REPORT

Second regional workshop on progressive control of peste des petits ruminants (PC-PPR) for South Asian countries

19-20 December 2013, Kathmandu, Nepal

SAARC

European Union

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Acronyms and abbreviations

AGID	Agar Gel Immunodiffusion
AI	Avian Influenza
ASEAN	Association of South East Asian Nations
BSL	Bio-safety level
CMC	Crisis Management Centre
CSF	Classical swine fever
CVO	Chief Veterinary Officer
ECTAD	Emergency Centre for Transboundary Animal Diseases
ELISA	Enzyme Linked Immunosorbent Assay
EID	Emerging Infectious Disease
EU	European Union
EMPRES	Emergency Prevention System for TAD and Plant Pests and Diseases
FAO	Food and Agriculture Organization of United Nations
FAO-RAP	FAO Regional Office for Asia and the Pacific
FCC	Food Chain Crisis
FMD	Foot and Mouth Disease
GF-TADs	Global Framework for the progressive control of TADs
GLEWS	Global Early Warning System
GREP	Global Rinderpest Eradication Programme
HA	Haemagglutination
HPAI	Highly Pathogenic Avian Influenza
HPED	Highly Pathogenic and Emerging Disease
IVRI	Indian Veterinary Research Institute
OFFLU	OIE-FAO Network of Expertise on Avian Influenza
OIE	World Organization for Animal Health (Office International des Epizooties)
PCP	Progressive Control Pathway
PCR	Polymerase Chain Reaction
PC-PPR	Progressive Control-Peste des Petits Ruminants
PD-FMD	Project Directorate on Animal Disease Monitoring and Surveillance
PPP	Private-Public Partnership
PPR	Peste des Petits Ruminants
QA	Quality Assessment
REC	Regional Epidemiology Centre
RLDL	Regional Leading Diagnostic Laboratory

RP	Rinderpest
RSU	Regional Support Unit
RT-PCR	Real Time Polymerase Chain Reaction
SAARC	South Asian Association for Regional Cooperation
SOP	Standard Operating Procedure
TOT	Training of Trainers
VNT	Virus Neutralization Test
WHO	World Health Organization

Summary

The Regional Support Unit had initiated developing the Regional Road map for Progressive Control of peste des petits ruminants (PPR) in the SAARC region in 2011. As a follow up to the first regional roadmap workshop this second workshop was held from 19-20 December 2013 with the objective to assessing the status of PPR in the region, building capacities in the members countries to pursue the road maps developed for the period 2014-2025 and joining global framework once it is formally put in place.

The workshop was attended by 17 senior/mid level officials from the animal health services of the SAARC Member States and facilitated by an expert from the FAO HQ with support from RSU/REC. Two of FAO country project staff involved in PPR control from Pakistan and Bangladesh also participated in the workshop.

Since the first workshop in 2011, some countries have initiated a number of activities including building capacities in surveillance and laboratory diagnostics. Others have yet to start developing comprehensive PPR control policy and programme. Given the trans boundry nature of the disease effective surveillance systems coupled with epidemiology and laboratory diagnostic capacities and the real time information sharing at all levels are vital for effective control of the disease which are however, inadequate and week in the region. The realizing the importance of effective veterinary services (VS) for the implementation of prevention and control programmes against PPR and the valuable role of FAO in supporting the member countries in this regard is well recognized by the member countries.

PPR remains endemic in most of the countries in the region except Sri Lanka. Maldives and Bhutan had sporadic outbreaks. There is high risk of incursion of the virus through animal movements and imports of small ruminants even in the countries, region and areas which are free and/or have sporadic accurances. The countries in South Asia region have varied capacities, capabilities and facilities in the fields of epidemiology, diagnosis and vaccine production. India has for instance has well advanced capacity in diagnostic facilities including those developed indigenously over the years and some of which are now well recognized commercial private vaccine production entities. India also claims to be self sufficient in production of live attenuated homologous vaccine using safe and potent Sungri/96 strain virus. The Regional Leading Diagnostic Laboratory (RLDL) in Dhaka, Bangladesh has over the last two years developed capacities in performing cELISA, AGID and cEISA for antibody detection, icELISA and EISA for viral antigen detection, RT-PCR, qPCR and sequencing for viral genomic material detection, and also virus isolation on Vero cells. It has now started testing samples referred to by SAARC member countries.

India is implementing PPR control programme in phased manner. The five States were covered during first phase of 2007-2011. The entire country is likely to be covered during the current phase of 2012-2017. Bangladesh, Nepal and Pakistan have their localised control programmes for PPR.

The participants of the workshop listed their current 'stocks' with respect to regulation and legislation, surveillance, disease reporting and disease investigation, comprehensive control plan, vaccine and vaccine production. Besides, identification of certain challenges for PPR control in the region breakout sessions sorted out various elements of proposed three phases of the control spread over a period of 2014-2025 and the options for capacity building and how to manage a PPR outbreak (refer session 9). The country participants also dicussed the achievements of road map regarding policy, institutional setup and capacity building, outbreak response and contingency planning, legislation, epidemiology, surveillance, outbreak investigation, vaccine and vaccine production, diagnostics impact assessment, advocacy and communication and monitoring and evaluation (refer session 10).

From the two days deliberations the group came up with the following key recommendations;

- FAO to continue to support the countries in the region to move forward in adopting and implementing the PC-PPR by providing expertise in preparing their national PPR control programme and other support as needed and also seek donor funding support.
- The Region continues to endorse the Progressive Control (PC) approach and updating the roadmap following annual assessment of the indicators for progress monitoring by the countries themselves on regular basis.
- Due to the variety of contexts and PPR status within the Member States there is a need to consider different approaches for PPR control and eradication in the region. The approachies should base on the epidemiological situation prevailing in disease free, free but at high risk and endemic countries
- Epidemiology capacity should continue to be strengthened in the region and a risk-based surveillance system for PPR across the value chain be developed
- The interactions between laboratory and epidemiology networks be strengthened to encourage exchange of expertise and information sharing
- Socio-economic impact analysis be undertaken and specialized expertise be provided where and when appropriate and feasibility to establish a regional PPR vaccine bank be explored
- Each country should identify a PPR Roadmap focal point for communication and that the Roadmap Secretariat i.e. RSU sends a request to each participating country on this matter
- Animal movement across borders and within countries should be mapped to design the national risk-based strategic control plan and develop regional value chain analysis
- Countries be encouraged to submit samples for virus characterization to the SAARC RLDL for PPR in Bangladesh
- Countries strengthen the PPR prevention and control coordination mechanism through the Regional Support Unit at Kathmandu

1. Background and rationale of the workshop

The Food and Agriculture Organization of United Nations (FAO) has been implementing an European Union (EU) funded regional project (OSRO/RAS/901/EC) entitled “Regional Cooperation Programme on Highly Pathogenic and Emerging Diseases (HPED) in South Asia” under the umbrella of South Asian Association for Regional Cooperation (SAARC) at FAO Sub-regional ECTAD Unit in Kathmandu, Nepal. The overall objective of the project is to strengthen and empower SAARC nations in their ability to prevent, control and eradicate HPEDs, including highly pathogenic avian influenza (HPAI), foot and mouth disease (FMD) and peste des petits ruminants (PPR), etc. through improved veterinary and public health services and inter-sectoral collaboration on a regional basis.

During the 37th FAO Conference, Rinderpest was declared eradicated worldwide; member nations requested FAO “to initiate, in collaboration with global, regional and national partners, appropriate programme for the control and eradication of PPR in ruminants within the framework of improved ruminant health”. Furthermore, concurrently, the FAO/OIE Global Framework for the Progressive Control of Transboundary Animal Diseases has also flagged PPR eradication as a major issue for attention. FAO has recently published a position paper with strategic framework which will serve as a guideline to formulate global, sub-regional or regional and national strategies for the progressive control and eradication of PPR.

PPR is a widespread, virulent and devastating transboundary animal disease of domestic and wild small ruminants. The disease can have significant economic, food security and livelihood impacts. PPR is of particular interest to FAO and other development agencies because of the important role small ruminants play in food security and livelihood resilience. SAARC region has a small ruminant’s population of about 300 million. The disease is endemic in most of the South Asian countries or reported at least once in the recent times except Sri Lanka which is free from the disease. The immediate response to control and contain the disease is based on clear epidemiologically defined targeted surveillance for early detection and early warning, sound vaccination strategy, and enhanced capacities in response. It can be further complemented by a medium to long-term strategy to enhance the capacities of communities and small ruminant owners so that their assets are protected through improved integrated activities targeting small ruminant health and productivity.

Regional Support Unit (RSU) for SAARC at FAO Sub-regional ECTAD Unit organized a regional workshop to develop a regional road map for progressive control of PPR for South Asian Countries in 2011. The representatives attending the meeting reviewed the status of PPR at global, regional and country level and developed a road map for the progressive control of PPR.

In order to review the progress made so far and challenges to implement the agreed road map 2011-2025 in the SAARC countries, the RSU organized the second regional workshop of PC-PPR on 19 and 20 December 2013 in Kathmandu, Nepal with the support from the Government of Nepal, SAARC Secretariat and the European Union.

2. Objectives

The main objective of this workshop was to develop and harmonize the practicable interventions for efficient and cost effective reduction in the incidence of PPR in the Member States and ultimately to enhance livelihoods of farmers and improve food security situation in the region.

The specific objectives of the workshop was to assess the status of PPR in the region and to build capacities in the member states to pursue the strategic framework for progressive control of PPR in accordance with the global framework and draft roadmap developed during 2011 workshop.

The specific issues to be discussed during the workshop were;

- To review the progress of PPR roadmap 2011-2020 in SAARC countries and develop a revised strategy framework for progressive control of PPR
- To discuss the PPR epidemiological tools such as sero-surveys to estimate prevalence /incidence, to evaluate vaccination programme, genetic characterization of PPR virus types to understand the distribution and evolution of PPR virus, value chain analysis, transmission of PPR virus within and between regions and husbandry system to identify control options, identification of PPR risk hot spots to make decision at policy and technical level, etc to meet the minimum requirement for progressive control of PPR;
- To discuss the national strategic plans, identify gaps and suggest practicable measures to implement the plan.

3. Expected output

To develop a revised strategy framework for progressive control of PPR in the region for the period 2014-2025.

4. Participants

The workshop was attended by 17 senior/mid level officials from animal health services of the SAARC Member States associated with developing and implementing animal disease prevention and control activities, two FAO country project team members from Pakistan and Bangladesh, eight staff from FAO including RSU for SAARC countries, Kathmandu and two from HQ Rome.

5. Opening session

The opening session of the workshop was graced by Dr Damodar Sedai, DG, a. i., Department of Livestock Services, Government of Nepal, Dr Somsak Pipoppinyo, FAO Representative for Nepal and Bhutan, Dr Felix Njeumi, Animal Health Officer and Dr Eran Raizman, Head EMPRES Animal Health, FAO HQ and staff from the RSU.

Dr Pipoppinyo welcomed the participants and the guests to the opening session and highlighted on the REC and RSU who are implementing the Regional Cooperation Programme on HPEDs for SAARC countries. The overall objective of the project is to build technical capacity and establish regional collaboration in responding to HPEDs on a regional basis. As PPR is endemic in most

of the countries in the region it has significant impact on the food security especially for the poorer section of the rural community in the region. He thanked government of Nepal for hosting the workshop.

Dr Felix Njeumi, on behalf of the Chief Veterinary Officer of FAO shared FAO's initiative on the eradication approach of PPR globally as per the pledge submitted by the member states during the 37th FAO conference in 2011 to initiate actions to eradicate PPR. He mentioned about the proposal of FAO/OIE Global Framework for the Progressive Control of Transboundary Animal Diseases (GF-TADs) Working Group on Peste des Petits Ruminants (PPR). The approach will be in line with the approach taken for Rinderpest eradication taking into consideration the lessons learned from the eradication of this disease. The timeline proposed for the eradication is 2025. He also complimented RSU and the SAARC countries in taking the initiative to develop regional road maps for the progressive control of PPR in the region, which is the first regional initiative in the world.

Dr Damodar Sedai touched on the significance of sheep and goat for the income and sustainability of Nepal's farming community and his country's commitment to any regional mechanism in controlling HPEDs and TADs including PPR. He also talked about the limitations to prevent and control PPR in Nepal that included non availability of adequate diagnostic facilities and quality vaccine.

6. Technical Sessions

6.1. Summary of outcome of the first meeting of PPR Roadmap development for South Asian Countries held in 2011

- Dr Muhammad Akram

The outcome of the self identified challenges and the outlines of the comprehensive control plan including the major and minor milestones set to be achieved by the participants following discussions during the workshop in 2011 are summarized as under in table 1, 2 and 3 respectively:

Table 1: Self identified challenges to PPR Control as listed by the participating countries in 2011

Bangladesh	Bhutan	Nepal	Pakistan
a. Development of strategic plan and assured budget for implementation b. Awareness among farmers about PPR is not high c. DLS is understaffed at field	a. Lack of Funds b. Technical expertise and skill c. Policy support (Animal health policy still at draft stage)	a. Policy Level: No contingency Plan for PPR; Low Budget allocation, Government commitment is poor b. Field Level: Multi-sectoral responsibility to the field staff, they could not pay much time for the control, containment etc for PPR	a. Formulation and implementation of regulation regarding animal movement b. Availability of Quality assured vaccine c. Harmonization of diagnostic tests at provincial /regional levels

Bangladesh	Bhutan	Nepal	Pakistan
			d. Formulation of regional/ national program for control of PPR e. Production and proper delivery system for PPR vaccine f. Development and dissemination of cost effective diagnostic assays e.g. HA test

Table 2: Components and summary outline of comprehensive control plan for PPR in South Asia

Components	Summary outline of comprehensive control plan
• Policy	• Appropriate policy (individual country policies turned to a generic Regional Policy) - Whole country, Regions within the Country (Zonal approach) • Objective of the Control Plan, e.g., loss reduction, freedom from the disease, eradication
• Institutional setup and capacity building	• Institutional set-up (appropriate legislation, technical capacity, diagnostics and vaccines, R&D, notification mechanism, implementing agencies and governance) • Resources (financial, human and infra-structure) • Stakeholders (Producers, GOs, Civil Societies, Financial Institutions (Banks and Insurance), Importers
• Outbreak response and contingency plan • Legislation • Epidemiology/surveillance / outbreak investigation/reporting/ info sharing • Vaccine and vaccination • Diagnosis	• Plan of implementation: Disease surveillance, diagnosis, vaccination etc.
• Advocacy and Communication	• Communication and Advocacy • Specific requirements (Reporting channels, outbreak investigation / communication, stamping out and compensation, market closure,)
• Impact assessment/Food Security/Poverty alleviation • Monitoring and evaluation	• Time-lines, milestones and M&E • Defined output, outcome, impact

Table 3: Prioritized major and minor milestones for PC-PPR Roadmap 2011-2015 for SAARC Countries

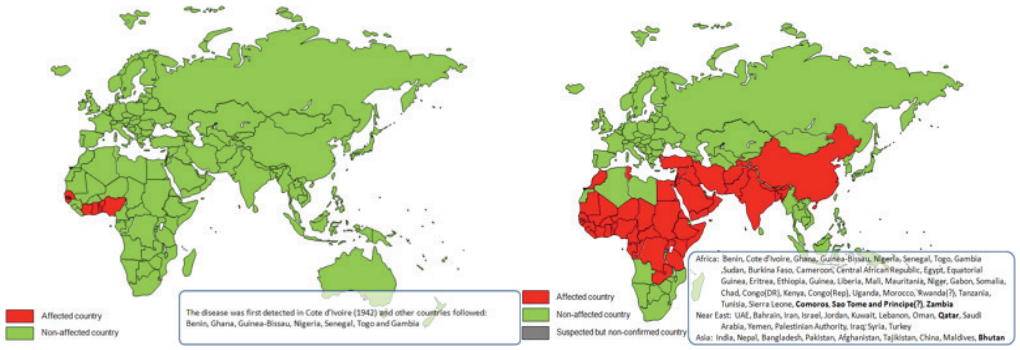
Major Milestones	Minor Milestones
Development/Formulation of Policy Framework for PPR Control/Vaccination/Availability of Vaccine/Vaccine Production/ Coverage/Resource Mobilization	Advocacy to the government to convince to prepare a strategy Plan for PPR
Comprehensive/Strategic/Action/Operation Plan developed and adopted for PPR eradication	SOPs for various components developed /Outbreak investigation and response mechanism/ Quality vaccine production capacity in the country
Advocacy and communication/Awareness	Policy reviewed /Over-all PPR Control program reviewed and revamped/Sero-monitoring/ Surveillance
Regional Road map in Place/Laboratory diagnostic Test/Diagnostic protocols (SOPs) established and harmonized	Legislation revisited/Formulation and implement of legislation regarding animal movement between and within regional countries
Institutional Set up/Impact Assessment and Socio-economic Studies/Legislation/Surveillance and Epidemiology/Baseline surveys/capacity Building	Monitoring and Evaluation

6.2. Current scenario and control initiatives for PPR at global, regional and country level according to risk factors and socio-economic impact

– Dr Felix Njeumi

6.2.1. Peste des petits ruminants trends and evolution from 1942 through 2012

The disease was first detected and officially confirmed in Cote d'Ivoire in 1942 and



followed by other countries such as Benin, Ghana, Guinea-Bissau, Nigeria, Senegal, Togo and Gambia. India was the first country where PPR was officially diagnosed in Asia, in 1987. In China, PPR was first confirmed in West Tibet (Ngari region) in 2007, and subsequent confirmation again in 2008 and 2010. Maldives and Bhutan reported the disease for the first time in 2009 and 2010 respectively. Both cases were part of consignments of imported goats.

