OFFICE OF EVALUATION
Project evaluation series

Final Evaluation of “Progressive Control of Peste des Petits Ruminants in Pakistan”

October 2017
Final Evaluation of “Progressive Control of Peste des Petits Ruminants in Pakistan”
GCP/PAK/127/USA
Contents

Acknowledgements ......................................................................................................................................vi
Abbreviations and acronyms ....................................................................................................................vii

Executive Summary .................................................................................................................................1

1. Introduction ........................................................................................................................................4
   1.1 Background .................................................................................................................................4
   1.2 Evaluation scope and objectives .................................................................................................4
   1.3 Methodology of the evaluation ....................................................................................................5
   1.4 Limitations ..................................................................................................................................7
   1.5 Structure of the report ................................................................................................................7

2. Context of the project .........................................................................................................................8
   2.1 Project description .......................................................................................................................9
   2.2 Project area ................................................................................................................................10
   2.3 Target beneficiaries ......................................................................................................................10
   2.4 Implementation arrangements ....................................................................................................11

3. Evaluation findings ...........................................................................................................................12
   3.1 Analysis of project concept and design .......................................................................................12
   3.2 Analysis of project implementation ............................................................................................14
       3.2.1 Project management .........................................................................................................14
       3.2.2 Institutional arrangements including Government participation ........................................15
   3.3 Analysis of project’s contribution to results ................................................................................15
       3.3.1 Intermediate Outcome 1(a) – Diagnostic capacity ..........................................................15
       3.3.2 Intermediate Outcome 1(b) – Strengthen PPR vaccine production ..................................17
       3.3.3 Intermediate Outcome 2 – Improved disease surveillance for PPR outbreaks ..............18
       3.3.4 Intermediate Outcome 3 – Effective control of PPR through vaccination .....................20
       3.3.5 Gender and women empowerment ...................................................................................24
       3.3.6 Overall impact ....................................................................................................................25
   3.4 Analysis of cross-cutting issues and sustainability .......................................................................27
       3.4.1 Capacity development .......................................................................................................27
       3.4.2 Partnership and alliances ...................................................................................................28
       3.4.3 Research ............................................................................................................................28
       3.4.4 Training materials ..............................................................................................................28
       3.4.5 National PPR control strategy ...........................................................................................28
       3.4.6 Sustainability .......................................................................................................................29
       3.4.7 Similarities and synergies with the control of foot and mouth disease and other transboundary animal diseases .................................................................29
4. Conclusions and recommendations ................................................................. 30
   4.1 Conclusions .................................................................................................. 30
   4.2 Recommendations ...................................................................................... 31

5. Lessons Learned ............................................................................................. 33

6. Appendices ....................................................................................................... 34
   Appendix 1. Documents consulted ................................................................. 34
   Appendix 2. List of people interviewed ......................................................... 36

7. List of Annexes .................................................................................................. 40
Boxes, Figures and Tables

Boxes
Box 1: Sample collection and response ..............................................................18

Figures
Figure 1: Laboratory confirmed outbreaks of PPR in 2014, 2015 and 2016 by district .................................................................19

Tables
Table 1. Evaluation team coverage of project activities through field visits ..........6
Table 2: Vaccination campaign (Output 3): project coverage and evaluation field visits coverage .................................................................6
Table 3: Sites for meetings with beneficiaries of project vaccination (project Output 3) ........................................................................................................................................7
Table 4: Locally reported effectiveness of vaccination against PPR in Tharparkar-Mithi .......................................................................................................................22
Table 5: The increase in herd immunity in seven demonstration sites following vaccination with PPR vaccine ......................................................................................23
Table 6: The project’s response to the challenges and issues raised during the second South Asia Roadmap meeting for PPR in December 2013 ....................26
Acknowledgements

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Composition of the evaluation team
Mr Paul Rossiter, Team Leader, consultant livestock specialist
Mr Mikal Khan, Evaluation Manager, FAO Office of Evaluation
# Abbreviations and acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organization of the United Nations</td>
</tr>
<tr>
<td>FMD</td>
<td>Foot and Mouth Disease</td>
</tr>
<tr>
<td>PCP</td>
<td>Progressive Control Pathway</td>
</tr>
<tr>
<td>PPR</td>
<td>Peste des Petits Ruminants</td>
</tr>
<tr>
<td>TAD</td>
<td>Transboundary Animal Disease</td>
</tr>
</tbody>
</table>
Executive Summary

1 In June 2017, the three and a half year project “Progressive Control of Peste des Petits Ruminants (PPR) in Pakistan” (GCP/PAK/127/USA) was completed. The purpose of this final evaluation is to analyse project achievements in their context, draw lessons for planners and recommend future actions that the Food and Agriculture Organization of the United Nations (FAO) and the Government of Pakistan should take to accelerate the progressive control of the PPR disease in the country.

2 The context of the project was that PPR, which is a fatal and economically damaging infectious disease of sheep and goats, was widespread and prevalent throughout the country at a time when Pakistan was joining a specific progressive control pathway (PCP) to limit and eventually eradicate the infection. The project’s expected overall impact was to improve the livelihoods of smallholder farmers by curtailing their losses from PPR. This would be achieved by implementing activities to curtail the spread of PPR in Pakistan and mitigate its negative impacts on small ruminant-based livelihoods. Three main outputs were expected to contribute significantly to this: enhanced capacity for laboratory diagnosis and vaccine production; improved field surveillance for PPR; and demonstrations of effective control through vaccination in different animal husbandry systems and different locations of the country. The evaluation questions focused on whether the project successfully delivered its results in terms of improved diagnosis, surveillance and vaccination – the essential tools for Pakistan to begin its journey along the PCP.

3 The evaluation team visited laboratories and veterinary offices, and interviewed and held discussions with veterinary staff and smallholder farmers in several provinces. This provided opportunity to gather information and opinion from these beneficiaries to correlate with reports and other information provided by the project.

Key findings

4 The project concept and design were clear and appropriate for Pakistan’s needs, and were well linked to the Country Programme Framework and the FAO Strategic Objectives. The project’s goal was to provide the federal and provincial veterinary services of a Pakistan with the basic technical platform to begin the progressive control pathway for Peste des Petits Ruminants. The design was to install this platform through a close collaboration between FAO and the federal and provincial authorities that would introduce and provide training in a set of simple, interdependent and essential activities. These were: disease surveillance; laboratory diagnosis; improved vaccine production in Pakistan; and demonstrations of the effectiveness of correctly administered quality vaccine in the field. Without these inputs Pakistan could not proceed on the progressive control pathway for PPR. The project has made them available and Pakistan can proceed on the PCP.

5 The project substantially strengthened Pakistan’s federal and provincial government diagnostic capacity to diagnose PPR. Routine diagnostic testing is installed in two federal laboratories and in one laboratory in each of the four provinces. The strengthened laboratories confirmed PPR in 2,339 sets of samples submitted from 3,166 outbreaks. In addition, advanced diagnostic laboratory techniques have been installed at the National Veterinary Laboratory in Islamabad improving Pakistan’s ability to carry out more detailed studies without having to export samples to global reference laboratories. All this laboratory capacity has been supported with training and continuous technical backstopping from the project. Pakistan now has the diagnostic capacity to continue on the progressive control pathway for PPR. The challenge for Pakistan will be to maintain the high level of diagnostic capacity for the next one to two decades and beyond.

6 PPR vaccine production at the main manufacturing laboratory, the Veterinary Research Institute in Lahore, appears to have been significantly increased and improved, despite some delays. The project directly supported the Veterinary Research Institute to establish the production of around 500,000 vaccine doses per month. Quality assurance capacity has been strengthened at the National Veterinary Laboratory in Islamabad, where quality control systems have been established.
The project has substantially improved surveillance and reporting of PPR outbreaks by strengthening the provincial veterinary services throughout Pakistan. As a result, the number of reports of PPR cases has increased from 261 in the first year of the project to 1,124 in the second and 1,781 in the third year, for a total of 3,166. While surveillance still needs to increase its coverage, these early results begin to disclose and uncover the extent of PPR presence in Pakistan. Also, the project has established a good model for operational partnership with provincial government staff to perform surveillance efficiently. The increasing amount of data being gathered is not being sufficiently analysed by national laboratories, and makes the case for more epidemiology research.

The project convincingly demonstrated the preventive effect of vaccination in six sites with almost 60,000 herd owners. It showed the importance of using quality assured and correctly administered vaccine and the importance of the cold chain for its storage, distribution and use. As a result, some herders are considering the possible purchase of PPR vaccine for their use. At one project site with almost 16,000 owners, however, difficulties in reaching higher levels of herd immunity illustrated the challenge posed by some different husbandry systems – and which is probably the ultimate challenge for future PPR control in Pakistan.

The project benefits were generally equally distributed among men and women, as the vaccination campaigns and disease control have benefits for the entire household. While there was some involvement of women in decision making, with specifically targeted trainings on PPR diagnosis and control, the absence of female project staff limited women’s’ involvement and also missed the opportunity to set an example for aspiring women veterinarians.

The project’s impact has been to provide Pakistan with the essential technical tools to begin the progressive control pathway for PPR. It has done this very effectively and has put PPR firmly on the agenda with Pakistan’s livestock departments and policy makers. It has highlighted to all veterinary authorities in Pakistan the danger posed by PPR to small ruminant-based livelihoods. It has provided these authorities with a core of disease surveillance and reporting skills for PPR in the field, with laboratory capacity to confirm the disease, and a clear demonstration in most provinces of how successful properly administered vaccination can be. The project has also demonstrated that PPR vaccine needs to be of certain minimum quality to be effective in the field and has facilitated its improved production in Pakistan. The new challenge is for each province and the federal authorities to take up and use these tools on the long path to eradication. If this can be achieved, the potential impact of the project for safeguarding small ruminant-based livelihoods from this frequently fatal disease is enormous.

Conclusions

Conclusion 1

The project effectively combined people and resources from provincial and federal veterinary services with those of FAO, the United States Department of Agriculture and several other organizations into a network which has developed the control of PPR in Pakistan to a point where it can move towards the next stage of control described in the PPR progressive control pathway.

The project has effectively provided Pakistan with the main technical tools for following the progressive control pathway for PPR throughout the country. It also demonstrated a very positive model of cooperation between federal and provincial authorities and FAO that could be applied to improved control of other animal diseases throughout the country and other important constraints to livestock production. There are significant synergies and similarities between the control of PPR and foot and mouth disease (FMD) and other transboundary animal diseases and the requirements facing these different diseases in the immediate future.
Conclusion 2

13 The project has done an exemplary job of raising the awareness of a small proportion of the country’s farmers to the clinical signs and dangers posed by the disease and how it can be prevented.

Conclusion 3

14 The project has not significantly strengthened epidemiological capacity for PPR to a level required for successful progress along the PCP.

15 There are two main challenges for the implementation of the progressive control pathway for PPR in Pakistan. The first is to scale up farmer awareness, field surveillance and vaccination throughout the country, all of which must be underpinned by much more epidemiology than has been possible during the project. It is also important to place much greater emphasis on control in difficult areas and highly mobile small ruminant populations. The second challenge is to develop a long-term programme for this work which will require much more time than a single project.

Conclusion 4.

16 Implementation of the progressive control pathway for PPR requires national leadership in terms of legislative reforms and resource allocations.

Recommendations

Recommendation 1. To FAO and the federal and provincial governments of Pakistan

17 The Evaluation Team recommends that FAO and the federal and provincial governments of Pakistan together with strategic development partners prepare and implement a long-term programme to support the country to follow the progressive control pathway for PPR.

Recommendation 2. To FAO and the federal and provincial governments of Pakistan:

18 The evaluation team recommends that FAO and/or the federal and provincial governments seek resources to begin work as soon as possible on preparing the concept and design for a transboundary animal diseases (TADs) programme for Pakistan. This should include an early workshop or meeting of all stakeholders to agree and plan the immediate way forward.
1. Introduction

1.1 Background

1 This document presents the findings of the final evaluation of the project “Progressive Control of Peste des Petits Ruminants (PPR) in Pakistan” (hereafter the ‘project’).

2 The financing agreement for the project signed on 15 September 2012 was followed by an inception workshop on 20 August 2013 and staff began working in February 2014. A significant part of the delay between the financial agreement and the start of implementation was due to very thorough consultation with the provincial authorities to assure their ownership and commitment from the beginning.

3 The project end date was 30 September 2016, and a no-cost extension was obtained to 31 March 2017. A second no-cost extension was granted and the project closed on 30 June 2017. The project budget was USD 1,655 million and this amount was spent by the end of the implementation period. A final evaluation of the project was conducted as it was mandated in the project document and requested by the donors.

4 The main donors were the United States Department of Agriculture and the Federal and Provincial Governments of the Islamic Republic of Pakistan. The project was implemented by the Food and Agriculture Organization of the United Nations (FAO) under number GCP/PAK/127/USA. The main project beneficiaries were the public veterinary services at federal and especially provincial levels and strategically selected communities of sheep and goat owners.

