaccination monitoring; and (iii) OIE standards relevant to PPR. All the other tools referred to in Part A Section 5 are used in the same way regardless of the Stage.

²⁴ As in Stage 2 (see footnote No. 21) it is very difficult to foresee the percentage of the small ruminant population to be vaccinated. In Stage 3, a range of 20 to 75% could be vaccinated.

- If PPR outbreaks are limited to clearly identified unvaccinated areas/production systems not targeted in Stage 2, an additional targeted vaccination campaign can be put in place for those zones/sectors; during one or two years according to the PVE results.
- If PPR outbreaks are very rare in the areas/production systems not targeted in Stage 2 and their origin is clearly identified, then a country may adopt a stamping-out programme, which may suffice to eliminate viral activity in otherwise unvaccinated zones/sectors.

The adoption of a targeted strategic approach will require the country concerned to have the capability to assess the risk of virus introduction into those sub-populations not covered by the vaccination programme and to implement measures to properly address such risks.

Should the risk assessment process suggest that the introduction of PPR virus may also occur because of its presence in neighbouring countries, then targeted vaccination in high-risk areas may be considered (e.g. buffer zone along borders or along trade routes) as an additional option.

】 Post-Vaccination Evaluation

As in the previous Stage, PVE will require implementation of specific activities aiming at ensuring that:

- a) the level of protection in the vaccinated animals is maintained equal to or above the expected threshold over time;
- b) the vaccine distribution system is monitored over time to ensure that the cold chain is maintained and there are no failures that could affect the efficacy and effectiveness of the vaccination campaigns;
- c) the decrease and progressive disappearance of PPR outbreaks and PPRV circulation have been obtained (through the implementation of surveillance activities).

】 Use of OIE standards

During Stage 3, countries are entitled to submit their national control programme (CP3) to the OIE for official endorsement, in accordance with the provisions of the OIE *Terrestrial Animal Health Code* (Chapter 1.6.). CP3 should build on the Control Strategy and Eradication Strategy, respectively produced at the end of Stage 1 and Stage 2, thus showing a long-term commitment to and continuity in the control of PPR.

■ Stage 3 enabling environment (Component 2)

In Stage 3, the VS must have the necessary authority and capacity to put in place aggressive control measures to eradicate PPR throughout the national territory and to maintain this situation through appropriate emergency measures as needed. Two CCs are relevant to support the PPR specific activities of Stage 3. The important competencies to acquire and/or implement for Stage 3 are to ensure that a laboratory quality assurance system is in place and to provide for animal identification and movement control (CC II.12.A).

OIE PVS CRITICAL COMPETENCIES		TARGETED OIE PVS LEVEL OF ADVANCEMENT	
CC II.2	Laboratory quality assurance	2	Some laboratories used by the public sector VS are using formal QA systems
CC II.12.A	Identification and traceability – Animal identification and movement control	3	The VS implement procedures for animal identification and movement control for specific animal subpopulations as required for disease control, in accordance with relevant international standards

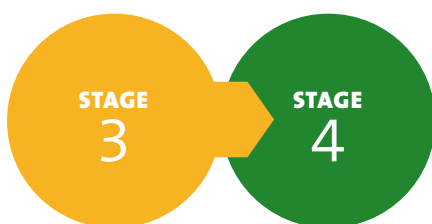
■ Stage 3 Combining control activities with other diseases (Component 3)

Depending on the strategic approach adopted by an individual country, complementarities with other small ruminant diseases may be found. If, for example, the implementation of the eradication strategy foresees a mass vaccination programme this may offer an opportunity (provided that the vaccination schedules coincide) for the concurrent elimination (or a significant decrease in the incidence) of other diseases.

Besides, some activities implemented in Stage 2 are not PPR specific and can serve the purpose of any other prevention and control programmes:

- outcome 1 → activity 1.1; 1.3
- outcome 4 → activity 4.1; 4.2; 4.3

2.3.4. Moving from STAGE 3 to STAGE 4



Minimum requirements:

1. All activities of Stage 3 are successfully completed
2. the **use of vaccine is suspended** and no clinical outbreaks have been detected in the previous 24 months

■ STAGE 4) Post-eradication Stage

■ Stage 4 epidemiological situation

There is a body of evidence that PPR virus is no longer circulating in domestic animals within the country or zone. PPR incidence is very low (reduced to zero incidence) and limited to occasional incursion from other countries.

It is worth noting that acceptance into Stage 4 is now clearly linked to the animal health status of the susceptible population in relation to PPR (differently from previous Stages).

Nota bene: For the purposes of the OIE *Terrestrial Animal Health Code*, PPR is defined as an infection of domestic sheep and goats with PPR virus (PPRV) (Chapter 14.7.). The official free status therefore takes into account the status in domestic animals only.

■ Stage 4 focus

To build evidence that, after suspension of vaccination, there is no clinical disease and no virus circulation

Entry into Stage 4 means that a country will be ready to start implementing a full set of activities that should lead to its being recognised as officially free from PPR.

In Stage 4, eradication and prevention measures are based on early detection and reporting of any new outbreak occurrence, emergency response and contingency planning. Vaccination is prohibited. If emergency vaccination needs to be implemented, the country or the vaccinated zone ('zone' as defined in the OIE *Terrestrial Code*) will be downgraded to Stage 3.