6.2.2. Risk factors for PPR introduction and spread

The identified risk factors include animal density, husbandry system and transhumance, seasons and droughts/climate, misuse of vaccines, virus strains (sero-positive without clinical signs), inter and intra-regional and within country animal movement and trade, and intermingling of animals, local markets, common grazing, conflicts and competition.

6.2.3. Economic impact of PPR reported from some countries

In Kenya, antibodies were detected in 1985 and the disease declared in late 2005 and massive vaccination was implemented 2 years later. Morbidity rate was 73-75percent and mortality rate 57 to 60 percent. In Tanzania the disease was suspected in November 2008 and official notification done in January 2009. Morbidity rate was 54 percent and mortality rate 72 percent. Loss of Goat milk was estimated to be about half a million litres annually and slightly more than 2 million animals were estimated to have died between 2008 and 2012. The annual average loss was estimated to be around US$ 147.6 million

In Pakistan, it is estimated that PPR causes annual losses of more than US$ 342 million due to high levels of morbidity and mortality and the resulting depletion of genetic stock.

Table 4: Annual economic impact due to PPR in South Asia (Source: GALVmed South Asia strategy 2012-17)

Country	Total Incidence (M $)	Total mortality (M $)	Production loss (M $): Due to disease	Treatment loss (M $): Due to disease	Overall loss (M $)
Nepal	1.95	46.14	59.62	9.76	107.47
India	43	968.00	1,386.00	215.00	2,612.00
Bangladesh	4.86	114.4	149.16	24.30	292.72
Bhutan	0.01	0.07	0.28	0.04	0.40
Total	**49.82**	**1,128.61**	**1,595.06**	**249.1**	**3,012.59**

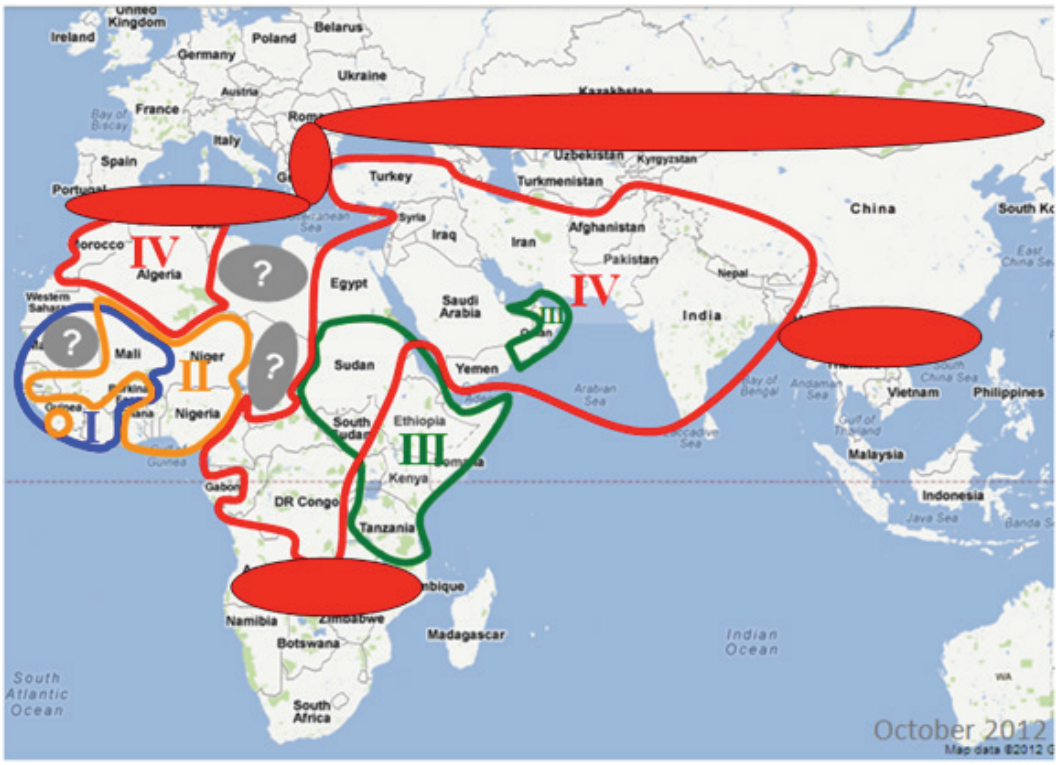


Figure 3: The four different lineages of the PPRV prevalent in the world

6.2.4. Scenario for control: Cost of PPR Control

Total cost in three years of vaccination in Morocco was 24 million Euros (unit cost of the vaccination = 0.42 Euros). Unit cost of the vaccination in Republic of Congo was approximately 0.38 Euros. In Somalia, 11 million Euros were spent to vaccinate 20 million animals, to test 20,000 sera for sero-monitoring and to ensure cold chain @ 0.35 Euros per animal.

Considering the above mentioned unit cost of vaccination etc. the financial requirement for PPR eradication from the globe was calculated as under:

a) Global small ruminant population: 1,801,434,416
b) Total population at risk: 1,126,910,710 ~1.2 billion
c) Overall 62.5percent of the global domestic small ruminant population is at risk.
d) Total number of vaccines needed for 3 years mass vaccination = 1.2*3 ~ 3.6 billion doses
e) Average unit cost of the vaccine dose is: $ 0.1 but $0.04 for Indian Sungri vaccines
f) The vaccines cost for 3 yearly mass vaccination = 0.1*3.6 ~ $0.36 billion
g) Extrapolated unit cost of vaccinated animal: $0.5-1.0
h) Three yearly mass vaccination: 0.5- 1.0*3.6 ~ $1.8 – 3.6 billion

From the forgoing it can be concluded that:

a) The vaccines cost for 3 yearly mass vaccinations (~$0.36 billion) is close to the yearly loss in Pakistan (~$0.342 billion)

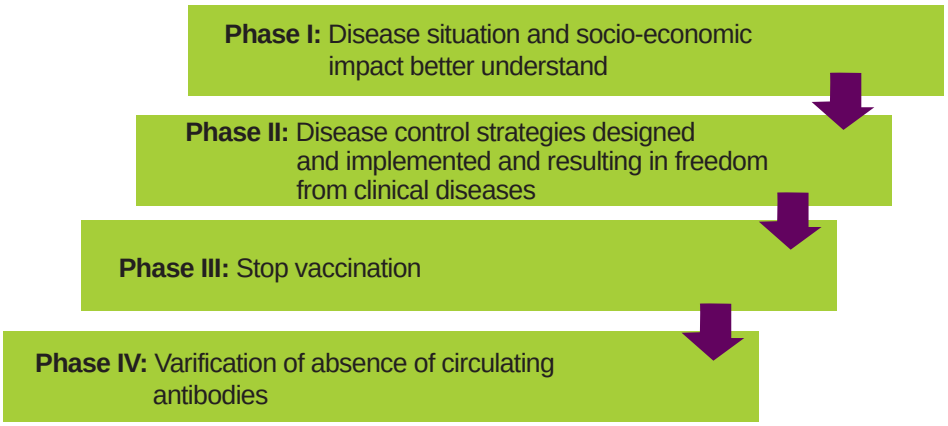
b) The total cost of the 3 yearly mass vaccinations (~ $3.6 billion) is 1.24 fold the loss in South Asia country per year (~ $2.9 billion)

c) The above $3.6 billion could be reduced if other factors are considered example as Singh et al estimated to $199.36 million the cost for the 3 years PPR eradication (Vet Ita, 45 (3), 449-462

Therefore, In the current financial crisis, target vaccination is advisable to the mass vaccination and surveillance and risk assessment can assist for targeting our intervention.

6.2.4. Scenario with possible phases

The infected countries may consider the following phases for control/eradication of PPR from their country an ultimately from the globe:



There should be a country specific strategy for vaccination and a regional coordination machanism. This is expected to be achieved through a focused approach [similar to rinderpest (RP)], clearing ecosystem per ecosystem and preventing re-introduction by involving all veterinary actors in the field and through supporting the establishment of sustainable animal health delivery systems; also by sourcing of budgets for disease surveillance and vaccination at national or regional levels to facilitate flexible implementation.

i. What is required at national level?

- In India, (for example) the number of outbreaks is higher (51.7 percent) following the winter until early autumn (March to June), the vaccination campaign should therefore be carried out before March.
- The high level immunity should be targeted in high density population and disease surveillance teams should be trained in:
- Conduct of clinical disease Surveys
- Active disease search (mapping of reservoir)

- Understanding of the livestock keeping systems in their operational area
- Collection, preservation and forwarding/shipment of samples for laboratory diagnosis
- Maintaining close links with vaccination coordination Unit
- Timing of vaccination against PPR is important and it can be combined with other small ruminants diseases
- Vaccination teams shoukd include all actors and preferable should be represented by regional entities for more ownership and immediate actions
- Quality certified (thermo-stable) vaccine should be made available while ensuring cold chain, transport, possibly paint for marking vaccinated animals, etc
- Any suspected clinical case should be reported to disease surveillance teams for immediate action

ii. What is required at regional level

- There should be a regional coordination body
- Technical advisors (national and regional) and a steering group should be in place to over see the control/eradication activities
- Diagnostic laboratories should have effective links (twinning) with world reference laboratories
- There should be a provision for research into the control programme

6.3. Progressive Control of Peste des Petits Ruminants (PPR) in Pakistan

- Dr. M. Afzal, Project Coordinator, FAO Pakistan, Islamabad

Pakistan is endemic to PPR with prevalence up to 30 percent in some areas. A national serological survey which tested 17545 samples between 2005 and 2006 estimated a period prevalence of 24.8 percent.

Sero-prevalence of PPR in 2012 when 3296 samples were tested showed point prevalence of 28.6 percent.

Project Goals

- Contain the current spread of PPR in the country and mitigate its impacts to safeguard small ruminant based livelihoods leading to improved family nutrition and livelihood for poor in the rural areas
- Demonstrate control of PPR in the selected areas which will provide a lead towards control and finally eradication of PPR from Pakistan

Project Outputs

- **Output 1:** Enhanced capacity for laboratory diagnosis and vaccine production in Pakistan
- **Output 2:** Improved disease surveillance for PPR outbreaks
- **Output 3:** Effective control of PPR through vaccination demonstrated in different production systems of sheep and goat husbandry

Output 1: Enhanced Capacity for Laboratory Diagnosis and Vaccine Production of PPR in Pakistan

Activities

- Strengthen one lab in each province / region for the diagnosis of the PPR
- Evaluate reliable on-spot diagnostic aid or animal pen-side tests under field conditions
- Strengthen the country's veterinary laboratory network
- Train at least two vets from each province/region in ELISA
- Upgrade facilities for molecular diagnosis (RT-PCR) and virus isolation at federal level
- Strengthen PPR vaccine manufacturing in the country
- Strengthen NVL for evaluation of PPR vaccine
- Train 4 to 6 laboratory managers and technicians in PPR vaccine quality assessment and quality control

Output 2: Improved disease surveillance for PPR outbreaks

Activities

- Awareness for farmers
- Capacity building for field veterinarians (public and private) and para-vet staff (525)
- Diagnosing and reporting PPR outbreaks and sample collection and submission
- Outbreak control activities
- Undertake epidemiological investigation of selected outbreaks

Output 3: Effective Control of PPR through Vaccination demonstrated in Different Production Systems of Sheep and Goat Husbandry

Activities

- Selection and participatory rural appraisal of one area in each province / region
- Vaccination of sheep and goats in different production systems in selected areas
- Increased follow-up surveillance for PPR in the vaccinated areas
- Determine the socio-economic benefits of PPR vaccination

Project Implementation and Management

- Project will be implemented in close collaboration with concerned Federal Ministry and Provincial / Regional Livestock and Dairy Development Departments
- Federal Government to nominate a focal point (preferably AHC) to liaise with the project team
- Project Steering Committee (overall supervision of the project and will be responsible for approval of work-plans, budgets)
- Technical Working Group (review project progress and address technical and research issues)
- A Letter of Agreement with explicit activities and project responsibilities with mode of payment to be signed with each provincial / regional LDDD

Project Outcome

- Contain the current spread of PPR in Pakistan and mitigate its impacts to safeguard small ruminant-based livelihoods
- Project activities would demonstrate and develop an approach for the progressive control of PPR in Pakistan
- Capacity building of animal health institutions at all levels and 600 of their veterinarian staff
- More than 50,000 farm families from the project's target areas would significantly reduce (through vaccination) their household food and nutrition insecurity and increase their income generating capacity through the increased livestock productivity

6.4. Progress in diagnostic techniques, research and development for control of PPR in the region

6.4.1. SAARC Regional Leading Diagnostic Laboratory for PPR (PPR-RLDL), Bangladesh

- Dr. Md. Rafiqul Islam, Director (In charge)

Mandate of PPR – RLDL, Dhaka

- Facilitate resource mobilization for strengthening regional diagnostic laboratories
- Identify training needs and conduct training in appropriate diagnostic tests
- Isolate and characterize viral strains in each country to define disease prevalence and provide appropriate information for vaccine strains to be used in the control programme
- Supply laboratories with necessary reagents and other expendable and non-expendable materials to be appropriately equipped
- In close cooperation with WHO and the human health sector develop harmonized diagnostic procedures, standards and training related to cross-cutting HPED issues

The test methods available for the diagnosis of PPR and their purpose as defined by (OIE, 2012) are given in the table below:

Method	Population freedom from infection	Individual animal freedom from infection	Purpose Confirmation of clinical cases	Prevalence of infection– surveillance	Immune status in individual animals or populations post-vaccination
Competitive ELISA	++	++	–	+++	+++
Virus neutralization	+++	+++	–	+++	+++
RT-PCR	–	–	+++	–	–
Real-time RT-PCR (QRT-PCR)	–	–	+++	–	–
Virus isolation in cell culture	–	–	++	–	–
Immunocapture ELISA	–	–	+++	–	–
Agar gel immunodiffusion	–	–	+	–	+
Counter immune-electrophoresis	–	–	+	–	–

The diagnostic facilities for PPR available at RLDL, Dhaka, Bangladesh are given below

Detection of antibodies	Detection of viral antigen
a) i) cELISA , ii) AGID, iii) cEISA	b) i) cELISA, ii) EISA
Detection of virus	**Detection of viral genomic material**
i) Isolation in Vero cells	i) RT-PCR, ii) q-PCR, iii) Sequencing

Other activities regarding PPR currently being undertaken at RLDL, Dhaka, Bangladesh include:

- Provision of free diagnostic services for Bangladesh , NGOs (FAO activities) also open for SAARC member states
- Provision of different aspects of scientific and technical training on PPR for personnel from Bangladesh and SAARC member countries
- Investigation of outbreak, samples analysis and monitoring of the virus circulating in Bangladesh
- Conducting a pilot project aimed at PPR control in selected areas of Bangladesh in collaboration with FAO and DLS
- Local IQC material development for PCR, q-PCR assay
- Effort has been taken to develop monoclonal and polyclonal based cELISA and icELISA
- Scientific and technical studies in collaboration with other laboratories or organizations e.g. BAU (Testing new seeds of PPR vaccine) and University of Texas A&M (ELISA Development)

- Polyclonal antibody based icELISA using recombinants express protein (Full length N protein coding region recombined with Baculovirus)
- MAb based cELISA, MAb against selected peptides as capture and detecting antibodies
- An outbreak investigation of PPR in Bhola, Dhaka, Mymensigh, Gaibanda, Lalmonirhat in 2013 by RLDL revealed that the PPR virus detected was of lineage IV. RT-PCR was performed and sequenced seven isolates from the outbreaks.