5 A new project (UTF/PAK/139/PAK) targeting Punjab Province has already been signed between the Government of Punjab and FAO as a logical sequel to the present one, and it will benefit from the experience gained in the present project. However, funding for a new project at national level is not immediately available. The evaluation will inform the implementation of this new project in Punjab (due to start in April 2017) as well as potential national level projects addressing the same issues.

1.2 Evaluation scope and objectives

6 The purpose of this final evaluation is to analyse project achievements in their context, draw lessons for planners and identify good practices. While this report is of interest to all project stakeholders, it is especially useful for those addressing the future control of PPR in Pakistan and for those facing a similar challenge.

7 The evaluation covered all of the project’s interactions at central, provincial/regional,1 district and community and farm level. The central level included the office of the Animal Husbandry Commissioner, Ministry of National Food Security and Research. At provincial level the Livestock and Dairy Development Departments were included and diagnostic laboratories were applicable. The community and farm level included sheep and goat owning communities in two provinces and Islamabad capital territory.

8 The project did not have a mid-term review to assess management and the process of implementation. The final evaluation reflects on some aspects of management and implementation but focuses on the project’s outcome level results. Questions posed include:

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1 Pakistan is administratively divided into four provinces; Sindh, Punjab, Kyber-Pakhtunkhwa (KP), Balochistan, and three Regions; Azad, Jammu and Kashmir (AJK), Gilgit-Baltistan (GB) and the Federally Administered Tribal Areas (FATA). For convenience throughout the report the term Province will mean both Province and Region. In addition, this project worked in Islamabad Capital Territory which, for simplicity in this report, is included as one of the eight main administrative regions or Provinces included in the project.
1) To what extent were the project design, approach and implementation arrangements (including partnerships) relevant and efficient?

2) To what extent did the project strengthen provincial and national laboratories’ capacity for diagnosing of PPR?

3) To what extent has the project strengthened national capacity for PPR vaccine production?

4) To what extent has the project strengthened provincial veterinary services’ capacity for surveillance, epidemiology and rapid response to PPR outbreaks?

5) How effective were the vaccination campaigns demonstrated in different production systems?

6) To what extent did the project respond to women needs?

1.3 Methodology of the evaluation

The evaluation follows standards described for evaluation in the UN system. It also assesses principles articulated for UN Common Programming which draw attention to gender equality, environmental sustainability, capacity development and results-based management.

The evaluation team was composed by an evaluation officer from the FAO Office of Evaluation and a senior veterinarian and animal health expert with over 25 years of experience in the design, implementation and assessment of transboundary animal diseases projects. Both members had extensive experience in the country. Field visits were conducted between 6 and 29 March 2017.

The evaluation team collected data and information through the following sources: i) documents issued by the project or sourced from the Internet and listed in Appendix 1; ii) project staff, interviewed formally or invited to present a synopsis of activities and views; and iii) institutions, stakeholders and beneficiaries throughout the country visited on-site and interviewed. Stakeholders were interviewed as single persons or in focus groups, allowing for discussion on topics raised by the evaluation team. Stakeholders interviewed included samples of farmers, of veterinary officers and veterinary assistants working with these farmers, staff at the laboratories supported by the project and several directors of institutions involved or responsible for the control of PPR. The evaluation team also visited laboratories and farmers who were not supported by the project in order to provide a counterfactual. A full list of interviews is provided in Appendix 2.

Much of the data referred to in this report were taken from the project data presented to the evaluation team in early March. Despite there being some gaps and the lack of the final project report at the time of the evaluation, there was sufficient material for this evaluation to be assessed. During the evaluation mission a first draft of a socio-economic impact assessment was produced by a service provider contracted by the project. The preliminary findings of this assessment were drawn upon by the evaluation team.

The project activities covered all provinces and the evaluation team also aimed at such coverage; however this was not possible mostly due to security reasons as explained in section 1.4 on limitations below. As shown in Table 1, all project components were active in all the provinces, and the evaluation team managed to cover most of these through direct field visits and interviews. Activities related to Outputs 1 and 2 were centred in the provincial capitals or other cities and more accessible for the evaluation team, while vaccination activities (Output 3) were spread out across the rural areas and the evaluation team had to rely on secondary data from the project and interviews with key informants in order to gain information.

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2 Sub-questions are aligned to the FAO Gender Policy (2013), available at http://www.fao.org/docrep/017/i3205e/i3205e.pdf

3 These are further described in http://www.uneval.org/document/detail/22, accessed October 2015.

Table 1. Evaluation team coverage of project activities through field visits

<table>
<thead>
<tr>
<th>Province</th>
<th>Project coverage</th>
<th>ET visit Project coverage</th>
<th>Output 1: diagnostic and vaccine production capacities</th>
<th>ET visit</th>
<th>Output 2: surveillance</th>
<th>ET visit</th>
<th>Output 3: vaccination</th>
<th>ET visit</th>
</tr>
</thead>
<tbody>
<tr>
<td>AJK</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Balochistan</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>FATA</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>GB</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Islamabad</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>KP</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Punjab</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Sindh</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

The vaccination campaigns carried out by the project, under Output 3 constitute the bulk of the field activities. Due to time and security constraints the evaluation team was only able to visit two of the eight provinces to have direct contact with farmers, veterinarians and government workers of those areas. The two areas visited were the Tharparkar District in Sindh, where three tehsils were visited, and the Sohan area in the Islamabad Capital Territory. Table 2 shows the number of farmers covered by the project in each province and those covered by the evaluation team’s field visits.

Table 2: Vaccination campaign (Output 3): project coverage and evaluation field visits coverage

<table>
<thead>
<tr>
<th>Province</th>
<th>District</th>
<th>Number of animals vaccinated</th>
<th>Number of farmers receiving project vaccination</th>
<th>Number of farmers covered by evaluation team focus groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>AJK</td>
<td>Kotli</td>
<td>152 994</td>
<td>28 083</td>
<td>0</td>
</tr>
<tr>
<td>Balochistan</td>
<td>Musa Khel</td>
<td>286 710</td>
<td>1 204</td>
<td>0</td>
</tr>
<tr>
<td>FATA</td>
<td>Khyber Agency</td>
<td>304 464</td>
<td>12 097</td>
<td>0</td>
</tr>
<tr>
<td>GB</td>
<td>Gilgit</td>
<td>147 619</td>
<td>8 245</td>
<td>0</td>
</tr>
<tr>
<td>Islamabad</td>
<td>Islamabad</td>
<td>31 318</td>
<td>2 878</td>
<td>4</td>
</tr>
<tr>
<td>KP</td>
<td>Mansehra</td>
<td>323 652</td>
<td>15 797</td>
<td>0</td>
</tr>
<tr>
<td>Punjab</td>
<td>Dera Ghazi Khan</td>
<td>306 449</td>
<td>9 536</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Sahiwal*</td>
<td>0</td>
<td>0</td>
<td>21*</td>
</tr>
<tr>
<td></td>
<td>Jhelum*</td>
<td>0</td>
<td>0</td>
<td>10*</td>
</tr>
<tr>
<td>Sindh</td>
<td>Tharparkar</td>
<td>416 322</td>
<td>11 185</td>
<td>99</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1 969 528</td>
<td>89 025</td>
<td>134</td>
</tr>
</tbody>
</table>

* Farmers not covered by project preventive vaccination

Furthermore, a detailed summary of the field visits and discussion groups with veterinary staff and farmers is shown in Table 3. A full list of meetings and field visits performed by the evaluation team is available in Appendix 2. The selection of villages in Sindh Province was made randomly by the evaluation team. The villages visited were largely those involved in the project demonstration of vaccination but also included some that had originally refused to participate in the project’s preventive vaccination. Farmers attending village meetings with the evaluation team mainly included those who had agreed to vaccination but also, in most villages, a small number who had declined or had missed the opportunity.
Table 3: Sites for meetings with beneficiaries of project vaccination (project Output 3)

| Evaluation team meetings with veterinary officers and veterinary assistants |
|-----------------------------|------------------|------------------|
| **Province** | **Location** | **Attendees** |
| Sindh | Mithi, Tharparkar | 22 |
| Sindh | Islamakot, Tharparkar | 12 |
| Sindh | Diplo, Tharparkar | 5 |
| Islamabad | Sohan Veterinary Hospital | 9 |
| Islamabad | PARC Mobile Hospital | 2 |

| Evaluation team meetings with farmer groups |
|-----------------------------|------------------|------------------|
| **Province** | **Village** | **Attendees** |
| Sindh | Jan Mohammed Noon | 16 |
| Sindh | Mithrio Soomro | 33 |
| Sindh | Khari Pasayo | 18 |
| Sindh | Pahtor* | 14 |
| Sindh | Jam Khan Lund | 18 |
| Islamabad | Sohan Veterinary Hospital | 4 |
| Punjab | Dadra Balla, Sahiwal* | 15 |
| Punjab | Noor shah, Sahiwal* | 6 |
| Punjab | Jhelum, Jhelum* | 10 |

* location was not covered by the project preventive vaccination

1.4 Limitations

Due to the timing of the mission, the evaluation team was unable to observe a Project Steering Committee meeting, a Technical Working Group Meeting or a transboundary animal diseases officers meeting, all of which were established to ensure smooth implementation of the project. The evaluation team also did not see ongoing diagnostic testing in the laboratory, disease investigation or vaccination in the field, nor did it have the opportunity to observe awareness training for farmers and veterinarians, again due to the timing of the mission.

The main limitation was posed by security constraints which did not allow the evaluation team to perform scheduled visits to the project sites at Dera Ghazi Khan in Punjab, Mansehra in Khyber Pakhtunkhwa (KP), and Kotli in Azad Jammu and Kashmir (AJK). This reduced the evaluation team’s ability to gather first-hand information on the success of the project’s demonstration vaccination exercises in these important provinces. To compensate, some visits were made to farms and villages where outbreaks had been controlled in Sahiwal and Jhelum Districts in Punjab Province, and impromptu discussions held with herd owners in Peshawar in KP.

1.5 Structure of the report

This report is organized in five chapters. Chapter 1 provides the background, scope and purpose of the evaluation and also describes the methodology. Chapter 2 provides the context and description of the project. Chapter 3 presents the key findings. Chapter 4 provides the main conclusions and recommendations. Chapter 5 looks at lessons learned.
2. Context of the project

19 Peste des Petits Ruminants is endemic in nearly 70 countries in Africa, the Middle East and Asia, where 80 percent of the world’s goats and sheep live owned by as many as 330 million of the world’s poorest people. In recent years, including 2017, PPR continues to infect new countries confirming its status as a major transboundary animal disease. It is estimated that its economic cost is USD 1.5 to 2 billion each year. It threatens food security and the livelihoods of many millions of smallholder households.

20 The disease was confirmed in Pakistan in the mid-1990s. The independent socio-economic impact study carried out by the project reports that 535 of 803 small farmers interviewed considered that sheep and goats provided their main source of income. Information gathered by the evaluation team indicated that the value of an adult sheep or goat is often USD 100 to 150 with exceptional animals reaching USD 500 or even more at times of great demand, while young stock are less valuable. Since herd sizes are often small, perhaps 7 or 8 per household, there is a strong impact on poor households from the loss of just one animal.

21 PPR virus spreads in infected aerosols from clinically affected to nearby susceptible animals. This relatively close-range transmission or contagion is assisted by the mixing of animals on communal pasture and through markets. Recovered animals are solidly immune and do not re-excrete virus. There are no wildlife reservoirs and no transmission by biting arthropods. The virus is fragile and does not persist outside the body for more than a few hours, very few days at the most, and it is not believed to spread in water nor by the wind. Animal movement, including trade, is the main factor in spreading the disease. It is considered to be highly suitable for eradication.5

22 The global distribution of PPR virus is in northern, central and eastern Africa, the Middle East and South Asia, with recent incursions to China and Mongolia. This reflects the areas where the virus (may have) originated followed by local spread, areas where spread has been facilitated by modern transport and national capacities to fund and implement control.

23 Four genetically distinct main groups or “lineages” of PPR virus occur. All four of these are found in Africa but only lineage four, long associated with the continent, is found in Asia including Pakistan. Despite the different genotypes, the virus has only one serotype. All vaccines, including the Nig 75/1 strain currently used in Pakistan immunize against all PPR viruses. This greatly simplifies control and eradication.

24 Unlike other diseases such as rinderpest (now eradicated) and foot and mouth disease with which known ‘hotspots’ of persistent infection could be targeted for control and eradication, the overall distribution of PPR virus in Pakistan is less clear. In principle, the virus is endemic throughout the country geographically and in all small ruminant farming systems. The threat of PPR virus moving from Pakistan to other neighbouring and trade-related countries is a concern especially through local livestock movements in the North and West of the country. For instance in Afghanistan, with whom Pakistan shares a 2 400 km border, both FMD and PPR are considered endemic and there is limited capacity for surveillance and diagnosis. Migratory and transhumant movements along this border are extremely frequent and occur with little control. Along Pakistan’s eastern border with India there is virtually no small ruminant movement, and the country is considered to be between step 1 and 2 of the PPR progressive control pathway. FAO has and continues to support south Asia’s regional-level cooperation for control of TADs, for instance through its capacity development for the South Asia Association for Regional Cooperation (GCP/RAS/294/ASB).