■ Stage 4 specific objectives (Component 1)

DIAGNOSTICS	To maintain laboratory capacity as in the previous Stage and strengthen the differential diagnostic pathways. To start implementing PPRV sequestration activities
SURVEILLANCE	To shift the goal of surveillance to proving the absence of PPR
PREVENTION AND CONTROL	To suspend vaccination. Eradication and prevention measures are based on stamping out, import movement control, biosecurity measures and risk analysis to understand the potential pathways of (re)introduction of PPR
LEGAL FRAMEWORK	To further improve the legal framework to accommodate more stringent border control policies; prepare additional legal provisions (such as containment) to implement in the context of an official PPR free status
STAKEHOLDER INVOLVEMENT	To keep stakeholders fully vigilant and committed with regard to PPR

■ Stage 4 PPR activities (Component 1)

Outcome 1 (Diagnostic system) The diagnostic activities carried out in the laboratories, while maintaining the same level of capability and performance in relation to PPR diagnosis, have been further extended to include all those diseases which may require a differential diagnosis with PPR. In addition, all material containing PPRV is sequestered in a well-defined secure location, under the supervision of the Veterinary Services, to avoid any PPR resurgence linked to accidental or intentional manipulations.	A1.1	Produce (and keep updated) a flowchart to indicate how a suspicion of PPR is handled and (once the suspicion is withdrawn) which other diseases will be investigated
	A1.2	Train laboratory staff in differential diagnosis of PPR
	A1.3	Identify, list and collate all PPRV-containing material and identify appropriate premises for its secure sequestration (in the future it may be destroyed)

<p>Outcome 2 (Surveillance system) The surveillance system operates as in the previous Stage with a focus on population at higher risk</p> <p>The surveillance system is robust enough to identify any animal with signs suggestive of PPR that require follow-up and investigation to confirm or exclude that the cause of the condition is PPRV.</p> <p>The case definition of a suspected case may be made broader so to be able to capture health events and rapidly rule out those that may be attributed to PPR.</p>	A2.1	Organise training sessions to make field veterinarians fully aware of where the country is now in relation to the eradication process
	A2.2	Design and implement specific studies aimed at proving that the cohort of animals born after the suspension of vaccination has not been exposed to the PPR virus (likely to be done through serology targeting the birth-cohort of animals born after cessation of the vaccination in accordance with procedures indicated by the OIE for being recognised as officially free)
	A2.3	Implement, when relevant, additional clinical inspection and serological testing of high-risk groups of animals following an alert, such as those adjacent to a PPRV-infected country

<p>Outcome 3 (Prevention and control system) Stringent preventive measures are put in place to maintain the absence of PPR outbreaks achieved at the end of Stage 3 and prevent any reintroduction; in the event of a PPR outbreak, emergency procedures are implemented.</p> <p>At this Stage, any true outbreak of PPR is treated as an emergency and consequently the contingency plan (prepared in Stage 3) is immediately activated to eliminate the virus as soon as possible.</p> <p>Stringent movement control and quarantine measures are applied at borders. Risk analysis is conducted on a regular basis and whenever justified by new factors that may jeopardise the free status. An emergency vaccination programme (combined or not with a stamping-out policy) may also be implemented in the worst case scenario, but will automatically downgrade the country or vaccinated zone to Stage 3.</p>	A3.1	In the event of an outbreak, implement the provisions of the contingency plan
	A3.2	Increase collaboration with the Customs services at borders to optimise border control
	A3.3	Conduct risk analysis on a regular basis
	A3.4	(Voluntary) Submit a dossier to the OIE requesting official recognition of PPR free status, in accordance with the provisions of Chapters 1.6. and 14.7. of the OIE <i>Terrestrial Animal Health Code</i>

<p>Outcome 4 (Legal Framework) The legal framework fully supports possible aggressive measures needed for prompt eradication of PPR in the country.</p> <p>The national legislation will require further improvement to include protective measures on imports of live animals to mitigate the risk of introduction.</p> <p>The review of the legal framework may at this Stage require consultation with international experts to ensure that the legal requirements for importers of livestock and livestock products (that may carry PPR virus) are in compliance with the SPS Agreement (should the country be a WTO member).</p> <p>Legal texts will also include provisions for additional measures, notably in the case of free status (e.g. establishment of a containment zone in accordance with OIE requirements).</p>	A4.1	Upgrade the legal framework, notably to ensure that it will include the necessary preventive and control measures foreseen in Stage 4 (in particular exclusion measures aimed at avoiding introduction of PPR virus from abroad)
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<p>Outcome 5 (Stakeholder involvement) Stakeholders are fully aware of the health status of the country and are fully committed to promptly collaborate should an emergency occur.</p> <p>Stakeholder involvement at this Stage is essential not only in relation to the formulation of a legislation framework, as indicated in previous outcome, but also in relation to other activities. It is crucial that if a suspicion of PPR arises at this Stage all stakeholders are fully aware of the consequences this may have, thus ensuring their full collaboration. Communication remains a key element.</p>	A5.1	Organise meetings with groups of stakeholders to acquaint them with the status of the country and ensure that they are aware that any suspicion of PPR is to be treated as an emergency
	A5.2	Prepare and disseminate informative material in order to maintain a high level of awareness among livestock keepers and other stakeholders

■ Stage 4 specific use of the tools²⁵ (Component 1)

】 Surveillance (→ active and passive surveillance)

The surveillance in Stage 4 has the same three objectives as in Stage 3:

1. to provide early detection of possible PPR appearance;
2. to explain the reasons for this new introduction of the virus, to monitor the results of the immediate response and to give guidance for possible refining of the prevention and emergency response plan if appropriate;
3. to demonstrate the absence of PPR clinical disease or infection.

However, in Stage 4, the strongest focus of surveillance is to provide evidence that the country is free from disease/infection, with the clear objective of obtaining official OIE recognition of free status and thus entitling a country to leave the PPR step-wise approach. Therefore, in Stage 4, surveillance must be conducted in compliance with the provisions of OIE *Terrestrial Code* Chapter 14.7. (Articles 14.7.29., 14.7.30. and 14.7.31. in relation to surveillance requirements for Member Countries applying for OIE recognition of PPR free status).

Another major objective is to detect any new PPR outbreak occurrence and to provide epidemiological guidance for the management of the emergency response. The epidemiological tools will also address the risk of virus introduction, categorising the different animal sub-populations on the basis of the level or risk of exposure to PPR virus and adapting the prevention and emergency response plans if appropriate.

Nota bene: All materials, tissues (cultures or pathological samples) should be maintained in secured laboratory conditions or destroyed.

】 No vaccination and therefore no post-vaccination monitoring

All stocks of PPR vaccine (monovalent and multivalent) should be safeguarded by the competent authorities or removed/destroyed from non-accredited sites.