Important issues and challenges in the region

- There should be a common agreement among the laboratories in SAARC countries for sero-monitoring and antigen detection as It will facilitate QA activities and help in building confidence among the laboratories in the region
- Development of DIVA test to differentiate vaccine strain and wild virus is required
- Development and availability of test applicable at field level such as Pen-side-test or any alternative
- We need reciprocal technical cooperation among the laboratories in SAARC countries

6.4.2. Indian Veterinary Research Institute, Izatnagar, India

- Dr. R. P. Sing, Principal Scientist, Division of Biological

The disease was first reported in India in 1989 but restricted to southern peninsula. By 1994 the disease was widespread and it became endemic throughout India during 1995-96. India had the diagnostic facilities by 2001-2002 and also developed vaccine by 2002. MAb based (Anti N) Sandwich-ELISA kit was used for PPR diagnosis and MAb based (Anti H) Competitive-ELISA kit was used for PPR sero-surveillance and monitoring.

Prevalence and distribution of PPR virus infection in small ruminants in India for the period 1996-2003 reported a prevalence of 33percent.

Clinical materials such as nasal/ocular/buccal/or rectal swabs from live animals and spleen, lymph nodes, lung pieces, large intestine from dead animals were collected in 10-20 percent PBS/NSS suspension for PPR diagnosis.

The important technological developments regarding PPR diagnosis, vaccine development, virus characterization, molecular epidemiology and disease control strategy are as under:

1. Developments in PPR diagnosis

• The kits for cELISA and sandwich ELISA have been developed in India using the following parameters for their onward use for PPR diagnosis:

Parameters	**Competitive-ELISA kit**	**Sandwich-ELISA kit (PPR antigen detection)***
Name of the kit Intended use	PPR c-ELISA kit Sero-surveillance, Sero-monitoring, Diagnosis from Paired serum samples, Antibody Titration	PPR sandwich-ELISA kit PPR diagnosis from clinical samples (anti-mortem and post tem), PPR Vaccine Q.C and R&D
Test capacity	500 sera samples and its multiples	100 samples in duplicate and its multiples
Nature of antigen used	Attenuated PPR virus	
Monoclonal antibody	4B11 (PPR "H" protein-specific)	4G6 (PPR "N" protein specific)
Sensitivity	92.2percent compared to VNT	89percent compared to Immunocapture-ELISA kit
Specificity	98.84percent compared VNT	93 percent compared to Immunocapture-ELISA kit
Cut-off	50 per cent inhibition (PI=50)	Two times of antigen blank
Stability of reagents		One year More than one year
Speed of diagnosis	Results within 4 hours	Results within 4-5 hours
Data processing:	Computer software based	
Status	Ready for commercialization	Ready for commercialization
Commercial viability	Commercially viable	Commercially viable
Target users	Disease Investigation laboratories, Research Organizations	Disease Investigation laboratories, Research Organizations
Export potential	Exists, only one global competitor	Exists, only one global competitor

*** has 90-99percent diagnostic sensitivity and specificity and is free from Prozone Phenomenon**

- Monoclonal antibody based Diagnostics based diagnostics have been developed using vaccine strain "Sungri /96"
- Development of biosensor based diagnostics for PPR (SPR based)
- Attenuation of more and more viruses for use as alternate vaccine (2 at IVRI, 1 at TANUVAS, 1 at CIRG).
- Investigations on host pathogen interaction
- Development of a marker vaccine by following different approaches.
- Development of LAMP assay for PPR
- Development of lateral flow test for PPR

2. Vaccine development and large scale production

- Live attenuated homologous vaccine for PPR
- Indian isolate - Asian lineage
- Thermostability studies on Vaccine Virus (Sungri/96 strain)
- Antigenic characterization of vaccine virus (Sungri /96 strain) using a Panel of 23 Monoclonal antibodies
- Genomic characterization of vaccine virus (Sungri /96 strain). Almost entire virus has been sequenced
- Trend of Vaccine Immunity and Long Term Immunity Trial up to 52 months
- Safe and Potent
- Vaccine production by government organizations and industry.
- Technology has been transferred to the following manufacturing firms;
  - M/S Indian Immunologicals, Hyderabad
  - M/S Intervet, India Pvt. Ltd. Pune, (MSD)
  - M/S Hester Biosciences, Ahmadabad
  - IAH and VB, Bangalore
  - IAH and VB, Palode, Kerala
  - M/S Biomed Pvt Limited, Ghaziabad
- Impact of vaccination. Mass scale use of PPR vaccine virus (Sungri/96 strain) has reduced incidence of PPR in India to the tune of 75 percent based on the reports. Also, more than 99percent reductions in outbreaks in selected states (AP and Karnataka) were achieved.
- Combined vaccine of PPR sheep pox and PPR goat pox using PPR vaccine virus is suggested

Disease Control/eradication strategy

- **Policy formulation** - vaccination
- **Objectives** - reduction in disease endemicity/intensity by using targeted vaccination followed by disease eradication
- **Control** - by intensive vaccination in affected areas
- **Coverage** - Mass vaccination campaigns for adequate vaccination coverage to achieve acquired herd immunity

Current practices and lessons learned

- The use of vaccine and diagnostics for PPR control in different Indian states (Chhattisgarh, Andhra Pradesh and Karnataka) as shown in figure 6, have resulted in about 75 percent reduction in disease over the years (1996-2010).

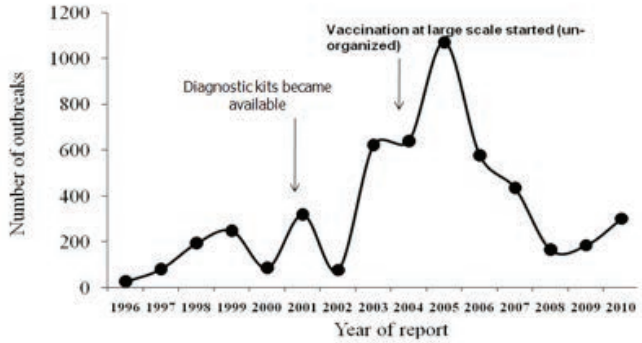


Figure 6: Impact of vaccine and diagnostics on reduction in PPR outbreaks

- De-worming of all goat and sheep and state level seminar before the launch of vaccination campaign against PPR were done that helped in vaccine coverage of 80 percent sheep and goats within 30 days that indicated the feasibility of mass vaccination to cover a large ruminant population in India as a part of PPR control strategy

Critical gaps

- Molecular epidemiology has to be a regular activity
- Development of real thermo-tolerant/stable vaccine and Pen side diagnostics

6.4.3. National Agriculture Research Centre (NARC), Islamabad, Pakistan

- Dr. Aamer Bin Zahur, Principal Scientific Officer, NARC

Epidemiological studies on PPR

- Identified high and low risk areas from Participatory Disease Surveillance (PDS) reports (2002-2005).
- Identified the factors responsible for persistence/transmission of PPR virus as: population density, animal movement, livestock markets, lack of awareness fig 7.
- Demonstrated a serological evidence for the circulation of PPRV in the areas (Zahur et al., 2008) fig. 8.

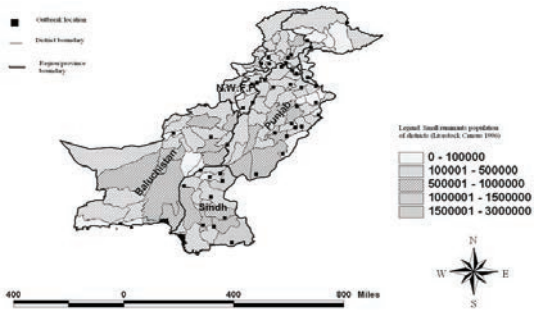


Fig 7: Factors responsible for persistence of PPR virus

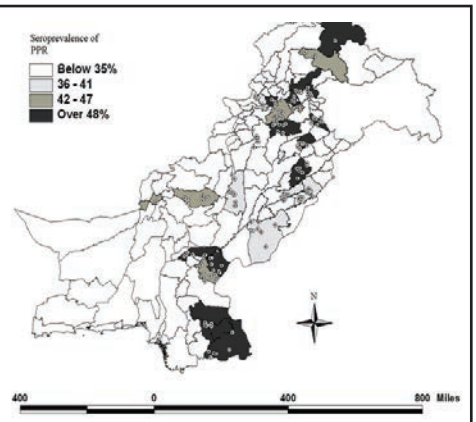


Figure8: District-wise sero-prevalence in Pakistan

Advances in PPR diagnostics

- Established diagnostic techniques for PPR
  - ELISA (Antigen detection and serology)
  - Virus isolation
  - RT-PCR (conventional, real time, quantitative)
  - Nucleic acid sequencing
- Non-specific HA found with no agreement with RT-PCR
- RT-LAMP standardized (NIBGE and NARC)
- Persistent PPR shedding in recovered animals up to 16 weeks

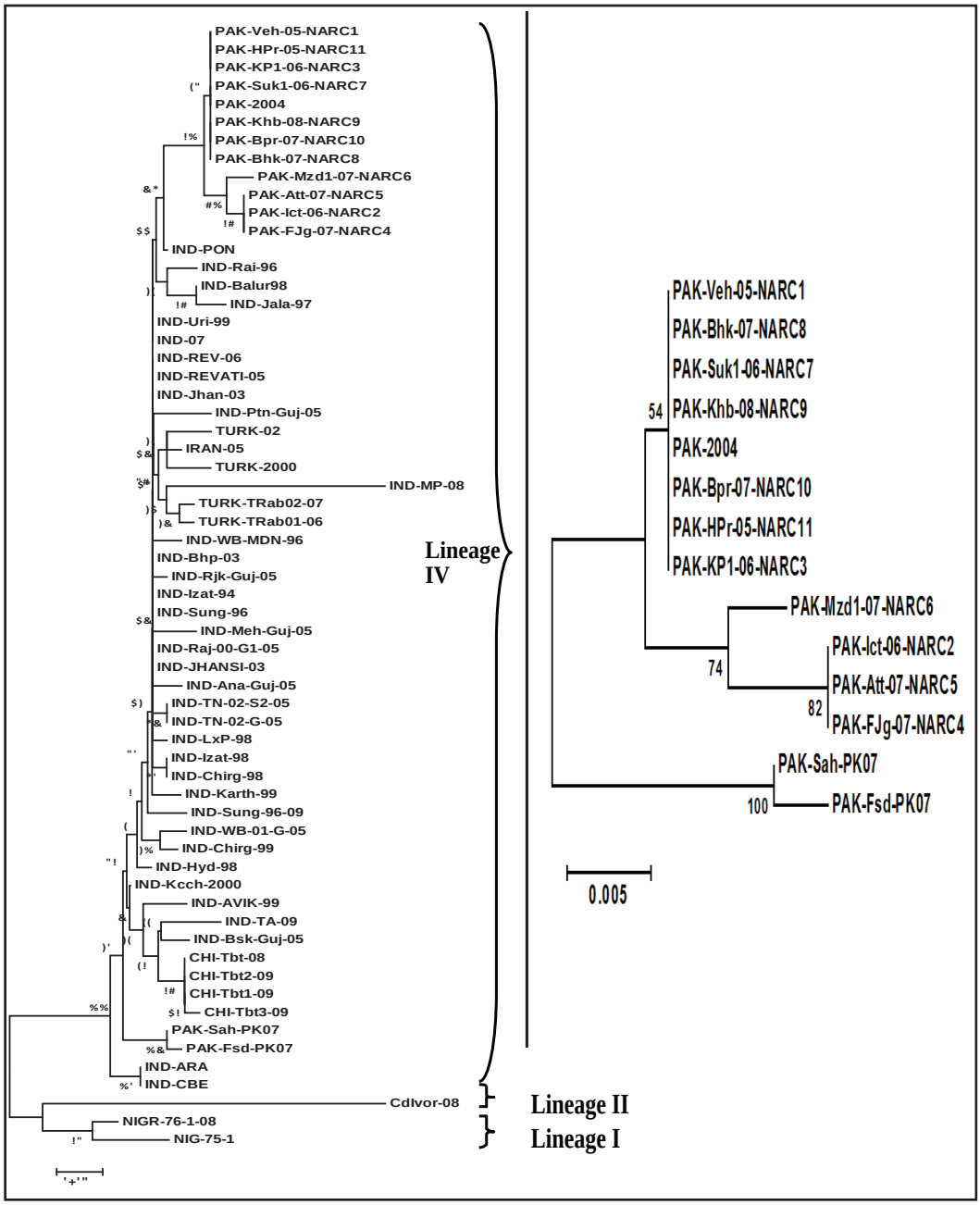


Figure 9: Unrooted NJ phylogenetic tree based on 372 bp partial sequences of F gene of PPRV detected in Pakistan and other isolates

Figure 10: Phylogenetic relationship based on 372 bp partial sequence of fusion (F) gene of Pakistani isolates of PPRVs

Establishment of models for the control of PPR virus in Pakistan

- Establish models to minimize PPR virus transmission through vaccination and zoo-sanitary control measures in high risk tehsils.
- Monitor the changes in virulence through PPR virus isolation, sequencing and its typing fig 9 and 10.
- Systematic socio economic impact assessment and cost-benefit analysis of prevention activities
- Capacity building of all stakeholders

6.5. Role of EMPRES in controlling TADs

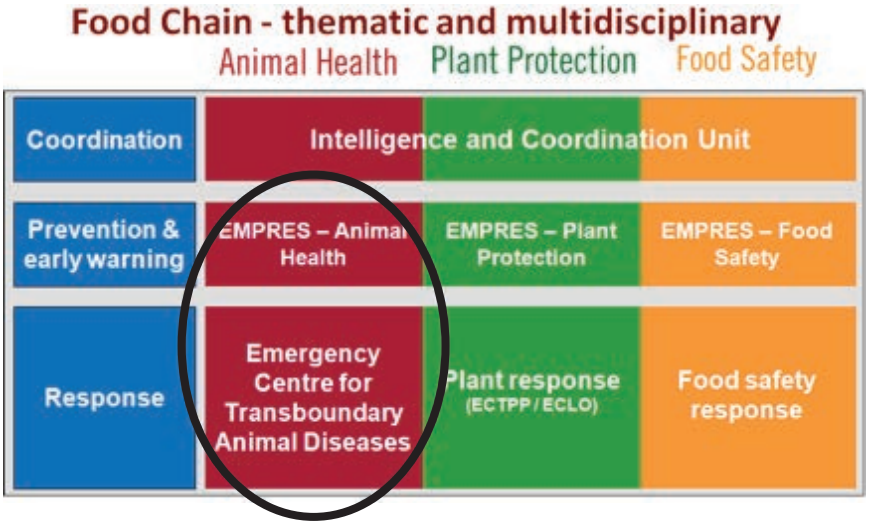
-by Eran Raizman, Sr Animal Health Officer, DAPH, **FAO HQ**

Dr Eran Raizman , Senior Animal Health officer, FAO HQ outlined the FAO Global mandate which are ; improve nutrition, increase agricultural productivity, raise the standard of living in rural populations and contribute to global economic growth. The overall structure Animal Health in FAO HQ falls under the Animal Health Service of the Animal Production and Health Division. He talked on the following topics:

i Threats to the food chain

- The increasing number of outbreaks of transboundary animal diseases (TADs), plant pests and diseases and food safety emergencies has raised public awareness.
- Their potential impact on human health as well as on livelihoods, food security, national economies and on global markets presents a cause for alarm.