25 PPR control requires both a strong national commitment to disease control and full engagement in a regional approach. A Global Strategy for the Control and Eradication of PPR was launched in Abidjan in April 2015 introducing the progressive control pathway

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Before the project, major challenges to implement the PPR progressive control pathway in Pakistan included: i) insufficient quality of assured PPR vaccine; ii) suboptimal laboratory diagnostic capacity for PPR; iii) poor farmer awareness of the disease and of disease control measures; and iv) lack of field veterinary personnel motivation to respond to outbreaks. The country also needed an officially-adopted, coherent national PPR control strategy.

Thus, the context of the project was global, regional and national: there is a global programme to eradicate PPR from the world; there is regional cooperation because of the transboundary nature of PPR; and there is a need to reduce losses affecting farmers’ livelihoods and food security in Pakistan; and public veterinary services require support.

A second South Asia Roadmap meeting for PPR was held for seven countries, in Kathmandu in December 2013. At this meeting, which coincided with the preparation of this project, Pakistan reported many gaps and challenges in the control of PPR. These conveniently provided an additional set of benchmarks for evaluating the project and are covered later in the report.

In trilateral (Afghanistan-Pakistan-USA) meetings held in Doha and Islamabad in January and February 2010, FMD control was agreed as a priority. In mid-2010 a United States Department of Agriculture mission visited Pakistan and developed a concept note with the Federal Livestock and Dairy Development Department for project work on FMD and identifying FAO as the implementing agency. The ensuing success of FAO project GCP/PAK/123/USA on FMD encouraged the United States Department of Agriculture to fund a similar project on PPR using a similar implementation strategy and mechanisms, namely GCP/PAK/127/USA, the subject of this evaluation report.

Controlling PPR to the point of eradication in Pakistan is a far more daunting test of veterinary services than the eradication of rinderpest. The size of Pakistan’s population of small ruminants is enormous, nearly 100 million head. This is only slightly less than the sheep and goat population of the entire European Economic Community. Furthermore, many of the country’s small ruminants are not easily accessible. In fact there are often inaccessible areas in the hill and desert provinces and regions of Balochistan, Khyber Pakhtunkhwa (KP), Azad Jammu and Kashmir (AJK), Gilgit-Baltistan (GB), and the Federally Administered Tribal Areas where transhumance and nomadism are most common. These areas are also comparatively insecure making travel and communication more difficult and disease surveillance and control even more of a challenge.

2.1 Project description

The project was funded by the United States of America and implemented between March 2013 and March 2017, with an overall budget of USD 1 655 000. The expected outcome of the project was to contain the current spread of PPR in Pakistan and mitigate its impacts to safeguard small ruminant-based livelihoods. In this regard, project activities aimed at demonstrating and developing an approach for the progressive control of PPR in Pakistan. It was anticipated that the Project would build the capacity of animal health institutions at all levels and around 600 of their veterinarian staff. It was further anticipated that more than 50 000 farm families from the project’s target areas would significantly reduce their household food and nutrition insecurity and increase their income generating capacity through increased livestock productivity (i.e. sheep and goat meat, milk, wool, hair, skins, etc.). The project has three main outputs. These outputs and the various activities needed to achieve them are:

Output 1. Enhanced capacity for laboratory diagnosis and vaccine production for mitigating against PPR at the provincial/regional level in Pakistan. Activities under this output include: a) strengthen one veterinary laboratory from each of the six administrative units of the country (i.e. province or region) for the diagnosis of the PPR; b)

6 FAOSTAT, 2016
evaluate reliable on-spot diagnostic aid or animal-side tests under field conditions, where available; c) strengthen the country’s veterinary laboratory network in order to enhance communication between the national and provincial/regional laboratories; d) train at least two veterinarians from each of the six selected provincial/regional laboratories in Enzyme-Linked Immunosorbent Assay (ELISA) and other diagnostic techniques at a national facility; e) upgrade facilities for molecular diagnosis, Reverse transcription Polymerase Chain Reaction (RT-PCR) and virus isolation at the National Veterinary Laboratory in Islamabad; f) strengthen PPR vaccine manufacturing at the Veterinary Research Institute in Lahore; g) provide minor equipment and consumables to National Veterinary Laboratory to evaluate PPR vaccine; and h) train four to six laboratory managers and technicians in PPR vaccines evaluation.

### Output 2. Improved disease surveillance for PPR Outbreaks.
Activities include: a) assist provincial/regional livestock departments to raise awareness amongst selected groups of sheep and goat herders; b) train 525 district-level government and private sector veterinarians, para-veterinarians/veterinary assistants in clinical disease, transmission, epidemiology, diagnosis, differential diagnosis, treatment and control of PPR, including the collection, dispatch and transportation of samples from sick and dead animals for PPR diagnosis; c) diagnose and report any PPR outbreaks, including the collection of samples and their submission to the nearest diagnostic laboratories; and d) undertake epidemiological investigation of selected PPR outbreaks.

### Output 3. Effective control of PPR through vaccination campaigns demonstrated in different production systems of sheep and goat husbandry.
Activities include: a) select one district/territory from each province/region in Pakistan for PPR control; b) provide veterinarians and para-veterinarians of the respective livestock offices/units and private sector veterinarians from the selected districts/territory with the necessary equipment and vaccines for PPR vaccination; c) undertake increased follow-up surveillance for PPR in the vaccinated areas; and d) determine the socio-economic benefits of PPR vaccination towards the end of the Project.

### 2.2 Project area

The project was implemented in all seven provinces/regions of Pakistan. Diagnostic capacity in laboratories (Output 1) was strengthened in eight laboratories. One laboratory for each of the seven provinces, with the exception of none in the Federally Administered Tribal Areas due to the ongoing military operation, and two in each of the two larger provinces of Punjab and Sindh. Vaccine production capacity (Output 1) was strengthened in the main national production centre in Lahore, Punjab. Surveillance capacity (Output 2) was strengthened in all provinces by training and supporting staff of the provincial district staff of the livestock department. Preventive vaccination was carried out in one district of each of the provinces, and the selection was based on the presence of a large population of small ruminants (around 300,000), the physical and security accessibility and availability of government staff to carry out the vaccination.

### 2.3 Target beneficiaries

The intended beneficiaries were around 50,000 poor smallholder sheep and goat farmers/herders of Pakistan who would be provided with improved PPR control and healthier and more productive livestock. In addition, the project targeted around 600 animal health and production professionals of Pakistan and aimed at enhancing their knowledge and capacity for participation in the control of PPR and other TADs. Also, the project aimed at improving the capacities of: i) managerial and technical staff of government PPR diagnostic laboratories; ii) professionals in the field of animal disease testing and control; iii) national and provincial/regional policy makers for the control of PPR and other TADs; iv) administrators of national surveillance authorities; and v) technical personnel of livestock support service providers (i.e. DoLDD veterinary services, community-based animal health services and para-veterinarians, processors, wholesalers, importers, exporters, etc.).
2.4 Implementation arrangements

The project was implemented on behalf of the Government of Pakistan and its Ministry of National Food Security and Research and Provincial DoLDDs by FAO. The FAO Representative to Pakistan was the project budget holder, responsible for general administration and financial supervision of the project. Specialized technical divisions of the FAO Regional Office for Asia and the Pacific and headquarters would be mobilized to provide needed technical backstopping to project activities. The Project Management Unit was hosted in the FAO office and built upon an existing Project Management Unit for a previous project (GCP/PAK/123/USA Support to Increased Sustainable Livestock Production).

The AHC (Animal Health Commissioner) of the Ministry of National Food Security and Research was the main national counterpart, while provincial DoLDDs were the main operational partners for project execution. A Project Steering Committee was established to provide overall guidance, coordination and facilitation to project implementation and consisted of representatives of the AHC, the seven provincial DoLDDs, FAO Representation in Pakistan and the United States Department of Agriculture Country Office. The project also formed an advisory technical group (for PPR control) similar to that established for FMD control by the Support to Increased Sustainable Livestock Production Project. The group addressed specific technical and research issues which arose and was composed of the Animal Husbandry Commissioner of the Ministry of National Food Security and Research, United States Department of Agriculture Country Adviser (on Animal Health), FAO National Director, FAO disease management officer (Lead Technical Unit), the Director Generals of the seven provincial/regional DoLDDs and representatives of the Pakistan Agricultural Research Council and National Veterinary Laboratory.
3. Evaluation findings

3.1 Analysis of project concept and design

Evaluation question 1 (part 1). To what extent were the project design, approach and implementation arrangements (including partnerships) relevant and efficient?

Finding 1. The project concept and design were clear and appropriate for Pakistan’s needs, and were well linked to the Country Programme Framework and the FAO Strategic Objectives. The project’s goal was to provide the federal and provincial veterinary services of a Pakistan with the basic technical platform to begin the progressive control pathway for Peste des Petits Ruminants. The design was to install this platform through a close collaboration between FAO and the federal and provincial authorities that would introduce and provide training in a set of simple, interdependent and essential activities. These were: disease surveillance; laboratory diagnosis; improved vaccine production in Pakistan; and demonstrations of the effectiveness of correctly administered quality vaccine in the field. Without these inputs Pakistan could not proceed on the progressive control pathway for PPR. The project has made them available and Pakistan can proceed on the PCP.

The project was aligned to the Country Programme Framework 2012-17, and contributed to Country Programme Framework area 3 area: Disaster Risk Reduction and Emergency Response. Together with another transboundary animal disease project focusing on foot and mouth disease (GCP/PAK/123/USA), it comprises the bulk of FAO’s activities in Pakistan in the field of TAD control. In addition, the project had strong links to most of the other livestock-related projects, most of which focused on emergency response. The project team was responsible for all these activities, thereby facilitating coordination across projects. In relation to the FAO results framework, the project contributed to FAO’s Strategic Objectives 5 (increasing resilience) and 2 (sustainable production), which reflects the fact that TAD control prevents the spread of disease and its potentially devastating effects, while also increasing production and productivity of the livestock sector.

The project has provided technical, organizational and material support that has the potential to move PPR control forward along the well-defined PCP. This progressive control pathway for PPR, which is both a pathway and a yardstick of progress, has a horizon many years beyond the life of the project. Under the auspices of the South Asia Association for Regional Cooperation a workshop in Nepal in 2011 developed a regional roadmap for the PPR progressive control pathway in South Asia. Pakistan was a member of the four countries at this first meeting which was facilitated by FAO and the World Organisation for Animal Health (OIE) through the Joint FAO-OIE Global Framework for the Progressive Control of Transboundary Animal Diseases (GF-TADs) with support from the European Union.

At the start of the project parts of Pakistan could be considered to have reached stage 1, the assessment phase of the PCP for controlling PPR, and the project’s main aim was to prepare the country for moving to stage 2, the main control phase. The project had built on experience gained in a preceding project on the control of transboundary animal diseases that had started to assess the impact and distribution of PPR in Pakistan.

The project’s expected outcome was to “contain the current spread of PPR in Pakistan and mitigate its impacts to safeguard small ruminant-based livelihoods”. Fewer animals would be affected, economic losses would be reduced and the threat to food security reduced for many rural households dependent on sheep and goats throughout the country.

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8 “Workshop to Develop Regional Roadmap for Progressive Control of peste des petits ruminants in South Asian Countries: 9-11 December 2011 http://www.rsu-saarc.org/activities-and-reports
To achieve this outcome, the project structured its activities towards three intermediate outputs: (1) enhanced capacity for laboratory diagnosis and vaccine production for mitigating against PPR at the provincial level in Pakistan; (2) improved disease surveillance for PPR outbreaks; and (3) effective control of PPR through vaccination campaigns demonstrated in different production systems of sheep and goat husbandry in different parts of the country. The three outputs closely follow those successfully achieved in the “twin” FMD project GC/P/PAK/123/USA. Taken together these outputs should contribute to reducing the amount of PPR virus circulating in Pakistan and form the basis for future progressive control of PPR in the country. The FMD project was evaluated by the FAO Office of Evaluation in 2016, and it provided useful lessons in terms of approach and implementation modality, especially regarding disease surveillance and diagnosis, which were beneficial for the PPR project.

The project’s intended ultimate beneficiary groups were small-scale farmers with sheep and goat herds throughout the country. These fall into two main categories. One was farmers in and around outbreak sites where the project delivered emergency control. During the three years the project investigated and responded to 3166 reported outbreaks of PPR. The other category was strategically selected administrative areas in all provinces for the demonstration of the positive impact of PPR vaccination. Criteria for these areas were that they should be a manageably sized administrative area such as a tehsil (an official government administrative unit in Pakistan), district or valley with easy access and good security, sufficient livestock department infrastructure, a sheep and goat population of around 300,000, and a reported high prevalence of PPR. Eight demonstration sites were chosen by the Livestock and Dairy Development Departments in each province. The number of villages covered in seven of the eight demonstration sites (the evaluation team did not receive data on Gilgit-Baltistan) was 3034 with 74434 farmers and almost 1.7 million small ruminants vaccinated. In addition, vaccination was carried out in 36 transhumant herds in Balakot in Khyber Pakhtunkhwa (KP). The project also provided imported quality vaccine to FAO emergency projects and to other donor-funded projects.