²⁵ In this section, only those tools whose utilisation varies in the different Stages are mentioned; this concerns namely: (i) surveillance; (ii) vaccination, including post-vaccination monitoring; and (iii) OIE standards relevant to PPR. All the other tools referred in Part A Section 5 are used in the same way regardless of the Stage.

Use of OIE standards

At the end of Stage 4, countries are entitled to apply for an OIE official PPR free status according to the provisions of the OIE *Terrestrial Code* (Chapter 1.6. on Procedures for self-declaration and for official recognition by the OIE and Chapter 14.7. on Infection with *peste des petits ruminants virus*).

Nota bene:

- when the country is granted an OIE official free status, the country leaves the PPR step-wise approach (i.e. ‘beyond Stage 4’);
- when the officially free status of a country is suspended by the OIE for reasons of evidence of PPRV circulation in domestic animals, the country can be considered as downgraded back to Stage 3 until its status is reinstated by the OIE; however, in this specific case, there is no need to move to Stage 4 again.

Stage 4 enabling environment (Component 2)

Four CCs are relevant to support the PPR specific activities of Stage 4. The VS must have the necessary authority and capacity to prevent the entry of PPR from neighbouring countries (CC II.4), to early detect and report any new PPR outbreak occurrence and to respond rapidly to it (CC II.6) by implementing the national PPR Contingency Plan, to maintain the PPR free status (not yet official) at national level or in a well-defined zone (CC IV.7), and to do this, to implement emergency measures supported by adequate funding (CC I.9). When applying for an OIE official status for PPR freedom, PPR must be a notifiable disease in the whole territory and proper notification to the OIE (CC IV.6) should operate (early reporting mechanism based on immediate notification).

OIE PVS CRITICAL COMPETENCIES		TARGETED OIE PVS LEVEL OF ADVANCEMENT	
CC I.9	Emergency funding	4	Funding arrangements with adequate resources have been established, but in an emergency situation, their operation must be agreed through a non-political process on a case-by-case basis
CC II.4	Quarantine and border security	3	The VS can establish and apply quarantine and border security procedures based on international standards, but the procedures do not systematically address illegal activities relating to the import of animals and animal products
CC II.6	Emergency response	4	The VS have an established procedure to make timely decisions on whether or not a sanitary emergency exists. The VS have the legal framework and financial support to respond rapidly to sanitary emergencies through a chain of command. They have national contingency plans for some exotic diseases that are regularly updated/tested
CC IV.6	Transparency	3	The VS notify in compliance with the procedures established by the OIE (and the WTO SPS Committee where applicable)

Stage 4 combining control activities with other diseases (Component 3)

The procedures to increase collaboration with customs to facilitate and/or enforce trade measures are not PPR specific and are therefore also applicable to other diseases.

At this Stage (if activities for other diseases have been combined with PPR) it will be appropriate to assess to what extent these combined efforts have led to an improvement for the other disease(s) addressed. The outcomes of this evaluation may dictate additional activities to be carried out with reference to those other diseases.

3. THE STRATEGY AT REGIONAL LEVEL

3.1. Peste des petits ruminants

Main features:

- 1. Regional coordination is needed.** Implementation of the Global Strategy will require regional harmonisation of the strategies and coordination of the activities. This harmonisation and coordination will be achieved through strong interactions between the Ministries in charge of animal health and their relevant structures, such as their VS, the laboratories and the epidemiology teams.
- 2. Regional coordination will benefit from the development of strong partnerships between international and regional organisations** (such as AU-IBAR in Africa, SADC in southern Africa, ASEAN in Asia, SAARC in South Asia, etc.), with regional or sub-regional projects, donors, regional and international unions of private sector stakeholders (animal product producers, vaccine-producing companies, international unions of private veterinarians, etc.).
- 3. The regional networks are tools of paramount importance.** The Global Rinderpest Eradication Programme demonstrated that networks are the best tools to develop such collaborations. There are many subjects that can benefit from networking approaches, such as harmonisation of diagnostic assays and epidemiology methods, exchange of information on animal health and on the control strategies being implemented, control of movements of animals, including border controls, legislation, dissemination and use of new scientific knowledge, combined training sessions for national laboratory and epidemiology officers to be implemented at regional level (economies of scale), etc.
- 4. The GF-TADs Regional Animal Health Centres can play an important role in implementing the Strategy at regional level.** Implementing all these regional activities would benefit from the establishment or strengthening of RAHCs, where regional multidisciplinary expertise would be located. It will be important for RECs and other relevant regional organisations (such as AU-IBAR in Africa) to be strongly associated with the RAHCs.

Main outcomes and activities at regional level:

<p>Outcome 1 (Diagnostic system) Regional Laboratory Networks are established or reinforced in the nine Regions/Sub-Regions proposed under the Strategy (see Part C, paragraph 2), which associate all national laboratories.</p> <p>One (or two) of them is (are) nominated as Regional Leading Laboratory (RLL) (regional network coordinator) with specific mandates and missions.</p> <p>If an OIE FAO Reference Laboratory/Centre exists in the region, it will act as the RLL; if not, the RLL will be closely associated with an international Reference OIE-FAO Laboratory/Centre.</p> <p>The RLL and the national laboratories will also be assisted by the Joint FAO/IAEA Division.</p>	A1.1	Establish or reinforce Regional Laboratory Networks and designate the RLL in each of the 9 regions/subregions
	A1.2	(RLL) Organise a regional meeting every year for exchanges between national laboratory staff or for training purposes
	A1.3	(RLL) Organise regional proficiency testing for PPR annually (ring trials)
	A1.4	(RLL) Organise regional training of diagnostic methods, quality assurance, etc. on a regular basis
	A1.5	(RLL) Provide reference diagnostics as needed
	A1.6	(RLL) Request twinning project when needed