Food Chain Crisis (FCC) Management Framework is really an evolution of ECTAD's approach to rapid response to animal disease, applied to the broader spectrum of threats to the food chain. FAO is building on its experience in response to HPAI and applying the Organization's added value to the entire food chain.



EMPRES Animal Health was established in 1994 and "Global Rinderpest Eradication Programme (GREP)" was one of its components. Other main components are:

- Early detection (GLEWS)
- Rapid response (Crisis Management Centre or CMC)
- Coordination and communication for high-impact animal diseases (TADs - and emerging diseases)
- Research facilitation

EMPRES Publications include;

- EMPRES Watch
- EMPRES Focus-on
- EMPRES Animal Health 3600

2. Global structures or systems in place are:

- Global framework for the Progressive Control of TADs (GF-TADs)
- Global Early Warning Systems (GLEWS)

GF-TADs - is a joint FAO/OIE initiative. Through its strong alliance with regional bodies it represent a platform for developing regional strategies built on regional and country needs in the fight against TADs. It is underpinned by consideration of national, regional and global prioritisation of TADs. The regional GF-TADs for Africa include AU-IBAR. Its 5-year Action Plan 2012-2016 intends to address the following priority diseases: ASF, CBPP, FMD, PPR, Rabies, RVF, NCD.

Global Early Warning System (GLEWS) is a joint FAO/OIE/WHO initiative to enhance Early Warning and Response at international level. It combines and coordinates the alert and response mechanisms for the international community and stakeholders to assist in prediction, prevention and control of animal diseases and zoonoses through sharing of information, epidemiological analysis and joint field missions to assess and control the outbreak, wherever needed.

EMPRES-i provides up to date information on the global animal disease distribution and current threats at national, regional and global level.

CMC-AH is the FAO-OIE Crisis Management Centre - Animal Health, based in Rome, who deploys missions and develops tools to support veterinary services responding to disease emergencies.

FAO ECTAD-the Emergency Centre for the Transboundary Animal Diseases (ECTAD) was created in 2004 to plan and deliver FAO's support to member countries in their endeavour to respond to transboundary animal health crises. The emergency response is cross departmental(Fig)

The current projects under FAO on animal health are;

OFFLU – An OIE/FAO Network of expertise on animal influenza, including H7N9. OFFLU network of animal influenza laboratories included OFFLU laboratories include OIE Reference Laboratories for avian influenza and for equine influenza, FAO Reference Centres for avian influenza, and OFFLU regional laboratory contacts for swine influenza and avian influenza

FMD Progressive Control

- Capacity building on diagnostics and epidemiology in Western Eurasia and Eastern and Northern Africa
- Development of guidelines for socio economic impact assessment for FMD
- Rinderpest - Repository reduction
- Other Projects include PPR, H7N9, ASF, RVF, CBPP

What can FAO do for you?

- Building veterinary structures – from design (with OIE) to its functional operation at sub-national level
- Public Health, food inspection, production and market analysis (risk control points)
- Capacity development and professional development

- Legislation (with OIE), regulatory, epidemiology, laboratory, pharmaceutical/biological …
- Strategic approaches to disease control
- Emergency preparedness
- Prevention, preparedness planning, natural disasters, disease outbreaks …
- Interface with other Ministries (Health, Economic Development and Trade, Environmental Protection)

Potential Projects: Brucellosis, LSD, AI, Rabies

7. Overview of Stock on PPR control in the participating SAARC countries

Information is based on a questionnaire circulated to the participants prior to the workshop and following stocks of the participating countries on PPR control were listed for 2013 which are indicated below:

Compon-ents	Indicators	Status in the Region* (+ = yes, ¬¬- = no)						
		BD	BH	IN	MD	NP	PK	*SL
Regulation and Legislation	Is PPR a notifiabledisease according to national regulations?	+	+	+	+	+	+	+
	Has an OIE PVS or Gap analysis mission been done in the last 5 years?	+	+	-	+	+	-	-
	Are regulations pertaining to animal disease control described and understood?	+	+	+	+	+	-	+
	Has the veterinary legislation been reviewed within the last 5 years with respect to legal authority to carry out disease control?	+	+	+	+	-	-	+
Surveillance system and Disease Reporting	Is there a robust surveillance system and disease information system in place that helps early detection of disease and guide control measures in the field?	+	+	-	+	-	-	-
	Do you have PPR reported by farmers /other stakeholders during last 5 years?	+	+	+	-	+	+	-
	Did the country report PPR outbreaks within the previous 12 months to the OIE?	+	+	+	+	+	+	-
	Have you shared official information on PPR situation with other countries in the region?	+	+	+	+	+	-	+
Comprehensive Control Plan	Is there comprehensive strategic plan in place to study the epidemiology and socio-economic impact of PPR and control?	-	-	+	+	-	+	-
	Is this plan officially documented?	-	-	+	+	-	-	-
	Is this plan endorsed by competent authority?	-	-	+	+	-	-	-
	Is there a specific funding mechanism (public/ private) to implement this plan?	-	-	+	-	-	-	-

Compon-ents	Indicators	Status in the Region* (+ = yes, ¬¬- = no)						
		BD	BH	IN	MD	NP	PK	*SL
	Does the plan include activities to estimate the losses due to PPR?	-	-	+	+	-	-	-
	Does the plan include activities to estimate the losses due to PPR?	-	-	+	+	-	-	-
	Does the plan include information of the structure of production systems for small ruminants throughout the country?	-	-	+	+	-	+	-
	Does this plan contain list of stakeholders involved in farming, breeding, transportation, marketing, slaughtering and processing of small ruminants?	-	-	-	+	-	+	-
	Are the livelihoods (i.e. source of income, expenses, losses) of each and every stakeholder associated with small ruminants well described?	-	-	+	-	-	-	-
	Have you set measurable targets/indicators for implementation? (e.g. defined vaccination coverage to be targeted, specific number of markets to be covered, number of training sessions to be conducted...)	+	-	+	-	+	+	-
	Does the plan include a timeline for activities?	-	-	+	+	-	-	-
	Does the plan include a budget estimate for each activity?	-	-	+	+	-	-	-
	Does the plan define roles and responsibilities of everyone involved in its implementation?	-	-	+	+	-	-	-
	Does this plan include in built monitoring and evaluation system?	-	-	+	+	-	-	-
	Have any of the activities described in the plan been initiated?	-	-	+	+	-	+	-
	Are the movements of sheep and goat within the country well characterized?	-	+	+	-	+	+	-
	Are the movements of sheep and goats into (import, porous borders etc) the country well characterized?	-	+	-	+	+	+	+
Disease Investigation	Has the causative PPRV lineage been identified in the last 5 years?	+	+	+	-	-	+	-
	Do you have the details of imports of sheep/goats and their disposal/destination during the last 3 years?	+	+	+	+	+	+	+
	Have field epidemiological units been defined to understand distribution of PPR across the country?	+	+	+	-	-	-	-
	Has a sero-survey, specifically designed to estimate PPR prevalence, been done in the 3 years?	-	+	+	-	-	+	-
	Has the prevalence of PPR been estimated for one or more regions (province/state, district) of the country, using robust epidemiological data collection techniques within the last 3 years)?	+	-	+	-	-	+	-

Compon-ents	Indicators	Status in the Region* (+ = yes, ¬¬- = no)						
		BD	BH	IN	MD	NP	PK	*SL
	Has the prevalence of PPR been estimated across the country (all provinces /states, districts) and in different husbandry systems (subsistence, occupational nomadic, corporate etc) using robust epidemiological data collection techniques in the last 3 years?	+	-	+	-	-	-	-
	Has the prevalence of PPR been estimated for each and every, using robust epidemiological data collection techniques during the last 3 years)?	+	-	+	-	-	-	-
	Have 10 or more outbreak investigations been carried out to describe the clinical presentation, identify source of infection and virus strain?	+	-	+	-	+	+	-
	Have 5 or more isolates from outbreaks been genetically characterized in the last 5 years by national, regional or international reference laboratories?	-	-	+	-	-	+	-
	Have you set measurable targets to reduce the impact of PPR? (e.g., No. of outbreaks decreased to XX, level, direct losses reduced by a target percent, etc)	-	-	+	+	-	-	-
	Have specific practices or areas been identified that are believed to be major contributors to PPR spread in the country?	+	-	+	+	+	-	-
	Have you identified hot spots based on magnitude of risk of PPR infection across the country?	+	-	+	+	-	-	-
Vaccine and Vaccine Production	Do you import PPR Vaccine?	-	-	-	-	-	+	-
	Do you produce PPR Vaccine?	+	-	+	-	+	+	-
	Have you estimated the total annual requirement of PPR vaccine for the country?	+	-	+	+	+	+	-
	Have you estimated the cost of vaccine per unit (Dose)?	-	-	+	+	+	+	-

The countries have identified themselves following challenges to PPR control in 2013:

India	Bhutan	Maldives	Nepal	Pakistan
– High fecundity of sheep/goat, new born are coming as unvaccinated – Pulse vaccination during winter season to overcome thermo-stability of vaccine	– No national Control strategy – No rapid diagnostic test available in the field; No awareness on the diseases – No diagnostic facility at national level	– PPR control policy focused on preventing entry of PPR virus to the country through importation of live animals and their products – Weak surveillance of PPR, border control and quarantine – Animal production and health Act	– Policy level: No contingency Plan for PPR; Different sectors to be addressed by government so budget allocation and commitment not as desired Field level: Field staff	– Legal frame work – Absence of national program – field level diagnostic test

India	Bhutan	Maldives	Nepal	Pakistan
		(drafted with FAO/WHO assistance)- not yet approved since 2011 – No animal diseases control policy for socio economically important diseases like PPR, FMD, brucellosis, anthrax except for HPAI – No proper disease surveillance strategy; import risk at sea ports – Lack of Political will/ political commitment – Field level: financial, manpower, diagnostic, vaccine; lack of coordination and technical expertise; low awareness	performing multi- sectoral responsibility so desired time for the investigation, control, containment and etc for PPR is not in place in field	

The percent stocks of the participating countries regarding respective component of PPR control during 2011 and 2013 are compared in fig 12 below:

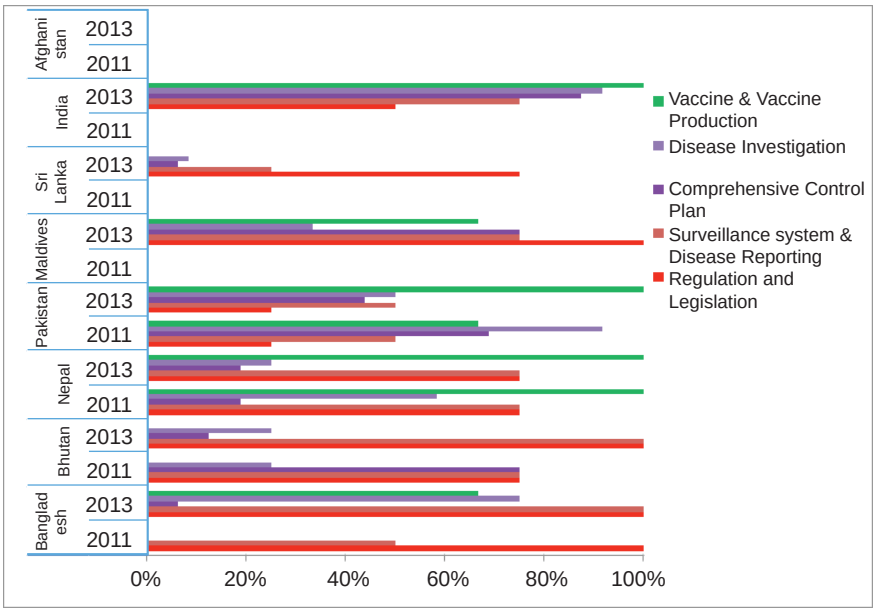


Figure 12: Comparative stocks of SAARC countries pertaining to PPR control during 2011 and 2013

The percent stocks of the participating countries regarding respective component of PPR control during 2013 are compared in fig 13 below:

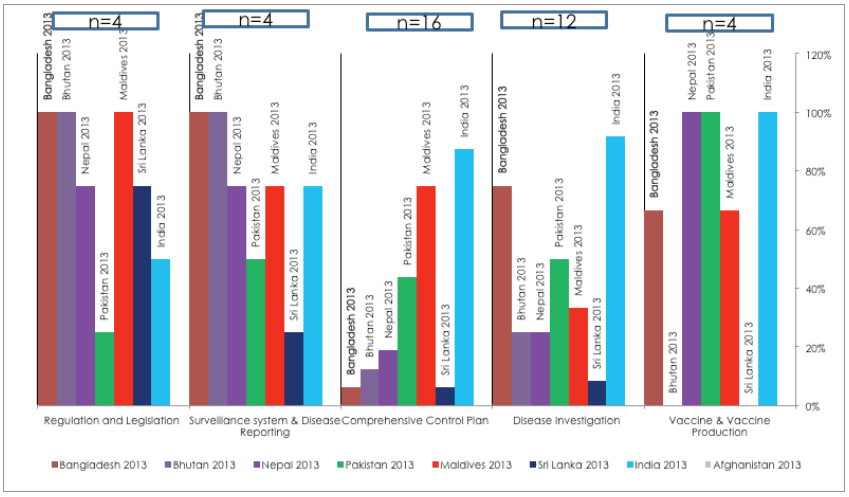


Figure 13: Questionnaire based stocks (percent) of the participating countries for PPR control during 2013

The component of the surveillance system being practiced being participating country are discussed in the following tables:

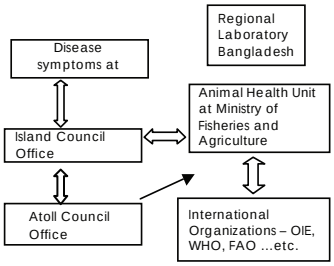
Table 1: Case definition (s) being followed in the participating countries for PPR

India	Bhutan	Maldives	Nepal	Pakistan
Suspected case based on typical PPR symptoms; confirmation by sandwich ELISA developed by IVRI	PPR is suspected when the animal (sheep and goat) shows typical clinical signs of PPR i.e. acute diarrhoea; nasal purulent ocular discharge; Signs of respiratory infection /distress and fever; high morbidity and mortality in the herd; augmented by the laboratory confirmation	Suspected case anorexia, depression, fever, nasal and ocular discharge with and mouth lesions subsequently many cases developed clinical signs of pneumonia and gastro-enteritis respiratory distress, cough diarrhoea with sunken eye. Confirmed cases based on clinical signs and laboratory test (cELISA) concluded the PPR case	Any sheep or goat having fever, anorexia, depression, nasal and ocular discharges, necrotic lesions on gum, lips and tongue , erosions on the nasal mucosa and finally diarrhoea is suspected to be infected with PPR Virus. If an animal having above symptoms with PM Lesions including Zebra striping (congestion of the longitudinal folds of the mucosa) in the large intestine and rectum) found positive in Antigen detection ELISA is considered a case of PPR	Sheep and goat showing ocular and nasal discharge and necrotic stomatitis. Zebra stripes in rectum in case of death, confirmation by ELISA and PCR