Intermediate actors included public sector veterinary officers (fully qualified veterinarians) and veterinary assistants, some private veterinarians and private veterinary assistants. In the eight provinces (including Islamabad) 98 workshops provided training on PPR clinical recognition and diagnosis and surveillance on PPR to 1156 veterinary officials and 1308 veterinary assistants.

A third group of project-engaged (but not employed) stakeholders included selected public institutes of veterinary services in eight provinces, including personnel of seven main and one smaller laboratories at federal and provincial levels. Trans-boundary animal diseases officers provided an important link between the project and the government services. Their position had been introduced by the FMD project GC/P/PAK/123/USA and proven to be of key importance for effective communication between services. TAD Officers are technical staff of the provincial Livestock and Dairy Development Departments, and are qualified veterinarians who are appointed by the departments’ Director General to liaise with the FAO project staff; they have the role of overseeing disease surveillance activities of all veterinarians and stock assistants who diagnose the disease in the field, collect samples and perform vaccination.

The final group of stakeholders included FAO at headquarters, regional and national offices, and the main donor, the United States Department of Agriculture. Through FAO the project has accessed extra resources and used networks in the region. In turn, the project has contributed to FAO’s regional and global goals for the progressive control of PPR.

The project itself consisted of a core of four main technical and management staff and a small team of administrative staff and drivers. This team was extremely well led and has delivered the project in a timely and effective manner. The office and all staff were based near the National Veterinary Laboratory and the Animal Husbandry Commissioner (Chief Veterinary Officer) facilitating good interaction at the federal level of veterinary services.

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10 Available at: http://www.fao.org/3/a-bq883e.pdf
11 Strictly, a group of sheep is a flock and of goats is a herd. For simplicity, the term herd is used for sheep and goats throughout this report.
50 The project established and maintained three formal platforms for planning, management and communication.

- a Project Steering Committee to review progress, approve proposed plans and budget changes and, through its members, interact with stakeholders at federal, provincial and donor levels;
- a Technical Working Group to discuss and advise on technical and research questions;
- a meeting of TAD Officers and project staff to facilitate liaison with provincial veterinary services on all project activities.

51 These groups met regularly and, as minutes show,12 guided the project effectively.

3.2 Analysis of project implementation

Evaluation question 1 (part 2). To what extent were the project design, approach and implementation arrangements (including partnerships) relevant and efficient?

3.2.1 Project management

52 Operational management of the project has been of a high standard. Most activities were implemented on time, as planned. The only major delay was the anticipated production of quality PPR vaccine in Pakistan. This was caused by problems in commissioning the freeze-dryer purchased by the project for dedicated PPR vaccine production at the Veterinary Research Institute, Lahore. The equipment appeared to have been damaged during shipment and resolving this issue took over a year of deliberation and work between FAO and the manufacturer. Fortunately, the matter has been resolved and test batches of vaccine are to be sent for independent quality control. The concluding no-cost extension of the project effectively covers the final commissioning of this equipment and testing of its product.

53 The project kept a good record of its activities and outputs, allowing it to monitor itself and make strategic decisions. It has been strong in communicating condensed results in the form of minutes, planning and progress reports, presentations and quarterly bulletins. It has convened four meetings each of the Project Steering Committee and Technical Working Group and seven quarterly meetings of TAD Officers and project staff.

54 The project responded quickly and effectively to problems as they arose. For instance, following up rapidly where PPR vaccination was shown not to be working well. In Tharparkar District, Sindh, senior project staff provided additional oversight and renewed training in the correct preparation and delivery of vaccine leading to much better subsequent results. This ability to react and solve issues contributed strongly to the project’s success.

55 Networking by the project team has been satisfactory. Exchanges have taken place on a regular basis with professional partners both inside Pakistan (see next section) as well as abroad. The project team’s background and motivation enabled them to draw on surrounding institutions for solutions and to delegate and support implementation of project activities to public servants.

56 The project team members were very experienced, energetic and well informed about new developments with PPR diagnosis and control. However, the evaluation team wondered whether the lack of younger staff gaining experience in the project especially at national level was an opportunity being missed for the future of TADs control in Pakistan.

12 Detailed minutes were not reviewed by the evaluation team but outcomes of most meetings were included in project quarterly newsletters.
3.2.2 Institutional arrangements including Government participation

57 The institutional arrangement of the project was well planned and provided the project team with full engagement of the federal and provincial veterinary institutes and services. The importance of this must not be overlooked: in 2011, shortly before the start of the project, the federal Ministry of Livestock and Dairy Development was dissolved when its mandate was fully transferred to provincial levels, and new roles were still being defined at federal level. Some projects utilizing this close federal and provincial linkage might have foundered or been slowed by these institutional changes but the project, through experience and design, coped well.

58 The commitment of the federal and provincial governments to engage in the project activities was good. The planning and monitoring meetings (Steering Committee, Technical Working Group and TAD Officers meeting) were all well attended. TAD Officers were fully involved in determining the course of implementing activities, even though most of these had been planned in advance. The commitment was further boosted by allowing provincial governments to select PPR vaccination demonstration sites based on criteria provided by the project, rather than to dictate these.

59 Technical and operational support by FAO to the project has been effective, even though FAO was undergoing a devolvement exercise itself. Operational and financial decisions have been taken in smooth cooperation with the FAO Representation in Pakistan and have been well documented. The project has engaged itself outside its planned boundaries as a member of the United Nations family by providing vaccination and mitigating services to victims of the flood disaster in 2014. The Lead Technical Officer, now operating from the regional FAO Office in Bangkok, provided timely feedback on technical content as offered through quarterly progress reports. At FAO headquarters the Lead Technical Unit provided strong strategic guidance at the planning stage and subsequently through the South Asia Roadmap for PPR, and during implementation.

3.3 Analysis of project’s contribution to results

60 This section starts with an assessment of the project’s three intermediate Outcomes, as well as evaluation questions 2, 3 and 4: the enhanced capacity for laboratory diagnosis and vaccine production for mitigating against PPR at the provincial level in Pakistan; improved disease surveillance for PPR outbreaks; and effective control of PPR through vaccination systems demonstrated in different production systems of sheep and goat husbandry. It then addresses the extent to which the project responded to women’s needs and assesses the project’s overall result and impact.

3.3.1 Intermediate Outcome 1(a) – Diagnostic capacity.

Evaluation question 2. To what extent did the project strengthen provincial and national laboratories’ capacity for diagnosing of PPR?

61 Finding 2. The project substantially strengthened Pakistan’s federal and provincial government diagnostic capacity to diagnose PPR. Routine diagnostic testing is installed in two federal laboratories and in one laboratory in each of the four provinces. The strengthened laboratories confirmed PPR in 2339 sets of samples submitted from 3166 outbreaks. In addition, advanced diagnostic laboratory techniques have been installed at the National Veterinary Laboratory in Islamabad improving Pakistan’s ability to carry out more detailed studies without having to export samples to global reference laboratories.
All this laboratory capacity has been supported with training and continuous technical backstopping from the project. Pakistan now has the diagnostic capacity to continue on the progressive control pathway for PPR. The challenge for Pakistan will be to maintain the high level of diagnostic capacity for the next one to two decades and beyond.

The evaluation team visited four provincial and two federal laboratories that had been supported by the project. Laboratory diagnosis of PPR in provincial and national reference laboratories has clearly improved: the capacity of the participating laboratories has expanded to deal with hundreds of specimens for diagnostic confirmation (antigen detection in immunocapture enzyme-linked immunosorbent assay) and thousands of serum samples (antibody testing in competition enzyme-linked immunosorbent assay). As planned in the project, two staff members from each laboratory were trained and attended annual refresher trainings in 2015 and 2016 at the National Veterinary Laboratory.

The project provided eight provincial laboratories with enzyme-linked immunosorbent assay kits and other minor equipment and consumables to confirm the antigen of PPR virus in diagnostic samples and to detect antibodies in serum samples. This exceeded the planned number. By the end of January 2017, these laboratories had tested samples16 for PPR virus antigen detection from more than 3,000 reported outbreaks, with 2,339 outbreaks being positive. The project kept a watching brief over laboratory performance, organized appropriate training and annual refresher courses and provided technical backstopping to solve local difficulties as they arose.

More advanced diagnostic techniques including conventional and real-time polymerase chain reaction testing for PPR virus nucleic acid and cell-culture techniques for the isolation of live virus have been standardized and strengthened at the two federal laboratories in Islamabad: the National Veterinary Laboratory and the Animal Health Research Programme. These highly sensitive but technically demanding assays are used to confirm the disease where immunocapture enzyme-linked immunosorbent assay may have failed (though this is also a sensitive test). Twenty isolates of PPR virus are waiting to be fully gene sequenced through collaboration with an FAO and the World Organisation for Animal Health reference laboratory for PPR outside Pakistan. This process of virus isolation and characterization should continue and be widened to include viruses that are isolated from different locations and different clinical syndromes, especially mild disease (if found). It might be interesting to collect a longitudinal series of isolates over time (possibly years) from one or more locations where PPR is either endemic or frequently introduced.

The project has introduced a laboratory information management system to link the provincial and federal laboratories in order to accelerate the flow of diagnostic information to the project and the federal authorities for epidemiological analysis. This system was originally started for FMD by GCP/PAK/123/USA but still needs some fine tuning to adapt it for PPR and other diseases.

The other weakness currently facing the laboratory information management system is the lack of a central epidemiology unit to process the information coming from it and from other sources. The absence of such a unit is increasingly critical for the future control of both PPR and FMD in Pakistan.

"Pen-side" diagnostic tests are laboratory tests designed to be used beside the affected animal(s) in the field. They avoid the extra work and time involved in collecting and dispatching specimens to distant laboratories and delays in reporting results back. The project purchased a significant number of a recently developed pen-side test for Peste des Petits Ruminants Virus and used it successfully in field trials through twenty provincial and district laboratories. The work was reported in an international scientific journal.17

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16 Several samples should be submitted from each outbreak.
3.3.2 Intermediate Outcome 1(b) – Strengthen PPR vaccine production

Evaluation question 3. To what extent has the project strengthened national capacity for PPR vaccine production?

Finding 3. PPR vaccine production at the main manufacturing laboratory, Veterinary Research Institute, Lahore, appears to have been significantly increased and improved, despite some delays. The project directly supported the Veterinary Research Institute to establish the production of around 500,000 vaccine doses per month. Quality assurance capacity has been strengthened at the National Veterinary Laboratory, Islamabad, where quality control systems have been established.

PPR vaccine is produced in two laboratories in Pakistan: the Veterinary Research Institute, Lahore and the Centre for Advanced Studies in Vaccinology and Biotechnology, Quetta. These vaccines have never been produced in sufficient quantity to support a national programme against PPR. However, they were and still are used in Pakistan usually at a local provincial level or through commercial outlets, and not in a systematic or regular manner. Early during the project, representative samples from both laboratories failed quality control tests at a World Organisation for Animal Health recognized quality control laboratory for PPR vaccine. An international consultancy by a PPR vaccine specialist in 2014 provided training and technical advice on how to raise vaccine production standards at both laboratories. This included a specific training course for 14 people from federal, provincial and private laboratories. Remedial vaccine production issues have been addressed at the Veterinary Research Institute, Lahore, where the PPR vaccine unit is undergoing major rebuilding and refurbishment. The evaluation team was not informed that comparable action has been taken at the Centre for Advanced Studies in Vaccinology and Biotechnology in Quetta, which continues to produce PPR vaccine, without being subject to FAO-supported quality control.

One of the bottlenecks in all freeze-dried vaccine production is the physical capacity for freeze-drying. Freeze-drying capacity can be too low to match demand, especially when there are not enough machines available and one or more require repair or service. The project supplied the Veterinary Research Institute with a new freeze-dryer with a capacity for freeze-drying of 2,800 vials at each “run”. With 100th doses per vial this corresponds to 280,000 doses per run with conceivably two runs per week – some half a million doses weekly. In addition, the Veterinary Research Institute has another freeze-dryer with a capacity of 5,000 vials per month and another modern machine on order. As mentioned in section 33 the freeze-dryer supplied by the project had some mechanical faults on arrival but was reportedly working well by the time of the evaluation.

The project also strengthened Pakistan’s ability to assess and assure the quality of PPR vaccines. This was done by minor modification to the laboratory at the National Veterinary Laboratory, Islamabad, and provision of some equipment. An international consultant from the World Organisation for Animal Health recognized PPR vaccine quality control laboratory provided training at the National Veterinary Laboratory for staff from the Laboratory and AHRC, both production laboratories, and the Sindh Poultry Vaccine Centre in Karachi which has expressed an interest in producing PPR vaccine in the future. As the demand for quality assessment of nationally produced PPR vaccine grows it will be important to maintain appropriate staffing levels in this unit at the National Veterinary Laboratory.

The amount of vaccine needed to progressively control and eradicate PPR is difficult to estimate, and such an analysis would be part of the PPR national programme recommended by this evaluation. Based on an estimated national herd of sheep and goat of around 100 mil and a replacement rate of 30 percent, around 30 million animals are added to the national stock each year. The vast majority of these would need to be vaccinated at least in coming years, in order to increase immunity among the population. This provides some prospective as to the scale of the problem to be addressed.