<p>Outcome 2 (Surveillance system) Regional Epidemiology Networks are established or reinforced in the nine Regions/Sub-Regions proposed under the Strategy (see Part C, paragraph 2).</p> <p>The epidemiology networks are coordinated by a recognised regional epidemiology centre, which will become the Regional Leading Epidemiology Centre (RLEC) (regional network coordinator).</p> <p>If a specialised OIE/FAO Reference Centre already exists in the region, it will serve as the RLEC.</p> <p>The RLEC will work closely with the national laboratories and their regional networks.</p>	A2.1	Establish or reinforce Regional Epidemiology Networks and designate the Regional Leading Epidemiology Centre (RLEC) in each of the 9 regions/sub-regions
	A2.2	(RLEC) Organise a regional meeting every year for exchanges between national epidemiology staff or for training purposes
	A2.3	(RLEC) Undertake regional situation monitoring, risk analysis and disease intelligence studies with regard to PPR
	A2.4	(RLEC) Provide training and expertise as needed by the countries belonging to the Network
	A2.5	(RLEC) Request twinning project when needed
<p>Outcome 3 (Prevention and control system) The response capabilities are improved at regional level, notably through the support of the RHACs with multidisciplinary expertise and establishment of regional PPR vaccine banks.</p> <p>(Vaccines provided will meet or exceed the quality requirements provided in the OIE <i>Terrestrial Manual</i>)</p>	A3.1	Establish or strengthen the RAHCs as a source of expertise for members
	A3.2	Establish a PPR Regional vaccine bank
	A3.3	Organise simulation exercises
	A3.4	Undertake expert missions in countries when needed and contribute to the preparation of regional and national strategies and control programmes or of project proposals
<p>Outcome 4 (Legal Framework) The national legal framework for the control of PPR and more generally in the field of animal health is harmonised at regional level, whenever feasible.</p> <p>Specific issues such as cross-border movement of small ruminants (transhumance, trade), certification, compensation schemes, etc. are best addressed at regional level; REC policies need to be considered and defined, or updated, while respecting the national sovereignties.</p>	A4.1	Organise regional meetings
		Organise or undertake expert missions in countries (or for RECs) to identify areas for legislation improvement or updating and to define appropriate revised or new texts
<p>Outcome 5 (Regional coordination) Regional PPR initiatives are established in the nine Regions/Sub-Regions proposed under the Strategy (see Part C, paragraph 2).</p> <p>As part of these initiatives, there are ‘PPR Regional Roadmap meetings’. This is when the achievements of the strategy implementation, with its successes and failures, will be presented collectively and the challenges will be considered. This will serve as a basis for monitoring evolution of the regional situation (see Part C 2). Some key issues will be discussed during these Roadmap Meetings, such as any vaccination protocols being used, the control of movements of animals and the legislation in place.</p>	A5.1	(PPR Roadmap Secretariats, in collaboration with regional GF-TADs Secretariats and the PPR global GF-TADs Working Group) Organise ‘PPR Regional Roadmap meeting’ every year to bring together OIE Delegates/Chief Veterinary Officers and their collaborators <i>(These regional roadmap meetings will be combined as often as possible with the relevant GF-TADs Regional Steering Committee meetings)</i>
	A5.2	Organise regional meetings on specific thematic/disease subjects

3.2. Strengthening Veterinary Services

At regional level, there are a number of activities organised particularly in the context of the OIE's capacity building programme, which comprises a series of regional seminars for OIE national Focal Points.

Exchanges of health information and for harmonisation of animal health policies and strategies take place, for example through regular meetings of the OIE Regional Commissions and of the GF-TADs Regional Steering Committees.

3.3. Combining with other diseases

At regional level, the same principles and activities as for PPR apply to the combination of activities related to other diseases: establishment of regional laboratory and epidemiology networks specific to each selected disease, and organisation of annual regional meetings to exchange information on these diseases, harmonise policies and develop control strategies. The meetings will be combined as far as possible with other regional meetings, such the GF-TADs Regional Steering Committee meetings.

4. THE STRATEGY AT INTERNATIONAL LEVEL

4.1. *Peste des petits ruminants*

■ Main features:

1. The GF-TADs governing bodies (Global Steering Committee, Global Secretariat, Management Committee) will be maintained and supported as well as the new Global Secretariat for the implementation of the Global PPR Control and Eradication Programme (PPR-GCEP). The maintenance and possible roles of the GF-TADs PPR Working Group will be reconsidered when establishing the PPRGCEP.
2. **The development of partnerships at international level will add value to the Global Strategy.** The two international organisations, FAO and the OIE, will build partnerships with other international and regional organisations as well as with private sector unions.
3. The OIE Reference Laboratories and FAO Reference Centres specialised in PPR laboratory diagnosis and research and the OIE Collaborating Centres and FAO Reference Centres specialised in epidemiology related to PPR and other major small ruminant diseases will establish two global networks²⁶.
4. The FAO-OIE GF-TADs will establish the PPR-GREN platform to gather expertise in research and in the definition and implementation of control programmes. It will support appropriate updating of the national, regional and international strategies.
5. The joint FAO/IAEA Division continues to play an important role in supporting laboratories at national and regional levels,

Main Outcomes and activities at international level:

<p>Outcome 1 (Diagnostic system) A PPR International Laboratory Network is established by the OIE and FAO reference laboratories/centres, with specific international mandates and missions.</p> <p>There are three OIE Reference Laboratories (in France, UK and China), the first two also being FAO Reference Centres (see Annex 2). The Global Strategy will support them through financing certain activities and specific programmes (studies, applied research, etc.). The joint FAO/IAEA Division, in close links with the OIE and FAO PPR Reference Laboratories/Centres also plays and will continue to play an important role in supporting laboratories at national and regional levels, participating in regional and global networks and ensuring the transfer of new technologies to relevant laboratories. The Global Strategy will support the PPR-GREN.</p>	A1.1	Establish a PPR International Laboratory Network
	A1.2	(PPR International Laboratory Network) Organise international proficiency testing for the regional leading laboratories annually (ring trials) and support the regional leading laboratories in organising proficiency testing for the national laboratories and regional training sessions
	A1.3	(PPR International Laboratory Network) Organise international conferences in the field of PPR diagnostic methods
	A.1.4	(PPR International Laboratory Network) As the network of OIE and FAO Reference Laboratories/Centres, conduct strain characterisation monitoring, research programmes, training sessions, etc.
	A1.5	Establish the PPR-GREN platform