Table 2: Sampling size and frequency for PPR surveillance in the country/region/province/district/village etc

India	Bhutan	Maldives	Nepal	Pakistan
Sampling size is very low as compared to recommended 0.1percent of population. More organized approaches are required	No surveillance done; After 2013 outbreak spill over of infection was looked into where in only 35 serum samples were collected	Samples will be collected from (Minimum 15 animals each farm locations by required number of visits, representing 13 inhabited islands and 05 uninhabited Islands in the country. The total number of months for sample collection will be 6 months initially and could be extended later on, if necessary. The total number of samples at the end of six months will be 540 each both tissue and blood samples. Islands X farm locations X 15 18 X2 X 15	No specific Surveillance plan for PPR is present in the country, but sero-monitoring has been routinely carried out in the vaccinated population. The sample size in this case is established .05percent of the total vaccinated population	Sample size varies, frequency not definite

Table 3: Arrangement for data analysis and dissemination of outcome of surveillance results for action by relevant authorities/stakeholders

India	As such no	Maldives	Nepal	Pakistan
Mainly through publication and communication department of animal husbandry, Dairying and Fisheries, GOI	specific arrangement for PPR, but in general for all diseases: NCAH ⇕ RLDC ⇕ DVH / SVL ⇕ LEC	Suspicious PPR case is reported via the island council offices, atoll council offices to the Animal Health Unit of the Ministry of Fisheries and Agriculture (Central Government)  Feedback and information is sent to farm level through Island Offices copied to Atoll council. Any information to international organizations and development partners is directly from the Animal Health Unit of the Ministry of Fisheries and Agriculture	1. Veterinary Epidemiology Centre along with Laboratory manages the data 2. Epidemiology Unit disseminates the information to the concerned authorities	No definite plan

8. Group work outputs: Outputs from the breakout sessions on the THREE PHASES of the prevention and control of PPR for SAARC region

The participants were divided into three groups to deliberate on the possible three phase of the prevention and control for PPR. The output is summarized in the table below.

Phase I	Phase II	Phase III
Improved epidemiological understanding and diagnosis (identifying good practices in epidemiology and laboratory diagnosis)	*Establishment of the progressive control phases in front of different epidemiological situations*	*PPR Monitoring and assessment tools for the final eradication and verification phase*
• Demographic data on the small ruminant population • Understanding the disease status in the region • Prevalence studies	• Free countries: Sri Lanka • Sero-surveillance • Import (Quarantine) risk assessment • Informal trade (e.g. Jafna, Tamil Nadu) • Contingency plan	• Monitoring of vaccination efficacy: Sero-monitoring • Selection of the area – identification of villages/ markets/Quarantine station randomly for sera sampling for pre and post vaccination

• Outbreak investigation • Systematic outbreak investigation – Establish harmonized Case definition – Define epidemiological units – Harmonized SOP for investigation • Risk based/targeted surveillance - Identification of different types of risk factors – Population density – Climatic conditions – Anthropogenic factors – Production system – Identification of agent • Systematic socio-economic value chain analysis • Value chain studies with proper understanding on socio economic impact – Different stakeholders – Different risk factors • Surveillance • Enhanced disease reporting – Reporting template – Enhance the awareness among stakeholders • Enhanced passive surveillance • Active surveillance • Information system • Risk distribution • Risk Mapping • Research • Need to study continuously – Pathogenesis	• Capacity building/awareness • Non endemic but at risk countries: Bhutan and Maldives • Sero surveillance • Participatory Disease Search /Surveillance (PDS) • Move to 1st group (free) or to 2nd group (endemic) • Endemic Countries: India, Nepal, Bangladesh, Pakistan, Afghanistan Define low and high risk areas taking into account factors with weightings such as, population density (7/10), animal movement (8/10), rearing system (4/10), accessibility to road (3/10), proximity to animal market (4/10), previous history of outbreaks (6/10), social activity/public gathering (7/10) i.e. fairs, religious festival, importations (2/10) • High risk areas – Carpet Vaccination 1st followed by young animals (4 months and above) for 1 year plus carpet vaccination 3rd year – Post vaccination Sero monitoring after 3rd year to monitor flock/herd immunity If immunity is high – Enhanced surveillance for clinical cases followed by confirmation through labs	(after one month of vaccination) • Traceability /identification system for animals – e.g. putting colour marks on the body • Development of marker vaccine • Sentinel animal testing • Sero-monitoring for 3 years • Clinical disease surveillance • Investigation of suspected case(s) with lab testing (antigen detection) • Participatory rural appraisal for getting information on control efficacy and clinical surveillance/monitoring • Feedback mechanism from farmers – through identification of focal farmers /points • Getting phone contacts of farmers for follow up – Checking of vaccination records • Monitoring of animal movements • Vaccination of new born and left over for two rounds at 6 months interval • Stop vaccination (keep vaccine stock for emergency) – after complete coverage of vaccination of susceptible population.

– Means of transmission and maintenance of PPRV in the environment – Carrier status of PPR virus – Disease modelling to predict future outbreaks – Develop a pool of isolates for study – Monitoring of the circulating virus – Development of field friendly rapid diagnostic assay • Laboratory diagnostics • Identify a pool of standardized diagnostic assays • Harmonization of SOPs • Quality control and assurance of diagnostics procedures – Proficiency testing – Inter laboratory competition • Accreditation • Laboratory networking- two way linking (Epi-Lab) • LIMS • Identification of Quality control facility for PPR vaccine at National or Regional level independent from vaccine producer • Capacity building – Laboratory human resource – Epidemiology human resource	– Strengthening of lab facilitates to support surveillance / case confirmation – Evaluation of immunization progarmme – Advocacy, awareness, farmer education, training of professionals should be continuous process • Low risk areas – Enhanced targeted clinical surveillance followed by investigation – Awareness of farmers, veterinarian capacity building, national advocacy, diagnostic facilities – Contingency plan	• Declaring country free from disease • statistically valid sero-surveillance design • Declaring country free from infection – statistically valid sero-surveillance design

9. Group discussion on

i) challenges and options for capacity building for surveillance, networking, diagnosis and response for progressive control of PPR and

ii) PPR outbreak management

Two group breakout sessions were arranged to deliberate on the challenges and options for capacity building in responding to PPR disease and how PPR outbreak may be managed.

Group 1: Challenges and options for capacity building

The challenges for capacity building for surveillance, networking, diagnosis and response for progressive control of PPR were identified and options for addressing these challenges were outlined by the groups and presented below. The main challenges hover around political support, weak epidemiology and diagnostic capacity/facilities in most countries (except India), and limited availability of quality vaccine. The output of group deliberations is reproduced as under:

Challenges for surveillance	**Options for surveillance**
• Weak surveillance, both passive and active • Availability of diagnostic tools for mass scale application - either costly or time consuming • Epidemiology	• Mass awareness • TOT at national level • Resource mobilization • Capacity building for developing new appropriate tools at national/regional levels • Continuing molecular and sero- epidemiological studies at national/regional levels
Challenges for networking	**Options for networking**
• Political issues at regional level • Networking at national level	• International and Regional Organisations (FAO/OIE/SAARC) to establish the network in laboratory as in RP eradication • Harmonize • Advocacy for policy makers with evidence
Challenges for diagnosis and response	**Options for diagnosis and response**
• Limited availability of quality diagnostic tools • Diagnostic tools and procedures not harmonized • Limited availability of quality vaccine in required quantity	• Resource mobilization at national and regional level with PPP approach • Harmonization of diagnostic tools and procedures through training at regional level and backstopping • Capacity building in quality control of PPR vaccine • Strengthening of existing vaccine production units at national level • To identify commercial producers • Establishment of a regional vaccine bank for emergency supply

Group 2: PPR outbreak management

The outbreak management of PPR hinges around bio-security, movement control, treatment, vaccination, surveillance and overall management. The recommendations of the group are listed below.

Outbreak Management	**Bio-security**
• Bio-security measures • Treatment of the sick animal • Ring vaccination • Awareness of farmers • Epidemiological study of outbreak area	• Isolate the affected animals • Proper disposal of the dead animals • Decontamination with bleaching powder, Iodine based disinfectant • Disposal of feed/ water/bedding material/faecal material
Movement control	**Treatment**
• Movement control for two weeks including sale prohibition • Hygienic measures • Restrict entry of new animals • Restrict grazing outside • Awareness of public/farmers for mass mobilization and education of farmers about vaccination before campaign	• Antibiotic, antipyretic if it is fever • Early detection of new cases by taking temperature and immediate supportive treatment • Hyper immune serum if possible during early infection? • Supporting treatment e.g. Vitamin C • Anti-diarrhoeal drugs • High energy semi solid diet • Water to drink with sugar and common salt
Ring vaccination	**Surveillance**
• In and around (3-5 Km) of the outbreak area depending on availability of vaccines • Preferably have separate staff for vaccination at different farms • Change needle and syringe for separate house hold or each individual farm • Vaccination at international borders	• Enhanced active surveillance of the outbreak and surrounding area for two weeks

10. The consolidated (revised) Regional Road map for the SAARC Member States for the period 2014-2025 spread over in three phases is as under:

Component	Phase-1 (2014-2015)	Phase-2 (2016-2020)	Phase-3 (2021-2025)	Source of Verification
Policy	Small ruminant sector review including husbandry system, population, demographic factors, livelihoods issue; (BD; NP; MD*; PK*; SL*; BH; IN)			Study report
	Developing strategic plan;(NP; MD; PK; NP; SL***; BH; IN*)	Developing strategic plan; (BD; (BH)		Plan document
	Getting strategic plan endorsed by competent forum; (PK; SL***; IN*)	Getting strategic plan endorsed by competent forum; (BD;NP; MD; PK; BH)		Copy government endorsement
	Identification of budget sources for implementation of strategic plan. (BD; NP; MD; PK; SL***; IN*)	Identification of budget sources for implementation of strategic plan; (BD; NP)		List / Minutes of meetings with budgetary sources
	Implementing strategic plan;(NP;PK;SL***)	Implementing strategic plan;(BD ; NP ; MD ; PK)		Yearly Work Plan
	Considering zoning based on magnitude and severity of risk; (NP; MD; PK; SL***; BH; IN*)	Considering zoning based on magnitude and severity of risk; (BD ; PK)	Stop vaccination but continue surveillance for PPR virus / antibodies; (BD ; MD ; PK ; SL*** ; IN)	Minutes of the meeting / copy of policy decisions
	Developing exit strategy; (MD)	Developing exit strategy; (PK)	Developing exit strategy; (BD ; PK ; SL*** ; IN)	Strategy document
Institutional setup and Capacity building	Assessment of strengths and weakness of veterinary services at national / regional/local level; (BD ; NP ; SL ; MD* ; PK ; BH* ; IN)			Assessment document
	Strengthening of veterinary services; (PK ; BH; IN)	Strengthening of veterinary services; (BD; NP ; MD ; PK ; SL ; BH)	Strengthening of veterinary services; (SL; BH)	Work Plan
	Conducting training need assessment in terms of area and number; (MD ; PK ; BH ; IN)	Conducting training need assessment in terms of area and number; (BD ; NP)		Needs assessment document
	Identification and list of the equipment other than cold chain to be procured; (NP ; MD ; PK** ; SL*** ; BH ; IN)	Identification and list of the equipment other than cold chain to be procured; (BD; NP ; BH)		Approved List of Equipments

Component	Phase-1 (2014-2015)	Phase-2 (2016-2020)	Phase-3 (2021-2025)	Source of Verification
Outbreak Response and Contingency plan	Conducting training need assessment in terms of area and number; (MD; PK; BH; IN)	Conducting training need assessment in terms of area and number; (BD ; NP)		Needs assessment document
	Developing contingency plan. (BD ; NP ; MD ; PK ; SL ; BH ; IN)	Developing Contingency plan. (BH)	Developing contingency plan. (BH)	Approved contingency plan document
	Allocation of budget for contingency plan; (NP ; MD ; SL ; BH ; IN)	Allocation of budget for contingency plan; (BD ; PK)	Allocation of budget for contingency plan;(PK)	Financial statement / Pink Book/Agreement with INGO/NGOs etc
	Implementing contingency plan;(IN)	Identification and list of the equipment other than cold chain to be procured; (BD; NP ; BH)		Work plan
Legislation	Updating disease control Act (NP)			Updated bill/Act etc
	Enforcement of import regulation regarding PPR; (BH)			Copy of import regulation
Epidemiology/n surveillance / outbreak investigation	Conducting training need assessment in terms of area and number; (MD; PK; BH; IN)	Conducting training need assessment in terms of area and number; (BD ; NP)		Needs assessment document
	Developing surveillance plan and epidemiology, sero surveillance /monitoring of PPR; (NP ; MD* ; PK ; SL ; BH ; IN)	Developing surveillance plan and epidemiology, sero surveillance /monitoring of PPR; (BD ; IN)		Copy of PPR surveillance Plan
	Identification of risk factors for PPR(BD; NP; MD* ; PK** ; SL* ; BH ; IN)			Study report
	Mapping of key cross-border routes and markets and services and facilities available; (BD ; NP ; MD* ; PK* ; SL* ; BH ; IN)			Study report
	Identification of hot spots;(BD ; NP ; MD* ; PK** ; SL*** ; BH ; IN*)	Identification of hot spots;(NP)		Study Report? Spatial maps

Component	Phase-1 (2014-2015)	Phase-2 (2016-2020)	Phase-3 (2021-2025)	Source of Verification
Vaccine and vaccination	Identification and List of the equipment other than cold chain to be procured; (NP; MD; PK**; SL***; BH; IN)	Identification and List of the equipment other than cold chain to be procured; (BD; NP ; BH)		Approved List of Equipments
	Disease investigation team composition and SOPs for disease investigation (NP ; BH ; MD ; PK ; SL ; BH ; IN)	Team composition and SOPs for disease investigation ; (BD ; BH)	Team composition for disease investigation and SOPs for investigation; (BH)	Notification by competent authorities.
	Identification of risk factors for area classification / zoning (infected, buffer and free zones); (MD* ; NP ; SL***; BH ; IN*)	Identification of risk factors for area classification / zoning (infected, buffer and free zones); (BD)		Study Report
	Developing sero surveillance plan; (NP ; MD* ; SL ; BH ; IN)	Developing Sero surveillance Plan; (BD ; NP; PK; BH)	Developing Sero surveillance plan; (BH)	Copy of approved sero-surveillance plan
	Implementing sero surveillance plan; (NP ; MD; SL ; BH)	Implementing sero surveillance plan; (BD; NP ; PK ; SL ; BH ; IN)	Implementing sero surveillance plan; (BD); PK; BH)	Work plan
	Developing line of communication; (BD ; NP ; MD* ; PK ; SL ; BH ; IN)	Developing line of communication; (NP)		Approved copy of organogram
	Good quality vaccine, assured cold chain and SOPs to ensure cold chain at all level (storage to inoculation of vaccine); (NP ; PK** ; IN)	Procurement of Cold chain and SOPs to ensure cold chain at all level (storage to inoculation of vaccine); (BD ; NP ; MD ; PK ; BH)		Approved list of equipments
	Listing of all the steps for the vaccine procurement and vaccination (SOPs); (NP; PK; SL***; BH*; IN)	Listing of all the steps for the vaccine procurement and vaccination (SOPs); (BD; NP ; MD ; PK ; BH)	Listing of all the steps for the vaccine procurement and vaccination (SOPs); (BH)	Approved copy of SOPs
	Scheduling of the field activity; (NP ; MD ; PK ; SL ; BH ; IN)	Scheduling of the field activity; (BD)		Work plan + Time lines
	Conducting training need assessment in terms of area and number; (MD; PK; BH; IN)	Conducting training need assessment in terms of area and number; ;(BD; NP)		Needs assessment document
	Post vaccination monitoring with reference to FAO/OIE guidelines; (MD ; PK ; NP ; SL***)	Post vaccination monitoring with reference to FAO/OIE guidelines; (BD ; NP ; BH ; IN ; PK)	Post vaccination monitoring with reference to FAO/OIE guidelines; (BD ; PK; BH)	Approved plan for post vaccination monitoring