18 Smaller vial sizes of 50 or even 25 doses might save vaccine in the field and prevent its possible misuse (keeping reconstituted vaccine beyond the recommended time of two hours for later use) but will reduce production capacity because of the limited freeze-drying capacity.
3.3.3 Intermediate Outcome 2 – Improved disease surveillance for PPR outbreaks

Evaluation question 4. To what extent has the project strengthened provincial veterinary services’ capacity for surveillance, epidemiology and rapid response to PPR outbreaks?

Finding 4. The project has substantially improved surveillance and reporting of PPR outbreaks by strengthening the provincial veterinary services throughout Pakistan. As a result, the number of reports of PPR cases has increased from 261 in the first year of the project to 1,124 in the second and 1,781 in the third year for a total of 3,166. While surveillance still needs to increase its coverage, these early results begin to disclose and uncover the extent of PPR presence in Pakistan. Also, the project has established a good model for operational partnership with provincial government staff to perform surveillance efficiently. The increasing amount of data being gathered are not being sufficiently analysed by national laboratories due to insufficient human and financial resources, and make the case for more epidemiology research.

The project provided 111 awareness training workshops for 4,618 herd owners, including four workshops only for women. The workshops introduced the participants to the basic clinical signs of the disease, sanitary precautions to take, who to report to for assistance, and the most suitable forms of control, especially emergency vaccination. More than 7,000 colour brochures in local languages were distributed reinforcing the messages given in the workshops.

The project held 98 intensive training courses for 2,462 veterinary field staff, especially those who are the first responders to an outbreak. This involved the clinical recognition of PPR (then widely unrecognized throughout the country), the necessity of a swift response to confirm clinical suspicion, clear standard operating procedures especially for the collection of samples for laboratory diagnosis and for handling and dispatching the samples to the diagnostic laboratory (see Box 1).

Box 1: Sample collection and response

Reporting more than 3,000 outbreaks of Peste des Petits Ruminants has been a logistics challenge which the project addressed through strict operating procedures, the use of public transport, quick communication using mobile phones and reimbursement of real costs.

The moment a field veterinarian determines PPR through differential diagnosis he takes and packs samples following clear procedures and sends these by public transport, often by bus, to the nearest laboratory. For packing he uses a cool bag and containers provided by the project. He phones ahead to inform the laboratory of the arrival time and identification of the bus carrying the well-packed sample.

While picking up the sample from the bus station, laboratory personnel sends back to the field veterinarian, in a similar fashion, a replacement cool bag containing vaccine and medication for treatment. The value of these is about USD 10.

Upon its receipt, the field veterinarian starts a ring vaccination (up to 200 animals) using project procured vaccine before the laboratory’s enzyme-linked immunosorbent assay (ELISA) test results confirm PPR. Subsequent vaccination to enlarge the ring is then usually done by the provincial authorities using vaccine they have sourced.

Only after the test results confirm PPR the field veterinarian receives about USD10 in Pakistan Rupees to cover the cost of sampling and transport. However, this reimbursement is made through the TAD officer, who keeps a record of the outbreak and of test results in parallel to the laboratory information system.

During the training courses 2,297 diagnostic sample collection kits were distributed. The provincial veterinary services participated well and the number of reported outbreaks increased rapidly in the three-year project from 261 in 2014, to 1,124 in 2015, to 1,781 in 2016. Of these reported outbreaks 206,804 and 1,329 respectively were confirmed positive in the provincial laboratories supported by the project. The geographical distribution of the districts reporting these positive cases throughout the project is shown in Figure 1.
Figure 1 clearly shows the disparity between the eastern half of the country and the North and West of Pakistan. The challenge now facing Pakistan is to raise disease surveillance and reporting to similar levels in these areas. Other forms of reporting results might also be considered - when epidemiological capacity allows. This includes mapping areas from which clinical reports of disease are received (i.e. both laboratory confirmed and unconfirmed), and instituting a process whereby all districts must report their monthly result (no clinical reports received or a known number of reports received and investigated etc.) The aim is to involve all administrative units in order to build a composite picture of where PPR is and where veterinary services are searching for it effectively – and, importantly, where they may not be functioning sufficiently effectively.

In addition to first responder staff the project trained another 525 government and private veterinarians, veterinary assistants and para-veterinarians at district level on the clinical signs, transmission and epidemiology of PPR, its diagnosis, and sample collection and dispatch. Training manuals in English and Urdu were prepared and distributed along with more than 2,500 wall posters on the recognition of PPR and reporting procedures.

The project actively promoted PPR control at national and provincial venues and occasions such the International Livestock Dairy and Poultry Show in Lahore in 2013, 2014, 2015 and 2016.

One factor that contributed to the significant increase in outbreak reports was an increase in farmer confidence about the effectiveness of the response by veterinarians. This was due to the immediate ring vaccination of outbreaks which usually had very quick positive effects. This in turn was due to the project’s very correct insistence on using only quality assured vaccine even when it had to be imported. Too often, nationally produced PPR vaccine has provided poor results. Farmers recognize this and those in or near outbreaks appreciated the alertness and the effect of the response of veterinarians; this reputation spread quickly by word of mouth.

Another important factor was that the project used its resources to pay for confirmed outbreaks of PPR and for vaccinations carried out. This ensured that no veterinary staff were ever “out of pocket” for disease investigations and vaccinations.
During its visit to Tharparkar, Sindh, the evaluation team was told that the efficacy of outbreak responses and project vaccine was appreciated in several villages that received emergency vaccination from the project before the start of the demonstration trial of preventive vaccination there. Similarly, when the evaluation team visited two villages in Jhelum District, Punjab where outbreaks of PPR had been reported. The local herd owners and veterinary staff appreciated how quickly the problem was brought under control after the rapid vaccination responses supported by the project. The policy for outbreaks control was to supply vaccine provided by the project to immunize what is deemed the epidemiological unit infected by the virus, some 100-200 stock with subsequent vaccination in the area carried out by provincial staff using locally sourced vaccine, usually from the Veterinary Research Institute, Lahore. The success of this latter vaccination phase is dependent on the availability of the local vaccine and its quality.

Unquestionably, awareness raising about the recognition and control of PPR has been successful. However, 4,618 herd owners and 2,462 veterinary staff must be measured against the backdrop of 75 million people directly involved in farming in Pakistan and thousands of veterinary staff who have yet to be trained or even made aware of PPR. The evaluation team heard of recent outbreaks of PPR being misdiagnosed as combinations of pneumonia and enteritis (admittedly two of the clinical signs of PPR) and, twice, even as an allergy. Veterinary undergraduates (mostly women) who the evaluation team met in Faisalabas and Lahore knew the clinical signs of PPR. Nevertheless, much more awareness raising is required.

The project made an excellent job of informing veterinary services and policy makers about the progress of the project in its quarterly bulletins.

Throughout the project, data on outbreaks and laboratory testing has been collected and stored through the laboratories and partly through TAD Officers. In addition, more and more information is becoming available about where vaccinations have been carried out by the project and by others. When national PPR vaccine supplies increase the use of PPR vaccine will also increase and even more data will need to be stored and analysed. To date, however, the project has been unable to initiate a thorough national epidemiological analysis of the PPR data. The same appears to be true for FMD control. An epidemiology ‘node’ at the office of the Chief Veterinary Officer had been planned but is not yet operational. Epidemiological input and analysis has been relatively weak during the project(s) but must increase substantially if Pakistan is to move further along the progressive control pathway for PPR (and for FMD).

3.3.4 Intermediate Outcome 3 – Effective control of PPR through vaccination

Evaluation question 5. How effective were the vaccination campaigns demonstrated in different production systems?

Finding 5. The project convincingly demonstrated the preventive effect of vaccination in six sites with almost 60,000 herd owners. It showed the importance of using quality assured and correctly administered vaccine and the importance of the cold chain for its storage, distribution and use. As a result, some herders are considering the possible purchase of PPR vaccine for their use. However, at one project site with almost 16,000 owners difficulties in reaching higher levels of herd immunity illustrated the challenge posed by some different husbandry systems – which demonstrates one of the major future challenges for PPR control in Pakistan.

There are four separate sources of information about the effectiveness of this outcome: farmer and veterinary staff feedback; laboratory measurement of antibodies; disease reports; and continuing support and uptake from provincial authorities.
As mentioned earlier, the evaluation team was unable to evaluate three of the five PPR vaccination demonstration sites scheduled to be visited. Consequently, the views of many herd owners and veterinary staff were not evaluated.

The criteria set by the project to guide the provinces in the selection of the vaccination demonstration sites were entirely appropriate for these pilot trials. They ensured that the necessary infrastructure and foundations were available to perform the work and that many poor or very poor small stock owners, who were already suffering from the negative impact of PPR, would benefit from the vaccination.

The main site visited by the evaluation team was in Tharparkar in Sindh, where information was provided by three meetings with veterinary staff and six meetings with herd owners. The vast majority of veterinary staff and herd owners were positive about the protective results of vaccination. The responses to a set of questions asked in five village meetings in Tharparkar are shown in Table 4. They show that overall participation was good in four villages. However, in all of these a small proportion of stockowners failed to take advantage of vaccination either being unaware or being concerned about side effects. In these villages, everyone was pleased with the way vaccination was carried out, the lack of side effects and the resulting protection of their animals. After vaccination, the incidence of PPR in the vaccinated animals in these villages decreased to virtually zero but cases continued to occur in some unvaccinated animals. One village, Pahtor, unwittingly carried out a very clear demonstration of the protective effects of vaccination. Most members of the village decided against vaccination and refused to participate. PPR virus then infected the village causing severe losses until emergency vaccination was carried out. They will be more receptive to vaccination in the future.

The independent socio-economic impact study of the project was able to reach nearly all project sites including those that the evaluation team could not visit. Its preliminary findings show a very positive economic impact from vaccination against PPR. Purely in terms of overall mortality in the herds (not related to any specific disease) their results show that vaccination produced a 61 percent reduction in mortality among goats and a 36 percent reduction of mortality in sheep. This mortality was not attributed to any specific cause, but the greater impact in goats, which are more susceptible to fatal infections from PPR than sheep, is strongly suggestive that this reduced mortality was due to the vaccination. Although herd sizes were small the impact of a 36-61 percent reduction in mortality was high at household level. The study also reported that average household income rose from USD 90 to USD 114 per goat after vaccination against PPR. There was also a very substantial reduction in the cost of treatment for affected animals, from USD 36.7 to USD 3.83 though this figure did not discriminate between goats and sheep. The survey also reported that 89 percent of respondents were fully (70 percent) or moderately (19 percent) satisfied with the results of vaccination. Farmers and stock owners worldwide are often notoriously hesitant about showing too much appreciation of new ideas and procedures so an 89 percent approval rating for PPR vaccination indicates a very well done job.

For sustainability, there is some enthusiasm to pay for future vaccination (especially in Pahtor) but unless more effort is made to promote good PPR vaccination the inculcated desire of the farmers to have vaccine freely provided by the public services will resurface.

The evaluation team also visited the Sohan veterinary hospital in Islamabad which had been the focus of a demonstration for Islamabad Capital Territory. However, the number of farmers met and interviewed was few, just two, with little real feedback about the effectiveness of vaccination.
Table 4: Locally reported effectiveness of vaccination against PPR in Tharparkar-Mithi

<table>
<thead>
<tr>
<th>Village</th>
<th>Did you all agree to vaccination?</th>
<th>Why did you agree to vaccination?</th>
<th>Reasons why some farmers refused vaccination?</th>
<th>Were you pleased with the way the vaccination was carried out?</th>
<th>Are you pleased with the result?</th>
<th>Would you be prepared to pay for vaccination in the future?</th>
<th>Are you aware of the risks posed by other stock and markets?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan M.ohammed Noon</td>
<td>15 of 16 farmers present agreed</td>
<td>We knew it would reduce losses</td>
<td>1 farmer was not aware</td>
<td>Yes. Very.</td>
<td>Yes. Very</td>
<td>All prepared to pay up to PKR 10 per dose</td>
<td>Yes</td>
</tr>
<tr>
<td>Mithrio Soomro</td>
<td>27/28 of 33 farmers present agreed</td>
<td>To prevent losses.</td>
<td>Some away and unaware. One concerned about milk yield drop following vaccination</td>
<td>Yes</td>
<td>Yes</td>
<td>Perhaps</td>
<td>Yes</td>
</tr>
<tr>
<td>Khari Pasayo</td>
<td>All 18 present vaccinated but some in the village refused and then got the disease</td>
<td>To prevent losses</td>
<td>Away or worried about milk yield drop</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes, if not too much. Two want government to pay.</td>
<td>Somewhat</td>
</tr>
<tr>
<td>Pahtor</td>
<td>Only 5 of 25 farmers accepted.</td>
<td>Five farmers were aware that the vaccination should work</td>
<td>Concerned about negative side effects of vaccination</td>
<td>Yes</td>
<td>Yes</td>
<td>Definitely</td>
<td>We are now. (Serious PPR losses occurred in village after refusing vaccination)</td>
</tr>
<tr>
<td>Jam Khan Lund</td>
<td>Most agreed</td>
<td>A trusted para-vet said that it would work</td>
<td>A few stockowners refused fearing economic loss</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

93 The information in this table could have been substantially enhanced if the evaluation team had been able to visit the other vaccine demonstration field sites, which were not accessible due to security reasons.