²⁶ See paragraphs 4.7 and 4.8 and footnotes Nos 11 and 12

<p>Outcome 2 (Surveillance system) A PPR International Epidemiology Network is established by the OIE and FAO Collaborating/Reference Centres specialising in epidemiology with specific international mandates and missions, to support the regional and national networks and centres/teams, but with activities specific to epidemiology.</p> <p>There are around ten OIE and FAO Collaborating/Reference Centres that work on PPR.</p>	A2.1	Establish a PPR International Epidemiology Network
	A2.2	(PPR International Epidemiology Network) Organise data collection and management, risk analysis, disease intelligence, etc.
	A2.3	PPR International Epidemiology Network) Organise international conferences in the field of PPR epidemiology
	A2.4	Support regional and national epidemiology networks and centres/teams through training, expertise work, etc.
	A2.5	Establish the PPR-GREN platform
<p>Outcome 3 (PPR information exchanges and data analysis) the availability and exchange of PPR information is ascertained.</p> <p>The FAO/OIE/WHO Global Early Warning System (GLEWS) will be supported as well as the FAO EMPRES-i information system in order to deliver information and warning messages or disease intelligence analysis to countries and the international community. The OIE international information system (WAHIS-WAHID) will continue to be the basis for the dissemination of official disease information.</p>	A3.1	Activities of GLEWS in information collection and analysis (supported by the Global Strategy)
	A.3.2	activities of WAHIS and EMPRES-i in disease information collection and dissemination (supported by the Global Strategy)
<p>Outcome 4 (prevention and control system) International emergency response capabilities are in place.</p> <p>At the request of a country, the FAOOIE Crisis Management Centre – Animal Health (CMC-AH) can provide a rapid response to help countries assess PPR epidemiological situations and recommend options to prevent or stop PPR spread.</p>	A4.1	Deploy PPR field missions at the request of individual countries

4.2. Veterinary Services

At international level, the activities are related to the participation of the OIE Delegates/CVOs and their technical experts at international meetings and conferences, including the annual General Session of the World Assembly of Delegates of the OIE (the Assembly) in Paris. The Delegates and relevant experts from Member Countries contribute to the OIE's standard-setting activities by participating in expert meetings (*ad hoc* Groups, Specialist Commissions, etc.) or by commenting on the draft versions of texts for the OIE *Codes* and *Manuals* to be proposed for adoption at the annual General Session of the Assembly.

4.3. Combining with other diseases

At international level, the activities will be of a similar nature to those implemented for PPR (e.g. specific networks).

PART C.

GOVERNANCE AND MONITORING, TIMELINES AND COSTING

1. GOVERNANCE

The GF-TADs principles and mechanisms will be used for coordination at the international level (e.g. Global Steering Committee, Management Committee). At regional level the GF-TADs Regional Steering Committees (RSCs) and the GF-TADs RSC Secretariats will continue to facilitate and support regional coordination in the field of animal health. These Global and Regional Committees include international organisations (in addition to FAO and the OIE), regional specialised organisations such as AU-IBAR, Regional Economic Communities (RECs such as SADC, ECOWAS, IGAD, GCC, ASEAN and SAARC), key member States and other relevant partners such as development partners (donor agencies) and the private sector. They will meet every year to consider how situations are evolving and what changes should be recommended in the strategy and its implementation.

A new PPR Global Control and Eradication Programme (GCEP) to implement the Global Strategy will be launched and a joint FAO-OIE Global Secretariat will be established to implement this programme. The maintenance and roles of the current PPR GF-TADs Working Group will then be considered.

2. MONITORING AND EVALUATION

2.1. *Peste des petits ruminants*

Monitoring and evaluation are key elements of Global Strategy implementation.

The PPR Monitoring and Assessment Tool (PMAT), as described in Part A Paragraph 4.2. and in Annex 3.3., explains in how the monitoring will be undertaken.

The performance indicators for each activity will be used to complete a questionnaire which will allow appropriate assessment. This will in turn make it possible to adjust the activities or refine relevant strategic elements.

The assessment will be used either as a means of self-assessment by the country or by external experts (country visits) at the country's own request and for the time being under the supervision of the GF-TADs Global PPR Working Group (external independent assessment).

Given the transboundary nature of PPR, a single country in an endemic zone cannot achieve PPR control – not to mention eradication – unless its neighbouring countries share a similar objective. As a result, the Global Strategy strongly encourages countries to participate in (sub)regional PPR Roadmaps that are designed according to FAO and OIE (sub)regions and epidemiological considerations (see map below). The number of countries and/or the small ruminant populations in a regional Roadmap should be appropriate to ensure proper monitoring and supervision.