Component	Phase-1 (2014-2015)	Phase-2 (2016-2020)	Phase-3 (2021-2025)	Source of Verification
Diagnosis	Identification of labs for diagnosis and diagnostic tests; (BD ; NP ; MD ; PK ; SL ; IN*)	Identification of labs for diagnosis and diagnostic tests; (NP)		Notification for designated labs and diagnostic tests
	Identification and list of the equipment other than cold chain to be procured; (NP; MD; PK**; SL***; BH; IN)	Identification and list of the equipment other than cold chain to be procured; (BD; NP ; BH)		Approved list of equipments
	Conducting training need assessment in terms of area and number; (MD; PK; BH; IN)	Conducting training need assessment in terms of area and number; (BD ; NP)		Needs assessment document
Impact assessment/ Food Security/ Poverty alleviation	Listing of all of stakeholders and their respective role; (BD ; NP ; MD ; PK ; SL ; BH)			Approved list of stakeholders
	Consultation with stakeholders; (BD ; NP ; MD; PK** ; SL ; BH ; IN*);		Impact Assessment;(IN)	Minutes of meeting/proceedings of consultation process/ study report
Advocacy and Communication	Seeking political commitment; (BD ; NP ; MD ; PK ; SL*** ; BH ; IN)	Seeking political commitment;(NP ; PK)		Advocacy plan
	Developing Public Awareness Campaigns: (NP; MD ; PK** ; SL ; BH ; IN)	Developing Public Awareness Campaigns; (BD ; NP ; PK ; BH)		Public awareness plan
	Implementing Public Awareness Campaigns; (NP ; MD ; SL ; BH ; IN)	Implementing Public Awareness Campaigns; (BD ; NP ; BH)		Work plan /Tools of awareness campaign
Monitoring and evaluation	Developing monitoring and evaluation system for respective activity / intervention for PPR control; (NP ; MD ; PK ; SL***)	Developing monitoring and evaluation system for respective activity / intervention for PPR control; (BD ; NP ; BH ; IN)	Developing monitoring and evaluation system for respective activity / intervention for PPR control; (BH)	M& Plan
	Evaluation of PPR control plan including surveillance and vaccination outcomes; (MD)	Evaluation of PPR control plan including surveillance and vaccination outcomes; (BD ; NP ; PK ; IN)	Evaluation of PPR control plan including surveillance and vaccination outcomes;(BD ; PK)	Evaluation Plan

10. Recommendations

The specific objectives of the workshop were to assess the status of PPR in the region and to build capacities in the member states to pursue the strategic framework for progressive control of PPR in accordance with the global framework and draft roadmap developed during 2011 workshop. It was also discussion on the national strategic plans, identification of gaps and suggestion of practicable measures to implement the plan were also anticipated during the meeting.

The expected output was to develop a revised strategy framework for progressive control of PPR in the region for the period 2014-2025.

Recognising that;

- South Asian countries have a significant small ruminant-based small holder farming sector playing a major role in food and nutrition security and livelihood of rural population
- Peste des Petits Ruminants (PPR) causes huge economic losses and negatively impacts on livelihoods of poor farmers
- PPR, a highly contagious and transboundary animal disease endemic in the region is recognized as a priority disease for the region and therefore a regional approach is deemed crucial for improved control of the disease
- Countries in the region have a long history of PPR research and control initiatives and availability of appropriate expertise on PPR in the SAARC region also exists
- PPR laboratory in Bangladesh has been recognized as the SAARC Regional Leading Diagnostic Laboratory (RLDL) and has started providing required technical support/ services to the member countries
- The countries have agreed to a regional approach and have embarked on the Progressive Control for PPR with agreement on a roadmap for 2011-2020 through a consultative process in 2011
- Some countries in the region do not have comprehensive PPR control policy and programme
- The importance of effective surveillance systems and the need for real time information sharing at local levels for effective control of the disease incursion has been recognized
- The role of vaccination as an important component of the available tool to control PPR has been recognized and there is also vaccine production capacity in the region
- The need to improve capabilities in epidemiology, laboratory diagnosis and field investigations exists
- The role of effective Veterinary Services (VS) for the implementation of prevention and control programmes against PPR is crucial
- The valuable role of FAO in supporting the member countries to better prevent and control animal diseases is well recognized

The workshop recommends that;

- FAO to continue to support the countries in the region to move forward in adopting and implementing the PC-PPR by providing specialized expertise in preparing their national PPR control programme and other support as needed and also seek donor funding support.
- The Region continues to endorse the Progressive Control (PC) approach and updating the roadmap following annual assessment of the indicators for progress monitoring by the countries themselves on regular basis.
- Due to the variety of contexts and PPR status within the Member States there is a need to consider different approaches for PPR control and eradication in the region. The approachies should base on the epidemiological situation prevailing in disease free, free but at high risk and endemic countries
- Availability of quality vaccines complying with the OIE standards be ensured and post-vaccination protocols be developed and implemented for monitoring in the countries and at a regional level
- Epidemiology capacity should continue to be strengthened in the region and a risk-based surveillance system for PPR across the value chain be developed
- The interactions between laboratory and epidemiology networks be strengthened to encourage exchange of expertise and information sharing
- Support be given to improve trained manpower in laboratory diagnosis, vaccine quality control, epidemiology and risk analysis, in addition to communication
- Socio-economic impact analysis be undertaken and specialized expertise be provided where and when appropriate
- Feasibility to establish a regional PPR vaccine bank be explored
- The technical expertise available in the region be utilized across the SAARC member countries
- Each country should identify a PPR Roadmap focal point for communication and that the Roadmap Secretariat i.e. RSU sends a request to each participating country on this matter
- Animal movement across borders and within countries should be mapped to design the national risk-based strategic control plan and develop regional value chain analysis
- Those countries which has reached eradication stage be encouraged to create immune belt by carrying out vaccination along the international land borders
- Countries be encouraged to submit samples for characterization to the SAARC RLDL on PPR based in Bangladesh
- Countries strengthen the PPR prevention and control coordination mechanism through the Regional Support Unit

Annex I

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Annex II

Stock taking Questionnaire

Country: .....

Date: .....

Part One: Regulation and Legislation			
Q.1	Is PPR a notifiable disease according to national regulations? Yes □ No □	Q.2	Has an OIE PVS or Gap analysis mission been done in the last 5 years? Yes □ No □
Q.3	Are regulations pertaining to animal disease control, manure disposal, animal movement/ transport, marketing, taxes etc) described and understood? Yes □ No □	Q.4	Has the veterinary legislation been reviewed within the last 5 years with respect to legal authority to carry out disease control? Yes □ No □
Part Two: Current Status of PPR intelligence			
Q.5	Do you have PPR reported by farmers / other stakeholders during the last 5 years in your country? Yes □ No □	Q.6	Did the country report PPR outbreaks within the previous 12 months to the OIE? Yes □ No □
Q.7	Has the country shared official information with other countries in the region concerning the PPR situation? Yes □ No □	Q.8	Is there comprehensive strategic plan in place to study the epidemiology and socio -economic impact of PPR and control? Yes □ No □
Q.9	Is this strategic plan officially documented? Yes □ No □	Q.10	Is this strategic plan endorsed by competent authority? Yes □ No □
Q.11	Is there a specific funding mechanism (public/ private) to implement this strategic plan? Yes □ No □	Q.12	Does the strategic plan include activities to estimate the losses due to PPR? Yes □ No □
Q.13	Does the strategic plan include information of the structure of production systems for small ruminants throughout the country? Yes □ No □	Q.14	Does this strategic plan contain list of stakeholders involved in farming, breeding, transportation, marketing, slaughtering and processing of small ruminants? Yes □ No □
Q.15	Are the livelihoods (i.e. source of income, expenses, losses) of each and every stakeholder associated with small ruminants well described? Yes □ No □	Q.16	Does the strategic plan include a timeline for activities? Yes □ No □

Q.17	Does the strategic plan include a budget estimate for each activity? Yes □ No □	Q.18	Does this strategic plan define roles and responsibilities of each and everyone involved in its implementation? Yes □ No □
Q.19	Does this plan include in-built monitoring and evaluation system? Yes □ No □	Q.20	Have any of the activities described in the strategic plan been initiated? Yes □ No □ If yes, please specify: ---------- ----------
Q.21	Are the movements of sheep and goat within the country well characterised? Yes □ No □	Q.22	Are the movements of sheep and goats into the country (import, porous borders etc) well characterised? Yes □ No □
Q.23	Have you got the details of imports of sheep/ goats and their disposal/ destination during the last 3 years? Yes □ No □	Q.24	Have field epidemiological units been defined to understand distribution of PPR across the country? Yes □ No □
Q.25	Has a sero-survey, specifically designed to estimate PPR prevalence, been done in the 3 years? Yes □ No □	Q.26	Has the prevalence of PPR been estimated for one or more regions (e.g. province/state, district) of the country, using robust epidemiological data collection techniques within the last 3 years)? years? Yes □ No □
Q.27	Has the prevalence of PPR been estimated across the country (all provinces /states, districts) and in different husbandry systems (subsistence, occupational, nomadic, corporate etc) using robust epidemiological data collection techniques in the last 3 years? Yes □ No □	Q.28	Has the prevalence of PPR been estimated for each and every husbandry system, using robust epidemiological data collection techniques during the last 3 years? Yes □ No □
Q.29	Have 10 or more outbreak investigations been carried out to describe the clinical presentation and to identify source of infection, mechanisms for spread and virus strain? Yes □ No □	Q.30	Have 5 or more isolates from outbreaks been genetically characterized in the last 5 years by national, regional or international reference laboratories? Yes □ No □

Q.31	Has the causative PPR virus lineage been identified in the last 5 years? (Lineage 1,2,3,4) Yes □ No □	Q.32	Do you import PPR Vaccine? Yes □ No If Yes, please specify below: Number of doses being imported last year: ---------- Strain used in Vaccine? ----------
Q.33	Do you produce PPR Vaccine? Yes □ No □ If Yes, please specify below: Number of doses produced last year: ---------- Strain used in Vaccine? ----------	Q.34	Have you estimated the total annual requirement of PPR vaccine for the country? Yes □ No □ If Yes, please indicate:----------
Q.35	Have you estimated the cost of vaccine per unit (Dose)? Yes □ No □ If Yes, please indicate:----------	Q.36	Have you set measurable targets/ indicators for implementation? (e.g. defined vaccination coverage to be targeted, specific number of markets to be covered, number of training sessions to be conducted...) Yes □ No
Q.37	Have you set measurable targets to reduce the impact of PPR? (e.g., number of outbreaks decreased to XX, level of prevalence reduced, direct losses reduced by a target percent..) Yes □ No □	Q.38	Have specific practices or areas been identified that are believed to be major contributors to PPR spread in the country? Yes □ No □
Q.39	Have you identified hot spots based on magnitude of risk of PPR infection across the country? Yes □ No □	Q.40	Is there a robust surveillance system and disease information system in place that helps early detection of disease and guide control measures in the field? Yes □ No □
Q.41	What are the challenges to PPR control (Policy level and Field Level)? Attach separate sheet if required.		
Q.42	How you will meet the above challenges? Attach separate sheet if required		
Q.43	What is the sampling size and frequency for PPR surveillance in the country/region/Province/district/village etc? Attach separate sheet if required.		
Q.44	What is the Case definition (s) being followed in the country for suspected and or confirmed cases of PPR? Attach separate sheet if required		
Q.45	What is the arrangement for data analysis and dissemination of outcome of surveillance results for action by relevant authorities/stakeholders? Attach separate sheet if required.		

Annex I

Agenda

DAY 1: Thursday, 19 December

Time	Topic	Facilitator
	Opening Session	
08.30 - 09.00	Registration	
09.00 - 10.00	Welcome remarks by FAO	Dr Somsak Pipoppinyo, FAOR, Nepal and Bhutan
	Remarks from FAO HQ	Dr Felix Njeumi, FAO–HQ
	Summary outcome of 1st meeting of PPR roadmap for South Asian countries	Dr Muhammad Akram, REC/RSU/FAO
	Opening remarks and opening of workshop	Dr Damodar Sedai, DG, a. i., DLS Nepal
	Handing over of PPR Kits from India to Nepal and Bhutan delegates	-
09:30 - 10:00	Tea/ Coffee break and photo session	
10:00 - 11:00	Current scenario and control initiatives for PPR at global, regional and country level according to risk factors and socio-economic impact	Dr Felix Njeumi, FAO–HQ
	Technical Session	
11:00 – 13:25	Disease situation and status of control initiatives in line with country presentation guideline (each presentation-20 minutes)	Dr Md Abdul Hai –Bangladesh, Dr Sangay Rinchen–Bhutan, Dr Rabindra Prasad Singh – India, Dr Induinil Amaranath Jayawickrama – Maldives, Dr Bal Bahadur Chand – Nepal, Dr Aamer Bin Zahur – Pakistan, Dr Sumathy Puvanendiran – Sri Lanka
13:25 - 14:15	Lunch	
14:15 - 15:00	Development of a global PPR control strategy	Dr Felix Njeumi, FAO –HQ
15:00 – 15:30	Phase I: Improved epidemiological understanding and diagnosis (identifying good practices in epidemiology and laboratory diagnostic)	Phase wise break out into 3 groups

Time	Topic	Facilitator
	Phase II: Establishment of the progressive control phases in front of different epidemiological situations Phase III- PPR monitoring and assessment tools for the final eradication and verification phase	
15:30 -15:45	Tea/ Coffee break	
15:45 -17:00	Group presentation	Plenary

DAY 2: Friday, 20 December

Time	Topic	Facilitator
9:00 -9:30	Role of EMPRES in controlling TADs	Dr Eran Raizman, FAO –HQ
9:30 -10:00	Progressive control of PPR in Pakistan	Dr MuhammadImam Afzal, FAO
10:00-10:45	Progress in diagnostic techniques, research and development for control of PPR in the region	Bangladesh (RLDL) - Dr Md Rafiqul Islam, India – Dr R P Singh, Pakistan – Dr Aamer Bin Zahur
10:45 -11:15	Tea/ Coffee break	
11:15 -12:15	Group discussion on : 1) challenges and options for capacity building for surveillance, networking, diagnosis and response for progressive control of PPR 2) PPR outbreak management	Break out groups
12:15 – 13:00	Group Presentation	Plenary
13:00- 14:00	Lunch	
14:00 -14:45	Stock taking of PPR related activities Outline a revised framework for progressive control of PPR 2013-2020 for respective country in the region following PPR roadmap.	Break out groups
14:45-15:30	Group presentation	Plenary
15:30-15:45	Tea/ Coffee break	
15:45-16:30	Key recommendation to garner technical, financial and political support at country and regional level for the implementation of road map for the progressive control of PPR	RSU Country Team
16: 30 -17:00	Group Presentation	Country Team
17:00	Closing	

Annex IV

Summary of the country reports on the PPR situation and status of control initiatives in the SAARC Member States

Bangladesh

Bangladesh has a goat population of 25.12 million and a sheep population of 3.08 million. PPR affected 83260, 117539, 99658 small ruminants in 2010, 2011 and 2012 respectively. PPR is a notifiable disease in the country. The country is concerned about it as it causes great threat to the Black Bengal breed of goat and is also affecting the poverty alleviation programme of the Government.