94 Amongst the veterinary field staff there was overwhelming support for the demonstration of vaccination. Several extra staff had been employed by the Livestock and Dairy Development Department to help the project so their self-interest is understandable. However, many of the more experienced full-time field staff were also very pleased with the result. It is something that they can now offer their farmers that should make a real difference.

95 Until the training and awareness raising provided by the project, PPR was not being clinically recognized in Tharparkar. Many outbreaks of the disease were being confused with pneumonias, enterotoxaemia and sheep and goat pox. As a direct result of the project most staff (and many farmers) now recognize PPR, its clinical signs including mouth lesions, and what to do about it in the future.

96 One of the problems encountered at the start of the pilot vaccination in Tharparkar was that insufficient emphasis had been placed on the importance of following the detailed standard operating procedures for using PPR vaccine correctly. First results were disappointing and the project had to send a special training team, including the project coordinator, to reinforce the methodologies. Many vaccines routinely used by field staff and farmers in Pakistan are comparatively robust and temperature tolerant and do not require the more diligent reconstitution of freeze-dried PPR vaccine virus in cold diluent and the continued use of a cold product.
An alternative method for demonstrating the impact of vaccination was provided by pre- and post-vaccination seromonitoring\footnote{This requires the collection of a blood sample at the time of vaccination and another collected at least three weeks to a month or so later. These blood samples are then tested for antibodies to the virus. A non-immune animal has no antibody at the time of vaccination and should have easily detectable antibody three weeks after successful vaccination. This method of seromonitoring vaccination can be used for individual animals and to measure levels of herd immunity.} carried out by the project. The impact that project vaccination made in seven of its target sites is captured in Table 5. In six sites the herd immunity level increased from as low as 5 percent to over 80 percent (considered by many to be sufficient to stop transmission of the virus), and at the sites in Sindh and Tharparkar to over 90 percent. Although these summarized data cover some variance at village levels they inspire confidence in what can be achieved in Pakistan.

Table 5: The increase in herd immunity in seven demonstration sites following vaccination with PPR vaccine

<table>
<thead>
<tr>
<th>Province/ Region</th>
<th>Site</th>
<th>No. of villages</th>
<th>No. of herd owners or households</th>
<th>Animals vaccinated (first round)</th>
<th>Average Animals per household</th>
<th>Percent antibody positive (Pre)</th>
<th>Percent antibody positive (Post)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AJK</td>
<td>Kotli</td>
<td>1 121</td>
<td>28 083</td>
<td>152 994</td>
<td>5</td>
<td>5</td>
<td>86</td>
</tr>
<tr>
<td>Balochistan</td>
<td>Kingri</td>
<td>219</td>
<td>1 204</td>
<td>286 710</td>
<td>238</td>
<td>20</td>
<td>83</td>
</tr>
<tr>
<td>FATA</td>
<td>Khyber agency</td>
<td>225</td>
<td>12 097</td>
<td>304 464</td>
<td>25</td>
<td>22</td>
<td>80</td>
</tr>
<tr>
<td>Islamabad</td>
<td>Islamabad</td>
<td>218</td>
<td>2 274</td>
<td>18 877</td>
<td>8</td>
<td>37</td>
<td>81</td>
</tr>
<tr>
<td>KP</td>
<td>Mansehra</td>
<td>444</td>
<td>15 797</td>
<td>323 652</td>
<td>20</td>
<td>18</td>
<td>29</td>
</tr>
<tr>
<td>Punjab</td>
<td>DG Khan</td>
<td>534</td>
<td>9 536</td>
<td>306 449</td>
<td>32</td>
<td>43</td>
<td>93</td>
</tr>
<tr>
<td>Sindh</td>
<td>Tharparkar-Mithi</td>
<td>273</td>
<td>5 443</td>
<td>294 193</td>
<td>54</td>
<td>58</td>
<td>90</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3 034</strong></td>
<td><strong>74 434</strong></td>
<td><strong>1 687 339</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: project team

At Mansehra in Khyber Pakhtunkhwa (KP) one round of vaccination raised overall herd immunity to only 29 percent which is a poor result. The project followed up the matter and revaccinated 193 000 animals. As a result, one sampling site (Hamsherian) had a post-vaccination herd immunity of 93 percent but the three other samples sites (Sawan Mera, Shinkyari and Tanda) were still too low. Herds in these areas are highly mobile and some of the sample herds may have brought in new animals. The project is still pursuing the matter and learning more about how best to vaccinate there. It is precisely this type of area and animal husbandry system that Pakistan must tackle in the future.

The successful demonstrations of vaccination also boosted the morale and professional skills of the field staff involved. Veterinary field and laboratory staff in Tharparkar-Mithi admitted that they had been unsure of the clinical diagnosis of PPR before the project. There had been confusion with other diseases including FMD because of the mouth lesions, and the local name, hulgo, means coughing – a very non-specific sign. Since the properly administered vaccination demonstrations in four talukas\footnote{Administrative unit in Sindh similar to tehsil in Punjab.} the incidence of the disease that they had been seeing, and misdiagnosing, had significantly dropped there, whereas they continued to see it and now recognize it in the three other unvaccinated talukas in Tharparkar District. Some farmers in the unvaccinated talukas were aware of the benefits provided by vaccine elsewhere.

A final measure of the success of the PPR vaccine demonstrations has been the level of support and buy-in from provincial governments. The Livestock and Dairy Development Department of Sindh contributed anthelmintics to encourage farmer participation during the first round of vaccinations in Mithi, Tharparkar. Seeing how well the vaccinations were carried out, how well it was received by farmers and how sharply the incidence of PPR declined, the Livestock and Dairy Development Department then granted the project an extra USD 300 000 to vaccinate an additional 1.1 million sheep and goats in Tharparkar, which was achieved. Having seen the importance of using only quality assured vaccine, the Livestock and Dairy Development Department of Sindh has paid in advance for 500 000
doses of PPR vaccine from the Veterinary Research Institute but will only collect these when its quality is assured. The Livestock and Dairy Development Department of Sindh has limited budget but is hoping to maintain the employment of the extra staff recruited to assist with the project, many of whom have been trained and now have significant experience in PPR recognition and control. Some farmers in Tharparkar are asking for further vaccination against PPR, specifically mentioning the “Jordan” vaccine procured and used by the project.

The Government of Punjab has funded a trust fund project with FAO which includes a USD 1.3 million component for PPR control in the province in 2017. This includes training of 646 veterinary field staff, 1,000 workshops for herd owners, strengthening of laboratory diagnosis, improved outbreak responses, improved cold chain facilities and demonstration of preventive vaccination in three southern divisions with 13.7 million small ruminants.

3.3.5 Gender and women empowerment

Evaluation question 6: To what extent did the project respond to women’s needs?

Finding 6. The project benefits were generally equally distributed among men and women, as the vaccination campaigns and disease control have benefits for the entire household. While there was some involvement of women in decision making thanks to targeted trainings on PPR diagnosis and control, the absence of female project staff limited women’s involvement and missed the opportunity to set an example for aspiring women veterinarians.

The project was formulated before the establishment of gender markers as a standard FAO procedure. However it can be classified as G1 (the project addresses gender equality only in some dimensions) as the activities related to laboratory support and vaccine production can be considered gender-neutral. There are two areas where gender aspects are most relevant: the staffing of the project and the interaction with women herd owners at village level.

The evaluation team was told that the project advertised to recruit women staff with little success and there were no women in the senior project positions. Women veterinarians with comparable experience to most of the project staff are relatively few, and have family commitments that make their attachment to the project difficult. This is an acknowledged and complicated issue in Pakistan. The laboratories appeared to employ a more significant number of women at scientist and at laboratory assistant level but there were few women veterinary officers or veterinary assistants in the field. Future programme planning might consider how some of the increasing number of young women professionals now leaving the universities might be encouraged into internships or similar postings within the programme, with a view to progressing to more senior positions.

Most farmer awareness meetings held by the project were attended mainly, perhaps exclusively, by men. To provide women with an opportunity to learn about PPR the project held four awareness training workshops specifically for them, with 179 participants. Women are very much involved in the health of their family’s herds through feeding, watering, milking and almost all aspects of their management, apart from sales and marketing which is the man’s responsibility. Since most veterinary staff are men, women are restricted in being able to directly call professional help and must usually do this through a male member of the household. All the participants at the seven farmer village meetings with the evaluation team were men. As recounted to the evaluation team in a village in Tharparkar “if there is anything wrong with the sheep and goats they (the women) tell their husband and he will know about PPR and tell them what to do. We will tell them about PPR”. Improved small ruminant health and survivability should translate into improved household income some of which, hopefully, should benefit women family members.

The evaluation team met Dr Sumreen Kauser, the Senior Veterinary Officer in charge of the diagnostic laboratory in Faisalabad. Dr Kauser was one of only three women in her year group of 98 graduates. During the same visit the evaluation team met a group of seven graduating women veterinarians and it is clear the pool of skilled women is expanding.
The project was designed to provide better control of PPR to more than 50,000 poor small holder sheep and goat farmers. The pilot vaccination trials covered almost 75,000 households, the majority of whom would qualify as “poor”. In addition, the project supported many other poor farmers through emergency vaccination and provided project vaccine for FAO emergency projects, for FAO projects in Balochistan and for the JICA projects in Sindh.

3.3.6 Overall impact

Finding 7. The project’s overall impact has been to provide Pakistan with the essential technical tools to begin the progressive control pathway for PPR. It has done this very effectively and has put PPR firmly on the agenda with Pakistan’s livestock departments and policy makers. It has highlighted to all veterinary authorities in Pakistan the danger posed by PPR to small ruminant-based livelihoods. It has provided these authorities with a core of disease surveillance and reporting skills for PPR in the field, with laboratory capacity to confirm the disease and a clear demonstration in most provinces of how successful properly administered vaccination can be. The project has also demonstrated that PPR vaccine needs to be of a certain minimum quality to be effective in the field and has facilitated its improved production in Pakistan. The challenge is now for each province and the federal authorities to take up and use these tools on the long path to eradication. If this can be achieved, the potential impact of the project for safeguarding small ruminant-based livelihoods from this frequently fatal disease is enormous.

The evaluation team met with senior Livestock and Dairy Development Department staff, Director Generals of Extension and of Research, their Deputies, laboratory Directors and TADs Officers in Khyber Pakhtunkhwa (KP) provinces, Punjab and Sindh. Their consensus was that before the project PPR was largely unreported, it was being misdiagnosed, there was little or no capacity to confirm it at the laboratory, and there was a lack of confidence in vaccination which was being done with locally produced vaccine.

The senior provincial staff reported that the project has given the Livestock and Dairy Development Department surveillance and diagnostic capacity and confidence in vaccination. Where the project worked in the field at demonstration trials for vaccine and at emergency vaccination of outbreaks, farmers, stock owners and veterinary field staff were very satisfied with the results and wanted the effort to continue. Therefore, the policy makers in the provinces also want PPR control to continue. The Government of Punjab has committed USD 1.3 million to FAO for the project to continue its work by expanding its vaccination trials in the province. The governments of KP and Sindh, whilst they would like to continue the work, currently have inadequate budget. KP is able to vaccinate only 15-20 percent of its current population.

The provincial authorities appreciate how well collaboration between FAO, the federal authorities and themselves has worked and are prepared for this to continue. Recognizing the huge challenge to educate all farmers and all veterinary staff the provincial authorities unanimously stressed the need to expand the work on awareness raising and acknowledged FAO’s role in training at all levels.

By applying the training and procedures provided by the project, a much higher number of outbreaks of PPR have been detected than ever before in Pakistan. This is directly attributable to the successful swift and effective response to reported outbreaks by the provincial veterinary services and the project to which, in turn, the livestock owners have reacted.

The following Table lists the main challenges and issues for countries intending to follow the progressive control pathway for PPR, as raised by the second South Asia Roadmap meeting held in Kathmandu in December 2013 (mentioned in paragraph 29), and the contribution made by the project to addressing these in Pakistan.
Table 6: The project’s response to the challenges and issues raised during the second South Asia Roadmap meeting for PPR in December 2013

<table>
<thead>
<tr>
<th>Issue</th>
<th>Project contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 The lack of a strategic national control program for PPR</td>
<td>Being developed by the project</td>
</tr>
<tr>
<td>2 Limited political will, legislation and communication</td>
<td>Greatly increased political will after the project. A “paradigm shift” in approach in Punjab – from emergency control to prevention</td>
</tr>
<tr>
<td>3 Weak institutional setup and capacity building</td>
<td>Strengthened by the project</td>
</tr>
<tr>
<td>4 Limited funding for research activities</td>
<td>Not part of project scope</td>
</tr>
<tr>
<td>5 Unrestricted cross border and inter/intra-provincial animal movements</td>
<td>Not part of project scope</td>
</tr>
<tr>
<td>6 Under-performing disease reporting and surveillance system</td>
<td>Greatly strengthened by the project</td>
</tr>
<tr>
<td>7 A lack of quality vaccine</td>
<td>Need for quality vaccine amply demonstrated by project. Inputs to assist Pakistan produce quality vaccine</td>
</tr>
<tr>
<td>8 Concerns about vaccine delivery mechanisms including trained staff</td>
<td>Significant amounts of training provided by project</td>
</tr>
<tr>
<td>9 Lack of a policy for vaccination strategy based upon blanket/zonal/risk based coverage</td>
<td>Not part of project scope</td>
</tr>
<tr>
<td>10 Lack of communication strategy and awareness involving all stake holders</td>
<td>Significant amounts of awareness raising of farmers, veterinary field and laboratory staff, senior staff and policy makers</td>
</tr>
<tr>
<td>11 Limited cold chain facilities in some districts of provinces</td>
<td>Importance of cold chain stressed by project and equipment provided</td>
</tr>
</tbody>
</table>

Out of 11 challenges/issues the project strongly delivered on eight of them. While leadership and the majority of resources in these unaddressed areas will have to come from the federal and provincial governments, and the project could not have been expected to address them at this stage, FAO possesses the expertise and comparative advantage to support the government in the future.