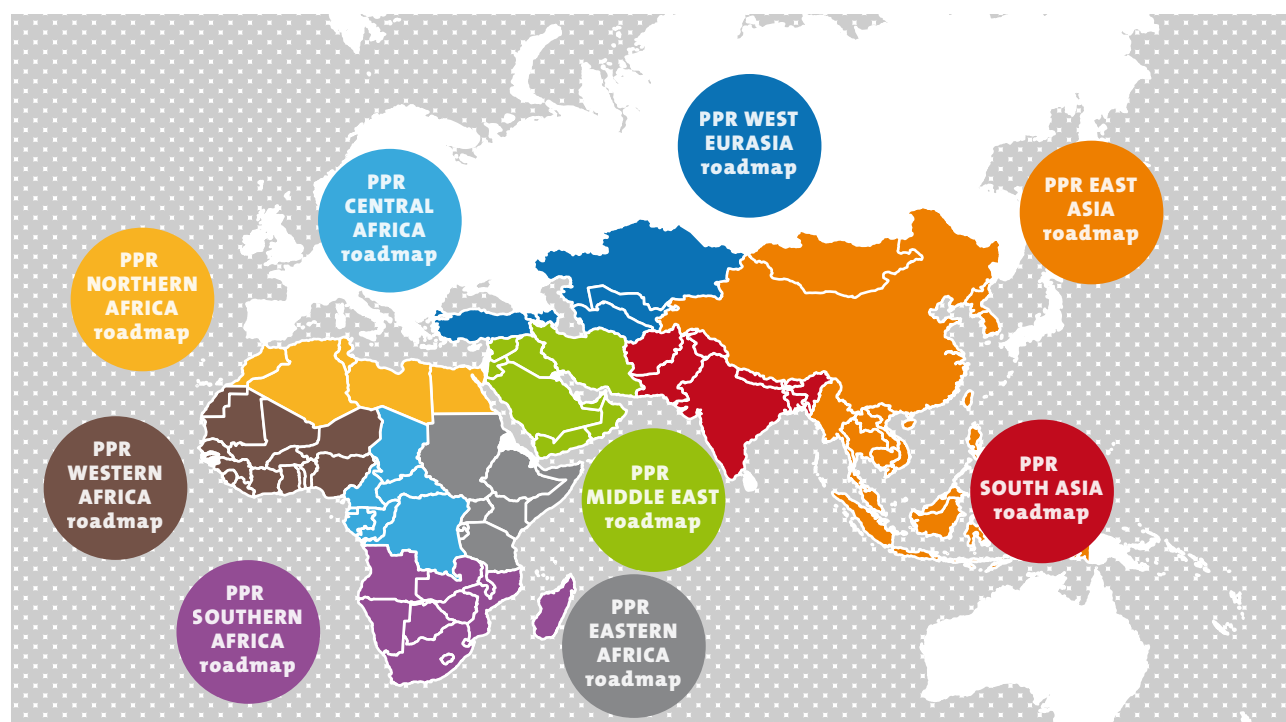
Regional PPR Roadmaps provide countries with a common long-term vision and create incentives for them to develop and embark on national risk-reduction strategies with similar progress pathways, milestones and timelines that are supportive of the regional effort. It is indispensable to link 'sustainable national PPR strategies' to 'regional long-term PPR roadmaps' and to 'global PPR progress'.

To gain recognition of the results of the assessments, an 'acceptance process' is being established to decide in which PPR stage a country can be classified. It follows the following successive steps:

- ▶ Self or external country assessment.
- ▶ Evaluation of the questionnaire by selected experts. For the time being the experts of the GF-TADs PPR Working Group and/or experts commissioned by the GF-TADs Working Group will undertake this task (until, when establishing the new GCEP, the maintenance and/or revision of the GF-TADs PPR WG missions is being reconsidered).
- ▶ Review and discussion of these assessments during the annual regional PPR Roadmap meetings. Nine (sub) regions are shown in the figure below for the definition of the Regional Roadmaps and meetings. A PPR Roadmap Advisory Group (RAG) is assigned to each Regional Roadmap; it is composed of nominated CVOs of three countries (nomination by the participants at the regional PPR Roadmap meeting) and the heads of the regional laboratory and epidemiological networks (members) as well as representatives of the OIE and FAO (Observers). The RAG reviews documents and evidence, and assigns each country a provisional (pending additional evidence) or final PPR stage, which is later presented to the participants at the regional PPR Roadmap meeting.

Information on annual progress of the regional PPR Roadmaps is transmitted to the GF-TADs Regional and Global Steering Committees, on an annual basis, as part for the time being of the Report of the GF-TADs PPR Working Group (to be reconsidered after the establishment of the GCEP and its Secretariat: see above).

The regional roadmap meetings will be organised at the regional/sub-regional level; nine regions/sub-regions have been defined according to the distribution of the member countries of the OIE and FAO regions/subregions as well as the existence of relevant RECs. The list of countries and a map are provided below.



SOUTHERN AFRICA/SADC (WITHOUT TANZANIA: SEE EAC)	Angola, Botswana, Democratic Republic of the Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Zambia, Zimbabwe
CENTRAL AFRICA/CEMAC	Cameroon, Central African Republic, Chad, Republic of the Congo, Gabon, Equatorial Guinea
WEST AFRICA/ECOWAS	Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo
EAST AFRICA/IGAD + EAST AFRICAN COMMUNITY + RWANDA	Burundi, Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Somalia, Sudan, Tanzania, Uganda
NORTH AFRICA/UMA + EGYPT	Algeria, Libya, Morocco, Mauritania, Tunisia + Egypt
MIDDLE EAST + ISRAEL	GCC (Bahrain, Kingdom of Saudi Arabia, Kuwait, Oman, Qatar, United Arab Emirates), Iran, Iraq, (Israel*), Jordan, Lebanon, Palestinian Autonomous Territories, Syria, Yemen + Israel
CENTRAL ASIA/WEST EURASIA	Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkey, Turkmenistan, Uzbekistan
SOUTH ASIA	Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan
EAST ASIA + SOUTH EAST ASIA + CHINA + MONGOLIA	Cambodia, People's Republic of China, Hong Kong (SAR – PRC), Indonesia, Japan, Republic of Korea, Democratic People's Republic of Korea, Laos, Malaysia, Maldives, Mongolia, Myanmar, Philippines, Singapore, Sri Lanka, Taiwan Province of China, Thailand, Timor-Leste, Vietnam

* Israel is part of this geographical region but is officially associated with the OIE and FAO Regional Commissions for Europe (and not with the Regional Commissions for the Middle East).

2.2. Veterinary Services

As part of the OIE PVS Pathway, the OIE PVS Follow-up mission allows an evaluation to be made of the progress that countries have made in sustainably improving their compliance with OIE's standards on quality since the time of the last PVS evaluation.