Bangladesh produced 43 million doses of vaccine and imported 2000 million doses between 2011 and 2012.

There is no specific PPR control strategy but there is passive surveillance by way of monthly reporting system. Some routine vaccinations including cluster and ring vaccination are carried out. The government spends around one million Taka for PPR control to create awareness through farmer training and operation of 24 quarantine stations in ports.

The country has diagnostic facilities in Upazila and field level including 65 district veterinary hospitals, 9 regional and one central laboratory. Dhaka also houses the SAARC RLDL for PPR.

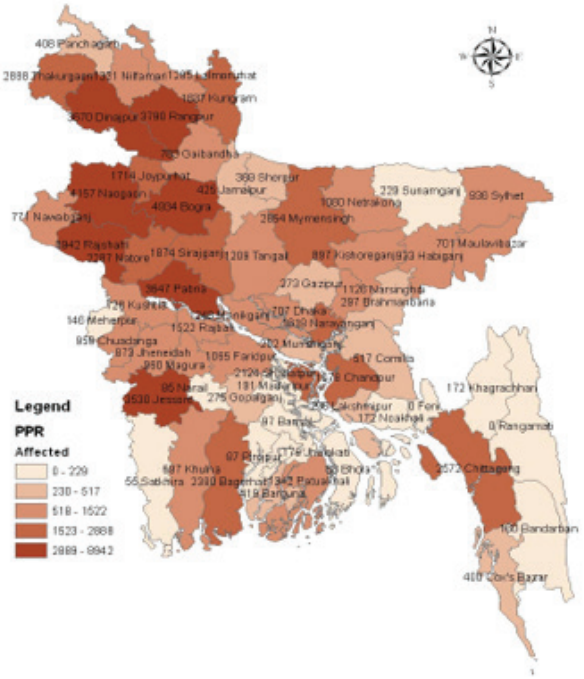

Fig 4.1. PPR affected Districts with FIG (2010)

Impact of the PPR on meat and leather sectors

- The disease affects the meat and leather industry sectors through direct loss and also on the quality of leather production

- Consumer demand for most favourite mutton dropped significantly after consumers stopped buying red meat due to fear of outbreak. Farmers and meat traders incurred significant losses
- PPR Threatened the poverty alleviation program
- PPR is doing harm in traditional family, rearing Black Bengal goats

Livestock acts and regulations

- Animal Disease Act-2005
- Bangladesh animal and animal product quarantine Act-2005
- Fish and animal feed Act- 2010
- Animal slaughter and quality control Act- 2011
- Animal disease rules-2008

Policies and Plans

- National livestock policy-2007
- National poultry development policy-2008
- National Avian and Pandemic Influenza Preparedness and Response Plan, Bangladesh, 2011-2016
- Strategy for the progressive control of FMD in Bangladesh, 2011-2016
- Anthrax prevention and control action plan 2009

Major constraints

- Inadequate veterinary coverage and technologies for disease diagnosis, treatment and control
- Poor/lack of epidemiological information about major livestock and poultry diseases
- Shortage of quality vaccines for PPR and Others infectious diseases
- Poor/lack of strategic disease control programs including absence of disease monitoring and information system
- Poor/lack of appropriate Budgetary allocation
- Bio-security and bio-safety issues not properly address

Bhutan

Small ruminant population of Bhutan in 2010 were 12 699 sheep and 43 134 goats and in 2011it was 12 459 sheep and 43 734 goats. Only backyard farming is practiced and that too mostly in the southern belts of the country and there are no commercial small ruminant farms. Since the market demand for chevon and mutton is very small therefore no value chain studies has been done so far.

The chronology and number of PPR outbreaks including other epidemiological information in Bhutan are given in the table below:

Year	Date of Outbreak	Number of outbreaks/ locations	Mortality/ Morbidity	Species affected	Premises affected	Source of virus introduction
2010	15/06/2010	01/ 01	(27 died out of 84 goats) 32.14percent	Goat	Backyard	Through Tshedaar goats from India
2013	30/05/2013	01/01	(41 died out of 87 goats) 47.13percent	Goat	Backyard	Illegal animal movement
2013	2013	01/01	(4 died of 26) 15.38 percent	Goat	Research station	Imported from Sirohi

The viruses from both the outbreaks belonged to lineage IV.

Sero surveillance

After the second outbreak of PPR, two regional centres have initiated sero-surveillance in the risk zones

- One hundred and fourteen serum samples have been referred from Western region to RLDL, Bangladesh
- One out of the 104 samples collected from general sero-surveillance tested positive
- Five out of the 10 serum samples from the affected herd have tested positive
- West-central region is still carrying out the surveillance activity
- Usually the samples are referred to the Pirbright Laboratory, UK

The location of the outbreaks and the Districts where surveillance is being carried out has been marked in yellow in the figure below:

Socio-economic impact analysis

- As such the analysis were not done as the flocks affected was tshethar goats (saved from slaughter to be released free in the forest) and imported from India
- Total of 68 goats succumbed to the 2 outbreaks
- It is suspected that PPR may be present in the small ruminant population of the southern bordering districts
- No vaccination against PPR is being carried out in Bhutan

Regulations regarding animal movement

- Bhutan Agriculture and food Regulatory Authority (BAFRA) is the regulatory authority
- Animals of any species and their products including bird feathers are restricted from entry into Bhutan
- Live animals may be quarantined at the place of entry for 15 days

Restriction on animal movement within the country

- Any individual who migrate their animal herd(s) from one district to another district shall obtain in-country movement permit from the concerned Regulatory Authority office.
- All animals shall be compulsorily vaccinated or treated against notifiable diseases in sufficient time before the date of migration and the relevant health and vaccination certificates should be provided to Regulatory Authority while applying for in-country movement permit.
- The Regulatory Authority shall impose any other additional measures as deemed necessary for issuance of in-country movement permit for prevention and control of notifiable diseases.

National PPR strategy/current practice

- The country doesn't have framed and endorsed National PPR strategy
- With the recent outbreak in June 2013, the Regional centres have initiated sero-surveillance in high risk areas under their region
- PPR is supposed to be prevalent in goat rearing areas of the country, but no scientific evidence is available
- So far Bhutan encountered two confirmed outbreaks. The investigation was being carried out by the RLDC
- Information sharing is done through OIE website and TADInfo system

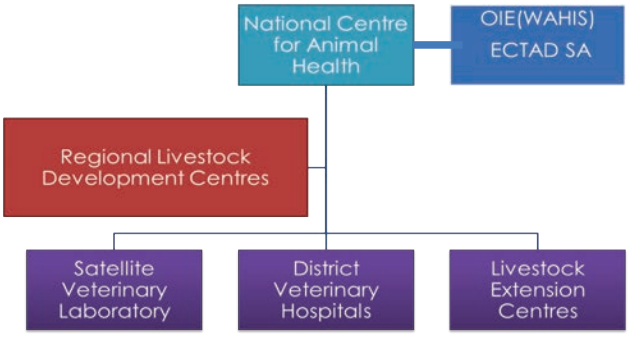

Fig 4.3: Reporting/ current technical set up

Gaps and challenges for PPR control

- No PPR control strategy in place and PPR prevalence study is not yet complete
- Advocacy on the disease is minimal at all the levels of society
- No available diagnostic facility at field level due to which the cases could go undiagnosed
- Goat farming haven't caught the importance from policy makers
- Constraints in diagnostic facility at National level
- No baseline epidemiology on the disease in the whole country

Way forward

- Nationwide sero-surveillance of PPR in goats and sheep to be carried out.
- Accordingly frame National PPR control strategy to initiate control measures, develop capacity, source funds, etc.
- Capacitate rapid detection at field and advance facilities at Regional and National laboratories.
- See the endemicity of disease in the country to decide on implementation of PPR vaccination
- Study the socio economic impact of the disease

India

Five States were selected to be covered for control for the period 2007-2011 and other States have limited vaccination under ASCAD Programme. The entire country is to be covered during the 12th plan period of 2012-2017.

Status of the road map implementation: capacity building

- Active disease investigation units with state departments are capable of PPR diagnosis and serosurveillance/sero-monitoring using indigenous PPR kits.
- Vaccine production capacity is not a limiting factor, more than 200 million doses/annum are produced in the country.

Status of the road map implementation: vaccine production or purchase and quality control

- Live attenuated homologous vaccine is produced for PPR using PPRV Sungri-96 strain- a lineage IV virus
- Vaccine production by Government organizations and private industry
- Commercialized to

– Indian Immunologicals, Hyderabad

– Intervet, India Pvt. Ltd. Pune, (MSD Animal Health)

– Hester Biosciences, Ahmadabad

– IAH and VB, Bangalore

– IAH and VB, Palod

Total vaccine production capacity is more than the country's requirement and sufficient for all SAARC nations.

Status of the road map implementation: advocacy and communication

- Funding agency for PPR Control: DADF, Government of India
- PPR control (NCP-PPR) core group constituted by Government of India Preliminary meetings of Core group and vaccine manufacturers held
- ICAR- for technical support and as advocacy agency
- State Animal Husbandry Departments as- Executive agency of PPR control programme
- There is a need to have more interaction at State/National/Regional Level

Status of the road map implementation: surveillance/diagnosis undertaken and results

Sero-prevalence (1996-2003) - Antibody prevalence 33 percent

Sero-prevalence (2004-2010)-antibody prevalence-around 40 percent (not an organized sampling, lot of vaccinated animals were tested)

- There is a need for organized sero-surveillance following OIE pathway which recommends about 0.1 percent animals to be tested following Random sampling method
- Sandwich-ELISA kit is regularly used in the active States for clinical diagnosis
- Lot of under-reporting of the disease, all States are endemic except North Eastern States

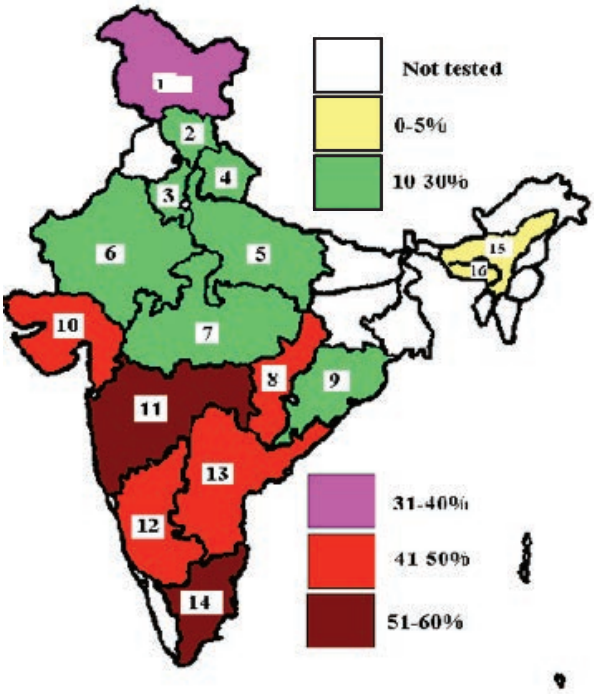

Fig 4.4: PPR antibody prevalence in India

Status of the road map implementation: impact assessment or socio-economic study

- According to an estimate in India, the annual loss due to PPR in small ruminant population of approximately 200 million is about INR 1800 million (USD 38 million) . All these losses can be reduced if vaccine is used properly under field conditions.

- These activities/disease control programmes should be an integral component of poverty alleviation in India.

Experiences to be learned from some Indian States

- An interesting experience from Chhattisgarh State under ASCAD
- Organized a state level seminar under ASCAD with nearly 100 percent participation of all veterinary officers.
- De-worming of all goat and sheep before vaccination.
- Vaccination coverage of about 80 percent sheep and goats against PPR within 30 days (Pulse vaccination).
- Experiences from Andhra Pradesh and Karnataka

These states have a plan for about 100 percent coverage of small ruminants during next 5 years

PPR control programme in Andhra Pradesh

- 2007-08 - Mass vaccination - State initiation
- 2008-09 - Covering young and unvaccinated animals
- 2009-10 - Covering young and unvaccinated animals
- 2010-11 - Mass vaccination - NCP-PPR
- 2011-12 - Covering young and unvaccinated animals
- 2012-13 - Covering young and unvaccinated animals
- 2013-14 - Covering young and unvaccinated animals

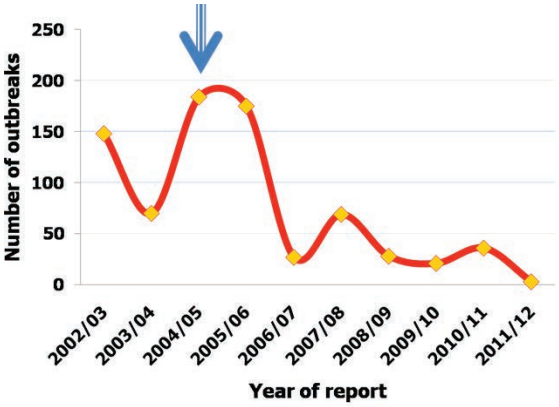

Fig 4.5: Status of the road map implementation: outbreak response (post vaccination monitoring) in Karnataka

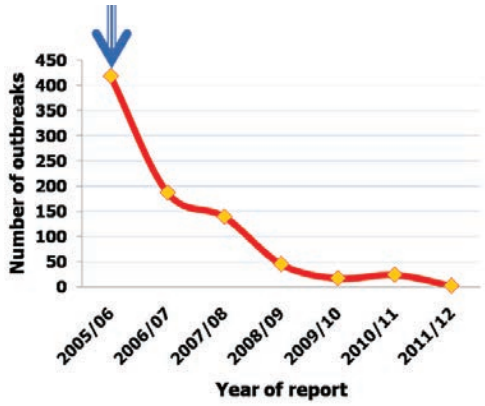

Fig 4.6: Status of the road map implementation: outbreak response (post vaccination monitoring) in Andhra Pradesh

Table 4.2

PPR-sero-monitoring results

Year	Pre vaccinate samples			Post vaccinate samples		
	Samples tested	Positive (percent positivity)	samples tested	Samples	Positive (percent positivity)	samples
2007	370	73	(19.7)	370	300	(81.1)
2010	3655	2361	(64.6)	3516	3361	(95.6)
2011	1069	581	(55.1)	1056	961	(91.0)
2012	986	190	(19.3)	876	784	(89.5)

Status of the road map implementation:

outbreak investigation

- Monoclonal antibody based sandwich-ELISA kit developed by IVRI is used for clinical Diagnosis throughout the country.

Impact of PPR vaccine and diagnostics in PPR control (75 percent reduction in disease incidence)

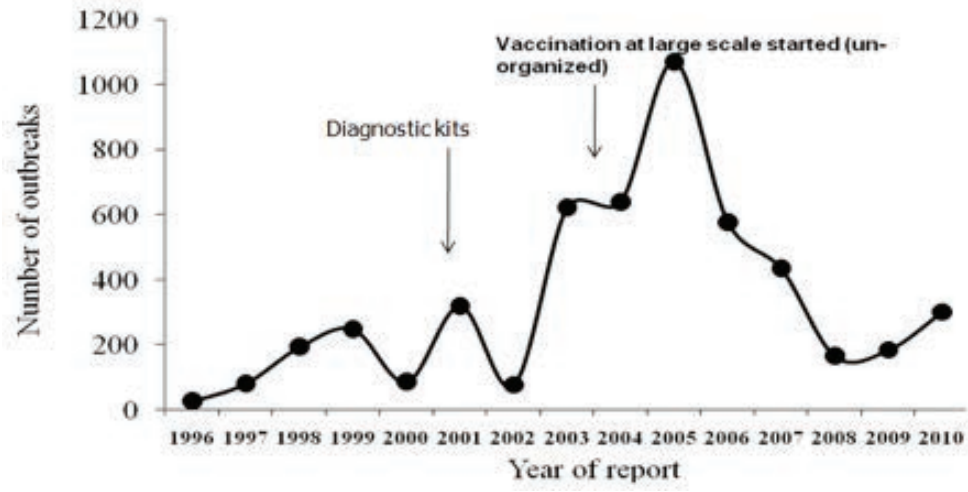

Fig 4.7: Impact of diagnostics and vaccination on PPR control in India

Status of the road map implementation: Funding strategy and potential donors

- Mainly Department of Animal Husbandry Dairying and Fisheries (DADF) , Ministry of Agriculture, Govt. of India for Control Programme.
- Indian Council of Agricultural Research (ICAR) for R&D.
- India is technologically independent due to its indigenous vaccine and monoclonal antibody based diagnostics (both for antigen and antibody detection) facilities available.