The preliminary findings of the independent socio-economic impact study of the project, by the service provider Brainbox, are that it was successful overall and left a positive socio-economic impact in the field, as there are clear economic benefits from vaccination.

Figure 1 (in section 3.3.3) shows that during project GCP/PAK/127/USA reports of PPR were received from more than half the districts in the country but none from many other districts. For those managing the PCP the question is whether a district with no report of PPR is free of PPR or is it that surveillance is not working there. In effect, Figure 1 shows the districts where the PPR status is unknown, i.e., those “below stage 1” on the PCP, and districts where assessment has begun, “stage 1” of the PCP. The work carried out by GCP/PAK/127/USA also showed that very high levels of control were achieved in some districts following effective targeted vaccination – for instance in Mithi, Tharparkar. Districts such as these have effectively reached “Stage 2” of the PCP. Future PPR control in Pakistan might consider mapping the different stages of each district on the PCP and using this as a tool to monitor and manage progress. Initially there will be a mosaic of neighbouring districts at different stages but management targeting specific districts should be able to “harmonize” these into whole blocks of districts, even divisions or provinces that are all at the same level on the PCP – allowing them all to be managed together.

Whilst this sounds simple in theory it will not be so in practice. Eradication of PPR from Pakistan will be heavily dependent upon vaccination with quality vaccine during stages 1 and 2 of the PCP. Whilst the Global Strategy for the Control and Eradication of PPR gives advice and guidelines on how vaccination should be carried out, all countries will have to tailor these to their own conditions. Pakistan is no exception to this and the national strategy for vaccination against PPR will have to contend with the following related issues:

- Although high levels of control, including local eradication, might be achieved in some areas and provinces, eradication of the disease from other areas of the country will
probably take several years, perhaps decades (with relatively little epidemiological data at this early stage, it is likely that the fight against PPR will be hardest in the North and West of Pakistan, and with nomadic/nomadic herds emanating from there).

- The country will not be able to enter the final stages of the PCP to confirm eradication, which requires stopping vaccination and developing a fully susceptible national herd, until the risk of reinfection from neighbouring countries is low or negligible. Some neighbours may not move through the PCP as fast as Pakistan.
- Maintaining high levels of PPR control through mass vaccination in certain provinces for many years will be very expensive, perhaps prohibitively so.
- Such prolonged expense almost certainly cannot be met by the public sector at provincial or federal level, and international funds for mass vaccination against PPR in Pakistan may not be forthcoming or reliable.
- National capacity for PPR vaccine production may always be insufficient for inducing widespread herd immunity throughout the country’s small ruminants.
- Effective control of the movement of sheep and goats into and within Pakistan will always be difficult to achieve.

With these issues in mind, it may be possible to follow the early stages of the PCP using a pragmatic and flexible approach that combines different tactics for the delivery of vaccine immunity: mass vaccination, targeted vaccination, outbreak vaccination and private vaccination. This will apply during the whole of stage 2 of the PCP during which, by definition, the epidemiological status of the country is being established. Opportunities for cost recovery will be limited initially but may increase later in some areas. The suggestions made here are not attempting to change the recommendations of the Global Strategy for the Control and Eradication of on vaccination but to use them in an epidemiologically and economically judicious manner for what may be a long time in Pakistan.

### 3.4 Analysis of cross-cutting issues and sustainability

#### 3.4.1 Capacity development

The project spent considerable effort in capacity development, targeting laboratory personnel, field staff, farmers and staff of veterinary services. The purpose of the training for implementers largely focused on diagnostic skills and operating procedures which were successfully applied on the job almost immediately. Where problems occurred technical backstopping by the project resolved the matter. The project did not formally assess and document training needs of the persons targeted, particularly farmers and herd owners but, where necessary, adjusted the content of training courses based on early training experiences and feedback from participants.

The evaluation team considers training of laboratory staff in diagnostic tests to have been effective as evidenced by the high proportions of submitted samples that tested positive for PPR in all laboratories. In addition, the very positive feedback from staff in the laboratories visited during the evaluation mission attests to their understanding of the work they are doing and its importance. The initial training courses were appreciated by the laboratory personnel interviewed, as were the annual refresher courses, and the backstopping (mostly by email) by National Veterinary Laboratory trainers of provincial and regional trainees. Experience from the eradication of rinderpest showed that both laboratory and field staff feel they are part of a national, regional or even global initiative their interest and self-confidence increase accordingly to the benefit of all concerned. This is a management issue that was obviously well addressed in the project.

The project trained nearly 2 400 field veterinarians and assistants, instead of the targeted 800, and a majority of these was equipped with sample kits and/or treatment kits. The impact of this training is evident, as measured by the increase of outbreak reporting and the high percentage of samples subsequently confirmed positive in diagnostic tests.

Training of these two groups, laboratory and field, is highly relevant and will have a lasting impact, if equipment and consumables for laboratory tests remain available and outbreak sampling continues to be backed up by the veterinary services.
3.4.2 Partnership and alliances

122 The project maintained good working relationships with provincial and regional senior officers of livestock departments (Secretaries and Director Generals), either through the Steering Committee, or through Technical Working Group meetings. The result is a shared understanding of content and ownership of PPR control.

123 Through the FAO representation the project has responded to requests for emergency vaccination after the floods of 2014. Beyond charity and solidarity with flood victims, this has widened the project’s reputation to have the capacity to respond to emergency situations.

124 Very importantly, the project has supported the Animal Husbandry Commissioner (Chief Veterinary Officer) in interacting with the World Organisation for Animal Health and in participating at PPR South Asia Roadmap meetings with its important peer review of progress.

3.4.3 Research

125 The project has assessed the use of a pen-side laboratory test for diagnosing PPR in the field in Pakistan. It has built an archive of PPR viruses that will be genetically analysed at one of the FAO and World Organisation for Animal Health global reference centres for PPR. However, with PPR widespread and prevalent in Pakistan, the project, due to its many commitments, has been unable to take advantage of the opportunity to study the infection in the field and to explore different ways of controlling it. In particular, control of PPR in the more insecure and inaccessible areas and in the more mobile animal populations of the country will be essential to Pakistan’s future progress on the PCP.

126 Pakistan is fortunate that research into PPR is widespread in many laboratories and centres of higher learning throughout the country. However, much of the work in the universities and colleges is not coordinated and whilst much of it may be useful some of it could be confusing or counter-productive and it may become increasingly valuable to have a harmonized approach to the “research” effort. The project took the initiative of holding a meeting at Faisalabad in September 2013 with national PPR experts from the universities, various laboratories and the field. The outcome was the mutually agreed standard operating procedures for PPR outbreak control in Pakistan. This could be a model for the project to use again to exercise some greater degree of coordination23 and cooperation over PPR research in Pakistan, including the development of a national policy for PPR control.

3.4.4 Training materials

127 The project has produced some videos of disease investigation and vaccination though these were not seen by the evaluation team. However, as it travelled in the provinces the evaluation team was shown extremely good quality photographs of PPR clinical and pathological signs (and of FMD) by veterinary field staff. Many of these were vastly superior to those in most text books and manuals. Similarly, some field staff had taken their own videos of disease and control and of farmers’ reactions to significant losses from PPR. This material is extremely valuable for improving awareness raising in Pakistan and perhaps other countries.

3.4.5 National PPR control strategy

128 Preparation of an agreed national control strategy for PPR in Pakistan was not a stipulated output from GCP/PAK/127/USA. However, it was mentioned as an outcome that is being worked on in the report given to the evaluation team. A national strategy is needed but could evolve slowly at first benefitting in time from modifications suggested by the kinds of practical research indicated in section 3.4.3 above.

23 There will come a time when the use of PPR virus in the laboratory and in experimental infections will need to be restricted. This may be easier if engagement with the universities is made earlier rather than later.
3.4.6 Sustainability

The project was designed to provide Pakistan with the basic technical tools for progressive control of PPR. This evaluation believes that excellent progress has been achieved; nearly all planned outcomes have been realized. The project has been successful in keeping PPR control on the agenda through good communication with decision makers and by demonstrating that strong outbreak management and immunization have a clear effect.

However, ultimate PPR control has a horizon of a decade probably longer, and therefore sustained efforts are needed to move to the next level of control. Challenges ahead are further institutionalization of control efforts, improvement of a regulatory framework and national production of significant quantities of vaccine (to reduce cost). Most, if not all these challenges would benefit from federal coordination and funding, and the evaluation team was informed by the AHC that a concept note had been submitted to the federal Ministry of Planning for approximately USD 7.5 million to support PPR for over ten years. It is likely that much more support will be required.

Whilst the results are a cause for cautious optimism about PPR control in Pakistan the sheer size of the country’s sheep and goat populations is daunting. The pilot demonstrations of vaccination covered 1.6 million animals and many more emergency vaccinations. But natural herd replacement levels of 30 percent or more annually meant that whilst the project was covering less than 2 million animals in the final year of the project another 30 million or more were being added to the national herd, which in fact probably replaced itself over the course of the three and a half years of the project.

3.4.7 Similarities and synergies with the control of foot and mouth disease and other transboundary animal diseases

The similarities between Projects GCP/PAK/127/USA and GCP/PAK/123/USA are striking. The main outputs of both projects have been almost identical with improvements to laboratory diagnostics and field surveillance, demonstrations of vaccination efficacy and efforts to increase national production of quality vaccine. Both projects have very successfully delivered their planned outputs which largely provide the tools and set the scene for a huge amount of dedicated work in the field and laboratories throughout the country.

The team behind the delivery of both projects was very much the same, with some changes of personnel, and the same offices, vehicles, equipment and arrangements with FAO and the National Agricultural Research Centre. The methodology for implementation in the field was very similar for both projects, and field staff in many areas worked with both projects. Both FMD and PPR have been selected by FAO and the World Organisation for Animal Health for progressive control leading to eradication; they share very similar progressive control pathways and have appropriate regional groups (Roadmaps).

Both diseases require similar if not identical types and degrees of future effort if they are to progress along their respective PCPs. This includes: continued support for what has already been established at laboratory and field surveillance level; far more awareness raising at farmer and veterinary professional level; an increasingly urgent requirement for strong epidemiological analysis and direction; more focus on difficult areas and husbandry systems; and longer-term programmatic support.

The skills, methodologies and working arrangements developed by both projects are also directly applicable to the control of other TADs in and threatening Pakistan, which is an added positive impact from both projects.
4. Conclusions and recommendations

4.1 Conclusions

Conclusion 1
136 The project effectively combined people and resources from provincial and federal veterinary services with those of FAO, United Stated Department of Agriculture and several other organizations into a network which has developed the control of Peste des Petits Ruminants in Pakistan to a point where it can move towards the next stage of control described in the PPR progressive control pathway.

137 The project has strengthened central and provincial laboratory capacity for PPR diagnosis with suitable materials, equipment and training; it has built a disease surveillance and rapid response system to control outbreaks of PPR; and it has clearly demonstrated that with the appropriate use of good quality vaccine PPR can be controlled in the field. As a result, Pakistan now has sufficient resources and skills to begin its progressive control pathways for PPR. These inputs and this capacity must not be allowed to stagnate or diminish but must continue to be supported and strengthened.

138 The implementation arrangements established by the project must not be lost and should be maintained and, where necessary, developed further. It is a model that could perhaps be replicated for other livestock initiatives in the country.

Conclusion 2
139 The project has done an exemplary job of raising the awareness of a small proportion of the country’s farmers to the clinical signs and dangers posed by the disease and how it can be prevented.

140 This was achieved through vaccination, raising awareness amongst farmers and training of veterinary staff in the diagnosis and control of the disease. For the country to achieve PPR eradication all veterinary staff and farmers will need to be included in the national fight against the disease. Much more awareness raising and training in disease recognition and control is required. It is important now to transfer the knowledge and lessons learned to the difficult areas and populations, possibly modifying vaccine delivery and population immunization tactics to suit local conditions and as continuing experience dictates (discussed further in Annex 2).

Conclusion 3
141 The project has not significantly strengthened epidemiological capacity for PPR to a level required for successful progress along the PCP.