In general, the OIE recommends that an OIE PVS Follow up mission be conducted every two to three years. In the specific framework of the Global Strategy and when a country intends to move to the next Stage, it is recommended that a PVS Follow-up mission be conducted if a PVS initial or Follow-up mission has not been carried in the previous two years. The objective is to identify and address gaps in the 'enabling environment' and to ensure the optimal implementation of PPR specific activities related to the Stage.

2.3. Other diseases of small ruminants

Specific and effective monitoring and evaluation tools for diseases other than PPR and FMD do not exist. According to the conclusions of regional specific meetings which will better define the list of priority diseases to be combined with PPR control activities, specific monitoring and evaluation tools could be developed.

3. TIMELINES

3.1. PPR at national, regional and international levels

For management and evaluation purposes, the Global Strategy period is divided into three 5-year phases. The situation in 2015 is known for most of the countries and the expected results in 2020 are based on the analysis of their current situation and of realistic evaluations of their future perspectives.

The results in 2015 and 2030 are based on the expected achievements of the implementation of the Global Strategy. The PMAT and PVE will be used on a yearly basis to monitor progress at national level. However, a precise evaluation of the results will be undertaken in 2020 and this assessment will provide guidance on the continuation of the activities, with or without changes that could include substantial modifications or even a full reorientation.

After five years, around 30% of countries are expected to have reached Stage 3 and 30% to have reached Stage 4. It is expected that around 40% of countries will be implementing a control programme and less than 5% will still be in Stage 1.

After ten years, more than 90% of countries will be in Stages 3 or 4, which means that in these countries cessation of the virus circulation is on the way to being achieved. As some countries could be at the beginning of Stage 3 only, PPRV could therefore still be circulating in rare areas.

During this period of reducing and eradicating virus circulation in endemic countries, the risk of reintroducing PPRV in free countries will be reduced.

The Global Strategy will focus on countries where PPR is endemic, i.e. countries at Stages 0 (i.e. 'below Stage 1'), 1 or 2. For countries at Stage 4, the objective is to maintain that status and obtain official OIE free status recognition.

The timelines for the expected results are presented in Table 1 (global) and Tables 2 to 6 (by region). The percentage of countries progressing along the step-wise approach has been estimated based on analyses of their current situation and of realistic evaluations of their future perspectives.

Table 1
Timeline of expected results: Global

Global	2015					2020					2025					2030				
Stage	0*	1	2	3	4/5	0*	1	2	3	4/5	0*	1	2	3	4/5	0*	1	2	3	4/5**
No of countries	3	36	32	12	13	0	4	40	25	27	0	0	8	39	49	0	0	0	0	96
%	3	37	33	12	15	0	4	42	26	28	0	0	8	41	51	0	0	0	0	100

* Stage '0' means that the country is suspected to be 'PPR endemic' but the situation is not well known and no structured and effective activities are being implemented. The country is not considered to have entered the PPR step-wise approach yet.

** In 2030, countries will be either at Stage 4, on the way to obtaining OIE official free status, or 'beyond' Stage 4 since they have received the OIE official status ('Stage 5' means beyond the PPR stepwise 4-Stage strategy). This also means that 2030 is the date of cessation of PPRV circulation worldwide but that it is not the date of the official declaration of global PPR freedom.

Table 2
Timeline of expected results: Africa

Region	2015					2020					2025					2030				
Stage	0*	1	2	3	4/5	0*	1	2	3	4/5	0*	1	2	3	4/5	0*	1	2	3	4/5**
No of countries	3	19	19	3	11	0	4	25	12	14	0	0	8	24	23	0	0	0	0	55
%	5	35	35	5	20	0	7	46	22	25	0	0	15	44	43	0	0	0	0	100

Table 3
Timeline of expected results: Middle East

Region	2015					2020					2025					2030				
Stage	0*	1	2	3	4/5	0*	1	2	3	4/5	0*	1	2	3	4/5	0*	1	2	3	4/5**
No of countries	0	4	3	8	0	0	0	2	5	8	0	0	0	2	13	0	0	0	0	15
%	0	27	20	53	0	0	0	13	33	54	0	0	0	13	87	0	0	0	0	100

Table 4
Timeline of expected results: Central Asia + Caucasus + Turkey (West Eurasia)

Region	2015					2020					2025					2030				
Stage	0*	1	2	3	4/5	0*	1	2	3	4/5	0*	1	2	3	4/5	0*	1	2	3	4/5**
No of countries	0	5	4	0	0	0	0	5	4	0	0	0	0	5	4	0	0	0	0	9
%	0	56	44	0	0	0	0	56	44	0	0	0	0	56	44	0	0	0	0	100

Table 5
Timeline of expected results: South Asia

Region	2015					2020					2025					2030				
Stage	0*	1	2	3	4/5	0*	1	2	3	4/5	0*	1	2	3	4/5	0*	1	2	3	4/5**
No of countries	0	3	2	1	0	0	0	3	2	1	0	0	0	3	3	0	0	0	0	6
%	0	50	33	17	0	0	0	50	33	17	0	0	0	50	50	0	0	0	0	100

Table 6
Timeline of expected results: South-East and East Asia + China + Mongolia

Region	2015										2025					2030				
Stage	0*	1	2	3	4/5	0*	1	2	3	4/5	0*	1	2	3	4/5	0*	1	2	3	4/5**
No of countries	0	5	4	0	2	0	0	5	4	2	0	0	0	5	6	0	0	0	0	11
%	0	45	36	0	18	0	0	46	36	18	0	0	0	45	55	0	0	0	0	100

At regional level, the expected results are that after five years, all activities listed in Part B3 paragraph 1 have been successfully implemented, such as the establishment of regional epidemiology and laboratory networks with RLLs and RLECs, and the regular organisation of regional roadmap meetings with effective harmonisation of health policies, methods and strategies. The GF-TADs regional Steering Committees have been strengthened as well as the regional expertise capacity. The political commitment of governments has resulted in ownership of the regional networks being taken over by the relevant RECs within five years.