Challenges encountered

- There is no progress beyond this (below 200- 300 outbreaks) since last 3-4 years, as further progress may demand very organized vaccinations combined with sero-surveillance and sero-monitoring following the OIE pathway of disease eradication tools available.

Reasons:

- Thermo labile vaccine only is available
- High fecundity of goat and sheep: Introduction of 35-40 percent new population every year
- Herd immunity NOT SUSTAINABLE in sheep and goats
- Possible role of wild life (antelopes) in disease transmission

Possible solution/Action plan

- Vaccinate all small ruminants indiscriminately with good quality PPR vaccine.
- Keep the record of vaccinated animals.
- Vaccinate the new born kids and lambs at around 6 months of age and keep the record.
- Monitor the vaccine response using competitive-ELISA test kit.
- Explore the possibility of intermediary host if any involved in epidemic cycle e.g. wild animals or other domesticated animals.
- Evaluate vaccine failures due to the improper maintenance of cold chain and revaccinate the entire population especially in winter season to minimize the problem of thermostability of vaccine.
- Also explore the possibilities of all vaccination campaigns to be executed in winter season as vaccine produces lifelong immunity.
- Vaccination teams will also be comfortable during winter season.

Pulse Vaccination

- Let all vaccination happen covering 90 percent population within 30 days. This will break the epidemic cycle.

Maldives

Current and past outbreaks

The disease was first officially reported in 2007 and outbreaks have occurred in 4-6 years interval mostly originating in October-January months. It is endemic in Kashidhoo Island, Thilafushi Island (Kaafu Atoll). Farmers and other stakeholders are not familiar with PPR because of which it is not regularly reported to MOFA. Maldives has a total goat population of 9800 heads. The source of the virus was through importation of goats from infected countries. Within the country the movement of the virus was due to movement of herds in farming system, transport of animals for slaughter, breeding and for religious activities.

No comprehensive strategic plan is in place to study the epidemiology and socio-economic impact of PPR and no specific funding mechanism exists to implement plan. Maldives does not conduct vaccination against the disease. The country has plans to conduct sero-surveillance in 2014 targeting to collect some 540 samples from 18 islands and send them to SAARC RLDL for testing.

Management of disease outbreak is through isolation of sick cases, movement control of animals and ring vaccination. The strength of PPR control is that there is national policy for control of contagious diseases since 2008 through special vote and enactments. One advantage for Maldives is that there are no international land boundaries and there is only one serotype affecting the country right now.

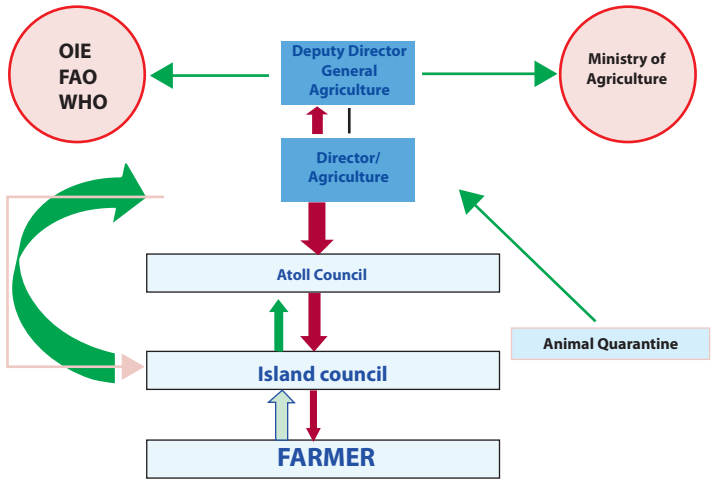

Fig 4.8: Animal disease management operation in Maldives

Gaps and challenges for PPR control

Policy Level

- No animal diseases control policy for socio economically important animal diseases
- Limitation in existing law (import and export of livestock and related products)
- No proper disease surveillance plans
- Quarantine system is in place at international airport but the risk not properly addressed at sea ports
- Some of the disease control policies are out dated
- Political will/ political commitment is limited

Field level challenges in PPR control

- Non availability of resources (financial, manpower, diagnostic, vaccine)
- Lack of coordination among different sectors - importers, farmers, local government authorities
- Lack of technical knowledge and expertise among goat farmers and officers on PPR, public awareness and understanding on PPR

Weaknesses and constraints

- Island based livestock raising system
- Complexity in controlling livestock movement
- Inaccessibility to endemic areas due to transport difficulties
- Inadequate mobile facilities
- Irregular disease reporting
- Non-availability of required laboratory facilities
- Shortage in trained man power

Threats

- Animal import from infected countries
- Smuggling of animals

How will above challenges be addressed?

- Establishment of an effective national surveillance system to collect data for future planning.
- Upgrading the existing facilities of disease diagnostic laboratory or make bilateral agreement to send PPR suspicious samples to referral laboratory(ies).
- Training of officers and goat farmers on the identification of PPR, burden of disease and risk reduction method.
- Public awareness for the general public on PPR using media, print media, talk shows on TV and radio programmes etc.
- Allow import of goat from PPR free zones only and with strict quarantine practices.
- Local and regional workshops on advocacy and transparency for political leaders (importance of capacity building and regional collaboration on allocation of animal disease control funds).
- Stake holder discussions and expert consultation (surveillance, control, response and public communication).

Nepal

Sheep and goat rearing is major source of income generation for the poor and marginal farmers, PPR is a notifiable in the country and threatening the livelihoods of large number of poor farmers. The disease was first reported in 1994 and since then it has been reported from 68 districts till date. Population at risk is 8.7 million.

Status of the control policy

- Efficient disease reporting
- Vaccination
- Emergency response to outbreaks
- Diagnosis (rapid and accurate)
- Quarantine of affected animals
- Tracing
- Restriction of animal movement

Status of the road map implementation: capacity building

- Training in vaccine production has not been imparted since long though requested for with different organizations.
- Field epidemiology training from FAO has helped in disease investigation works.
- Need more number of training for epidemiology and also in vaccine production.

Status of the road map implementation: vaccine production or purchase and quality control

- Government started control programme by importing vaccine from Africa.
- The government started vaccine production in Central Biological Production Laboratory in 1999.
- The vaccine has been produced according to the production protocol adopted by PPR world reference Laboratory CIRAD-EMVT, France and as suggested in the OIE manual for the production of homologous PPR cell culture vaccine.
- Vaccine production capacity (in the country) is 2.1- 4.0 million doses per annum
- Cost per dose is NRs 2.5 (50 dose vial) and 2.8 (100 dose vial)/dose
- Imported about NRs. 8/dose, in the beginning from Africa

Status of the road map implementation: advocacy and communication

- No international training is available for technical and supporting staff to improve skills and upgrade themselves.

- No skilled technicians are available for proficiency testing and quality assurance as well as repair and maintenance of the lab equipment and machinery.
- Research outputs by way of publication regularly in the national journal
- FM radio (local and national level), pamphlet, poster, flex etc.

Status of the road map implementation: surveillance/diagnosis undertaken and results

- Diagnostic facility- PPR Antibody ELISA, PPR Antigen ELISA, Rapid test (HA test)
- Establishment of diagnostic facility in the regional laboratory (under development).

Status of the road map implementation: impact assessment or socio-economic study

- Programme to find out the socio-economic impact of the disease has been prioritized by DAH and is included in national programme, but has not been completed yet.

Status of the road map implementation: outbreak response (target population/vaccinated)

Policy: Guideline draft is under preparation

National PPR control programme focused on

- Districts/areas with dense population of goat and sheep
- PPR prone districts/areas (with previous outbreak history)
- Areas linked with road or movement/live markets
- Highway corridor
- Border with high movement of goat

Status of the road map implementation: outbreak response (post vaccination monitoring)

- Vaccination of each animal at entry points
- Outbreak control through ring vaccination
- Vaccine bank in 5 RVLs always with 50 thousand dose of PPR vaccine for emergency
- Emergency stock in the centre (at least 0.2 million dose)
- Quarantine offices/checkpoint examine each and every animal for the vaccination status and vaccinate the unvaccinated animal charging the cost of vaccine
- Future plan proposal for PPR control
  - Disease eradication
  - Mass vaccination (> 80 percent coverage)

Status of the road map implementation: outbreak investigation

- Limited work is being done in the districts.
- VEC and DAH are having reports in short form indicating the epi units which are being affected, but no detail reports are available to rule out the risk factors and also the mode of transmission of the disease.

Status of the road map implementation: Funding strategy and country contribution

- Government funding is regular as the programme is focused to ultra poor, but the volume of budget is limited, so is not able to cover all the risk population.
- DAH has focused the programme in high risk districts which are selected based on history of outbreaks, population of goat, market and road access, employment generation

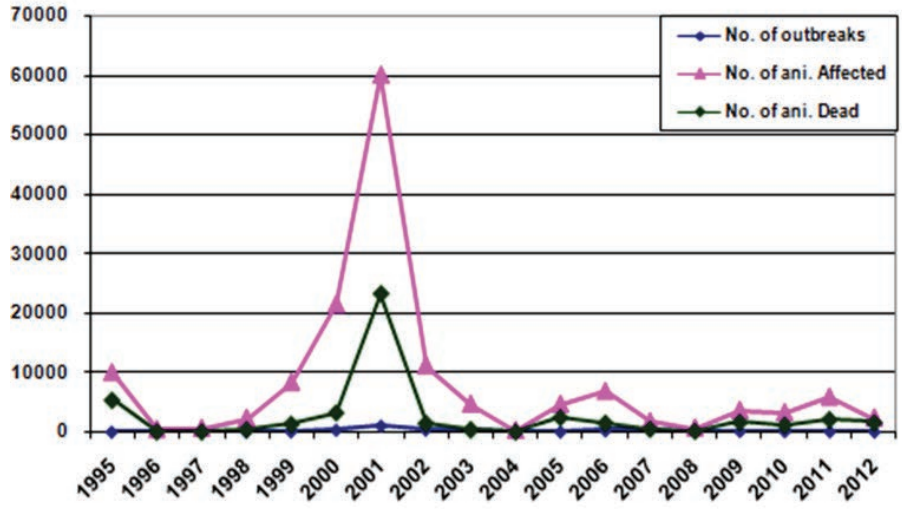

Fig 4.9: Prevalence of PPR in Nepal during 1995-2012

Status of the road map implementation: Contingency plan

- Drafted but still not endorsed by the government. It is under discussion at the Directorate of Animal Health

Challenges encountered

- Late reporting of outbreaks
- Cases mostly linked with movement of goats during festivals or with the movement of male goat for breeding
- Projects distributing goats- major contributor in disease cycle.

Pakistan

Pakistan has an estimated sheep and goat population of 28.8 and 64.9 million heads, respectively as of 2012-13. There is no regulation regarding animal movements in Pakistan. PPR in Pakistan was recognized during the last decade; initially the reports were based on clinical and epidemiological observations. The virus was confirmed in a laboratory in 1994. A Participatory Disease Search (PDS) between 2002 and 2005 revealed prevalence of PPR in many parts of country. Regional and national prevalence has been recorded bv various workers.

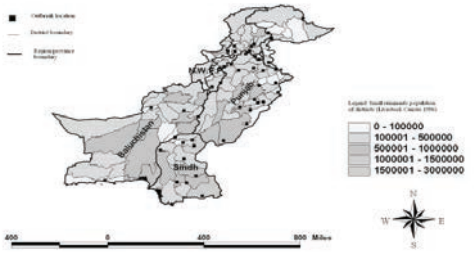

Fig 4.10: PPR outbreak distribution in Pakistan (2005-09)

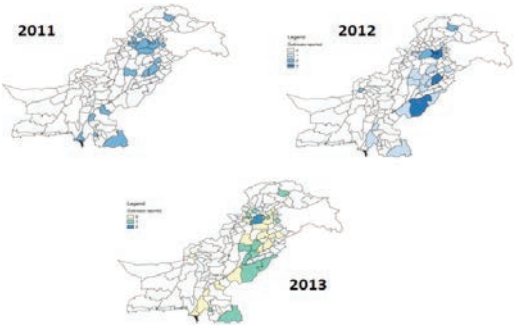

Fig 4.11: PPR outbreaks in the different districts of Pakistan (2011 -2013)

PPR is estimated to cause losses worth Rs.31.51 billion annually. For the control of the disease initially, tissue culture rinderpest vaccine (TCRV) was used but was later discontinued during 2001 due to ongoing rinderpest eradication programme. About 0.2 million doses of homologous PPR vaccine were imported during 2002-04 and another one million doses in 2005 for maintaining a vaccine bank for emergency use.

PPR vaccine production commenced during 2006-07 at two institutes located in Quetta and Lahore using PPR virus strain Nigeria 75/1 seed. Currently 2.5 million doses of PPR vaccine is produced annually.

Gaps and challenges in the control of PPR

- Lack of strategic national control program for PPR
- Limited political will, legislation and communication
- Institutional setup and capacity building weak
- Limited funding for research activities
- Unrestricted cross border and inter/intra provincial animal movements

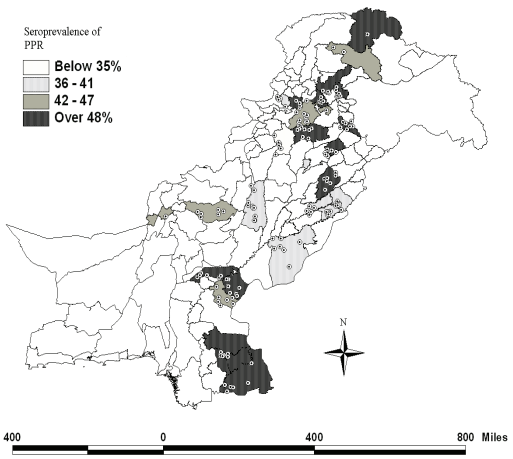

Fig 4.12: Sero-prevalence of PPR in Pakistan (2011)

- Under performing disease reporting and surveillance system
- Availability of quality vaccine
- Vaccines delivery mechanism/approach for blanket/zonal/risk based, lack of trained staff, consumables
- Lack of communication strategy and awareness involving all stake holders
- Limited cold chain facilities are available in some districts of provinces.

National PPR control strategy - approach

- Risk based or targeted vaccination
- Mass vaccination in endemic areas
- Intensive focus vaccination in infected areas and along the routes of animal movements
- Epidemiology(surveillance/outbreak investigation/reporting/ information sharing) to be enhanced
- Post vaccination monitoring

Sri Lanka

PPR is a notifiable disease in Sri Lanka. Small ruminant population is less than 400,000 out of which goat and sheep population are around 383,000 and 9,000 respectively (2012 census). So far the disease has not been reported from the country. As the country is PPR free the farmers may not have good knowledge on PPR.

Sri Lanka is an island nation therefore good control over animal importation exists, such as strict regulation and quarantining at seaport and airport which may be perhaps responsible for keeping away the disease. The country is going to initiate sero-surveillance in 2014 to ensure the absence of Questionnaire based self assessment of PPR control status in the SAARC countries circulating virus or antibodies against PPR virus

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