At the international level the global reference laboratories network (OIE PPR Reference Laboratories and FAO PPR Reference Centres) and the global network of reference epidemiology centres (OIE Collaborating Centres and FAO Reference Centres specialised in epidemiology) are established during the first 5-year period. The PPR-GREN platform is also put in place. During the same period and the following 10 years, the GF-TADs Global Steering Committee will continue to operate as well as its Global Secretariat and the specialised Working Groups, including for the time being the current GF-TADs Working Group on PPR (with possible reconsideration of its mandate or maintenance when the GCEP is being discussed). The PPR Global Control and Eradication Programme and its Secretariat will have started at the beginning of the first 5 year period and they will continue implementing the Global Strategy throughout the 15 years. Other tools such as GLEWS and the CMC-AH will also be carrying out effective activities during the 15-year period as will the FAO EMPRES-i information system.

The OIE international information system (WAHIS-WAHID) will continue to be the basis for the dissemination of official disease information and the OIE standards will continue to be updated to take into account the latest available scientific information.

3.2. Veterinary Services

Within a 15-year period, countries in PPR Stages 0 to 2 having VS that are not compliant with OIE standards (PVS CC Levels below Level 3) for all or some of the 33 relevant CCs will have reached at least Level 3 for all CCs (and in rare cases Level 4).

For countries that are in PPR Stage 3 and above, and therefore having most CCs compliant with OIE standards (CCs at Level 3 or above), the CC levels will at least be maintained or increased during the 15-year period.

Table 7 shows the number of CCs and the expected compliance level for each PPR Stage.

Table 7
Minimum number and level of PVS Critical Competencies (CCs) to be complied with at each PPR Stage

		PPR Stage			
		1	2	3	4
CCs Compliance level of advancement	1	0	0	0	0
	2	1	0	0	0
	3	11	11	1	2
	4	0	4	1	2
	5	0	0	0	0
Total number of CCs		12	15	2	4

3.3. Combining PPR control activities with other diseases at national, regional and international levels

Precise timelines for the control of other small ruminant diseases will be established after these diseases have been identified at regional meetings. A list of candidate diseases that could be combined with PPR control activities has already been proposed by the GF-TADs Regional Steering Committees.

4. COSTING

It is important to note that the cost of Component 2 (strengthening Veterinary Services) and Component 3 (combining with other diseases) has not been included in this exercise. The support to Veterinary Services is the subject of specific investments after countries have evaluated their needs, particularly through the use on a voluntary basis of the PVS Gap Analysis tool. The cost of combating other diseases in combination with PPR control and eradication activities is extremely difficult to estimate since the list of priority diseases to be addressed will be defined after discussions to be held during regional and national workshops and subsequent definition of specific control strategies against other diseases. But it is also worth highlighting that the investments in supporting activities against PPR will have benefits for the Veterinary Services' activities (e.g. surveillance systems) and ultimately for animal health improvement in all targeted countries.

The estimated maximum undiscounted costs for the Component 1 (specific activities against PPR) for a 15-year Global Strategy are between USD 7.6 and 9.1 billion, with the first five years costing between USD 2.5 and 3.1 billion. The lower range is 16.5% less and would be expected as a consequence of a rapid decrease in PPR incidence in countries employing an effective vaccination strategy. In all scenarios tested there are significant vaccination campaigns that could well be reduced with strong targeting of at-risk populations through carefully conducted epidemiological and economic analyses. These costs have also given a realistic figure on vaccine dose costs and an amount to cover the delivery costs in different scenarios. During the initial stages it is estimated that the annual costs will be in region of USD 0.5 billion which will be used for activities in 98 countries and to manage PPR in nearly 2 billion sheep and goats. This represents a major investment in a sector that affects the lives of 330 million poor livestock keepers.

The differences between the two estimates relate to:

- Assumptions on vaccine delivery cost – the lower estimate does not provide for a high amount for the delivery in mixed systems.
- Assumptions on the frequency of vaccination – the lower estimate does not provide for twice yearly vaccination for the mixed crop-livestock farming systems.
- Assumptions on the outbreak investigations – the lower estimate does not include a background level of outbreak investigation across all stages.

The determination of the exact percentage of the total population to be vaccinated is difficult due to highly variable local epidemiological situations. To calculate the costs of the vaccination programmes during the first five years, the chosen estimation of the population to be vaccinated is within the range of 20% to 50% of the national small ruminant populations in Stage 2 and 20% to 75% in Stage 3.

More information is given in Annex 5.

These costs need to be placed in the perspective of the numbers of animals that are being protected by the measures proposed – nearly a billion sheep and a billion goats. A rough estimate of the average cost per shoat year would mean an investment of between USD 0.27 and 0.32.

In contrast to an assessment of the annual global impact of the disease these costs are small. It has been estimated that annual losses of production and the death of animals due to PPR are between USD 1.2 and 1.7 billion. There is also an estimated ongoing expenditure without the proposed global strategy of between USD 270 to 380 million on

PPR vaccination. Therefore, the current annual impact of PPR alone stands at between USD 1.45 and 2.1 billion per year, and with a successful eradication programme this impact would be reduced to zero. It is important to recognise that without the strategy somewhere between USD 4.0 and 5.5 billion would be spent over a 15-year period on poorly targeted vaccination campaigns that are unlikely to lead to eradication. In summary, global spending in the current structures will be between USD 0.14 and 0.20 per sheep or goat year which will not result in eradication.

Given the importance of PPR and the availability of known technologies it is strongly recommended that a Global Strategy for Control and Eradication of PPR is funded and initiated.

Nota bene: The final cost is likely to be different from the cost estimates in this report, but they serve to demonstrate that the successful control and ultimate eradication of this disease would be economically profitable and that it will benefit the lives of many people around the world.

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ANNEXES

(PUBLISHED ON THE WEBSITE
OF THE CONFERENCE)

1. Socio-economic impact of *peste des petits ruminants*
2. Regional situations
3. Description of tools:
 - 3.1. Laboratory diagnostic tools
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4. Research
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INTERNATIONAL CONFERENCE FOR THE
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ABIDJAN, CÔTE D'IVOIRE
31 MARCH – 2 APRIL 2015