142 The lack of epidemiological capacity will hinder progress against PPR and is also needed for the control of foot and mouth disease and other livestock diseases in Pakistan. Research on PPR in Pakistan is important and widespread but at present is uncoordinated and not contributing as much as it should to the vision of a PPR-free country. Further areas of useful research are discussed in Annex 1. Coordination of research on PPR in Pakistan would harmonize and focus the thinking and approach about the control of the disease across all veterinary institutions and services in the country – which, conceivably, could reduce the time taken to eradication.

Conclusion 4
143 Implementation of the progressive control pathway for PPR requires national leadership in terms of legislative reforms and resource allocations.
As a Member State of FAO and a Member Country of the World Organisation for Animal Health and through its membership of the South Asia Roadmap for the progressive control pathway of PPR Pakistan is committed to PPR control and eradication. It has gained appreciation and built trust with counterpart national veterinary services about its achievements and planning of the next stage of controlling PPR. Such cooperation will prove invaluable towards the final stages of the regional approach to PPR eradication. The challenge is to implement that next stage along the PCP, building on what has been achieved so far without losing momentum or allowing considerable and scarce expertise (technical and managerial) to disperse.

Future movement along the progressive control pathway for PPR in Pakistan requires funding for a considerable number of years, possibly a decade but probably longer. The challenge is to mobilize the right mix of external support with federal and provincial government funding with a long-term vision of these latter sources increasingly taking budgetary responsibility.

4.2 Recommendations

Recommendation 1. To FAO and the federal and provincial governments of Pakistan: FAO and the federal and provincial governments of Pakistan together with strategic development partners should prepare and implement a long-term programme to support the country to follow the progressive control pathway for PPR.

The programme should include or be combined with the existing national control strategy for FMD and build capacity for other transboundary animal diseases, with possible links to zoonotic diseases in line with the One Health approach. Key elements of the national PPR programme should be:

- The programme will consolidate and continue to support the advances already gained with diagnostics and disease surveillance for PPR and FMD.
- It will continue to advocate for and facilitate the use of appropriate quality vaccine only.
- Without delay the programme must intensify and expand awareness raising about PPR to all areas and communities of the country.
- It will maintain and enlarge the demonstration sites already covered in GCP/PAK/123/USA and GCP/PAK/127/USA.
- In addition to these already successful areas the programme will turn its attention and leadership, especially with PPR, to the more difficult geographic and insecure areas and the more mobile animal husbandry systems; passing responsibility for the “easier” areas to the provinces.
- The programme must include a national epidemiology unit, with provincial subunits, to accumulate and analyse the growing amount of data the two PCPs (and other livestock issues) will generate, with a view to providing strategic advice.
- With the added benefit of its epidemiology unit, the programme will carry out research into the epidemiology of PPR in Pakistan and the most effective including the most cost-effective ways to control it.
- The project will initiate and lead a nationwide research and experience forum comparable to the PPR Global Research and Experience Network envisaged by the Global Programme for the Eradication of PPR.
- The new programme should incorporate short and longer-term training and work experience for younger members of the Livestock and Dairy Development Department including women.

Recommendation 2. To FAO and the federal and provincial governments of Pakistan: FAO and/or the federal and provincial governments should seek resources to begin work as soon as possible on preparing the concept and design for a TADs programme for Pakistan. This should include an early workshop or meeting of all stakeholders to agree and plan the immediate way forward.

Some funding (USD 8.9 mil) from the provincial government of Punjab for FMD and PPR has been secured; however, while this is encouraging, TADs require a national and international
approach, therefore further federal and provincial funding is needed in order to maintain the established systems for surveillance and response, diagnostic capacity, vaccination and vaccine production. Furthermore the completion of the post-project socio-economic survey should be analysed for potential publishable data, and its Terms of Reference revised in order to improve the socio-economic data collected in future studies.

The new programme should incorporate short- and longer-term training and work experience for younger members of the Livestock and Dairy Development Department including women.
5. Lessons Learned

149 It is easy to lose momentum after success, as was the case after the eradication of rinderpest from Pakistan, when it was assumed that the control of other transboundary animal diseases such as Peste des Petits Ruminants would naturally follow. This did not happen. Although international and FAO projects tried to address PPR in Pakistan it slipped off the national dashboard for disease control.

150 A basic set of requirements are essential for successful control of a disease such as PPR; field surveillance, laboratory diagnosis, correct use of quality vaccine. All of these had been available in Pakistan after the eradication of rinderpest but all fell into disuse or were not meaningfully coordinated. Without a national vision, as provided by the project, this situation would not have been rectified: the project replaced and enhanced the missing or dysfunctional tools and provided the leadership to re-establish PPR as a matter of major concern.

151 The failure of numerous veterinary staff to recognize the clinical signs of PPR, confirmed in Pakistan in 1996, was disastrous for many smallholders. How this happened is uncertain but the project showed that national oversight of the country’s animal health remains important when it comes to identifying priority diseases, and for all provinces and actors to take suitable measures for their control, including training and encouragement of field staff.

152 A successful donor funded project can result in a profound change of attitude among national and provincial budget holders. The countrywide achievements of the project (with both PPR and foot and mouth disease) have resulted in the government of Punjab overhauling and investing significantly in its vaccine cold chain and disease reporting systems, and setting aside significant budget for control of PPR and FMD by vaccination, some of it to be administered through a new FAO project. The government of Sindh provided funds for FAO to increase its demonstration of vaccination in the province. The federal Government of Pakistan is applying for funds for similar work on PPR. These successes should be acknowledged and built upon.

153 The results from the use of quality vaccines can change how farmers and veterinary staff view their use. When vaccines of poor and uncertain quality were being used (for both PPR and FMD) farmers frequently were not prepared to use them let alone pay for them, and veterinary staff were apprehensive about recommending them. The confidence now coming from the use of quality vaccines for both PPR and FMD has reopened the issue of farmers now paying for their vaccines and for their correct delivery. The possible impact this may have on the future cost of progressive control of these two diseases in Pakistan could be game changing (discussed further in Annex 2).
6. Appendices

Appendix 1. Documents consulted


Control of Transboundary Animal Diseases in Pakistan (Progressive Control of Peste des Petits Ruminants in Pakistan), GCP/PAK/123/USA. Sixth Technical Report; February – April 2015


Control of Transboundary Animal Diseases in Pakistan (Progressive Control of Peste des Petits Ruminants in Pakistan), GCP/PAK/123/USA. Eighth Technical Report; August – October 2015


Control of Transboundary Animal Diseases in Pakistan (Progressive Control of Peste des Petits Ruminants in Pakistan), GCP/PAK/123/USA. Tenth Technical Report; February - April 2016

Control of Transboundary Animal Diseases in Pakistan (Progressive Control of Peste des Petits Ruminants in Pakistan), GCP/PAK/123/USA. Eleventh Technical Report; May - July 2016

Control of Transboundary Animal Diseases in Pakistan (Progressive Control of Peste des Petits Ruminants in Pakistan), GCP/PAK/123/USA. Twelfth Technical Report; February - April 2017


"Socio-Economic Impact of PPR Vaccination on Targeted Household/herders/area". Draft report of an independent evaluation of the impact of project GCP/PAK/127/USA. Commissioned by the project. April 2017.

Appendix 2. List of people interviewed

<table>
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<tr>
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<td>1</td>
<td>6 March</td>
<td>Dr Muhammad Afzal</td>
<td>Project Director</td>
<td>Islamabad</td>
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<td>2</td>
<td>6 March</td>
<td>Dr Manzoor Hussain</td>
<td>FMD Epidemiologist (FMD project consultant)</td>
<td>Islamabad</td>
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<td>3</td>
<td>6 March</td>
<td>Dr Shahid Khan</td>
<td>National Field Officer (PPR project)</td>
<td>Islamabad</td>
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<td>4</td>
<td>6 March</td>
<td>Dr Humayoon Samo</td>
<td>National Field Officer (PPR project)</td>
<td>Islamabad</td>
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<tr>
<td>5</td>
<td>6 March</td>
<td>Mr Francisco Gamarro</td>
<td>Deputy FAO Representative</td>
<td>Islamabad</td>
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<tr>
<td>6</td>
<td>6 March</td>
<td>Mr Patrick Evans</td>
<td>FAO Representative</td>
<td>Islamabad</td>
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<td>7</td>
<td>6 March</td>
<td>Dr Qurban Ali</td>
<td>Animal Husbandry Commissioner and Chief Veterinarian Officer, Ministry of National Food Security and Research</td>
<td>Islamabad</td>
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<tr>
<td>8</td>
<td>6 March</td>
<td>Dr Muhammad Javid Arshad</td>
<td>Senior Scientific Officer – National Veterinary Laboratory</td>
<td>Islamabad</td>
<td>With visit to NVL laboratory</td>
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<td>9</td>
<td>7 March</td>
<td>Dr Mehmood Rasheed</td>
<td>Assistant Director, Sohan Veterinary Hospital and TAD Officer</td>
<td>Sohan, Islamabad</td>
<td>Capital Territory</td>
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<td>Sohan, Islamabad</td>
<td>Capital Territory</td>
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<td>11</td>
<td>8 March</td>
<td>Dr Nasrullah Panwher</td>
<td>National Field Officer (FMD), Sindh</td>
<td>Karachi, Sindh</td>
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<tr>
<td>12</td>
<td>8 March</td>
<td>Dr Madan Lal</td>
<td>Deputy Director Livestock and Dairy Development Department</td>
<td>Karachi, Sindh</td>
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<tr>
<td>13</td>
<td>8 March</td>
<td>Dr Manzoor Asif</td>
<td>Head of ELISA lab in Landhi: Assistant Research Officer, Animal Husbandry Laboratory, Landhi Cattle Colony Karachi</td>
<td>Karachi, Sindh</td>
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<td>14</td>
<td>8 March</td>
<td>Mr Muhammad Shakir Umer</td>
<td>President, Dairy and Cattle Farmers Association</td>
<td>Karachi, Sindh</td>
<td>Head of one of the two associations in Landhi</td>
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<td>Dr Ali Akbar Soomro</td>
<td>Director General – Livestock</td>
<td>Hyderabad, Sindh</td>
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<td>Dr Khadim Hussain Soomro</td>
<td>Sindh TAD Officer</td>
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<td>Dr Mushtaque Hussain Jokhio</td>
<td>Director Animal Husbandry Sindh</td>
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<td>9 March</td>
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<td>Co-Director, JICA projects in Sindh</td>
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<td>10 March</td>
<td>Mr Muhammad Zaman Narejo</td>
<td>Deputy Commissioner, Tharparkar</td>
<td>Mithi, Tharparkar, Sindh</td>
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<td>23</td>
<td>10 March</td>
<td>Dr SonuKhangharani</td>
<td>Chief Executive Officer, Thardeep Microfinance Foundation (NGO), Sindh</td>
<td>Mithi, Tharparkar, Sindh</td>
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<td>24</td>
<td>10 March</td>
<td>Dr Jamoon Mal</td>
<td>Additional Director, Central Veterinary Diagnostic Lab (Person in charge of CVDL, Sub Centre Mithi laboratory)</td>
<td>Mithi, Tharparkar, Sindh</td>
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<td>25</td>
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<td>11 March</td>
<td>Dr Nobat Khan</td>
<td>Deputy Director Livestock/Animal Husbandry, Tharparkar</td>
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<td>Dr Baz Muhammad Junejo</td>
<td>Ex- Secretary Livestock and Fisheries Department, Government of Sindh</td>
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<td>13 March</td>
<td>Dr urban Hussain</td>
<td>Directory General (extension) Livestock and Dairy Development Department of Punjab</td>
<td>Lahore, Punjab</td>
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<td>13 March</td>
<td>Dr Farhat Awan</td>
<td>Person in charge of Provincial Diagnostic Lab</td>
<td>Lahore, Punjab</td>
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<td>13 March</td>
<td>Dr Abdul Rauf</td>
<td>Directory General (research) Livestock and Dairy Development Department of Punjab and head of Veterinary Research Institute (VRI)</td>
<td>Lahore, Punjab</td>
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<td>Staff of DG Research office</td>
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<td>37</td>
<td>13 March</td>
<td>Dr Talha Farooq</td>
<td>Person in charge of vaccine production, VRI</td>
<td>Lahore, Punjab</td>
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## Final Evaluation of “Progressive Control of Peste des Petits Ruminants in Pakistan”

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<td>Dr Abeera Mubarak</td>
<td>Person in charge of vaccine quality control, VRI</td>
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<td>13 March</td>
<td>Dr Sajjad Hussain</td>
<td>Additional Director for FMD diagnostic Lab, VRI</td>
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<td>14 March</td>
<td>Ms Sumreen Kausar</td>
<td>Assistant disease investigation officer (in charge of the district diagnostic lab)</td>
<td>Sahiwal, Punjab</td>
<td>Lab was not supported by project</td>
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<td>15 March</td>
<td>Dr Munir Ahmed</td>
<td>Director of Faisalabad District, Livestock and Dairy Development Department of Punjab</td>
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<td>16 March</td>
<td>Mr Irfan Khalid</td>
<td>Deputy Secretary Livestock and Dairy Development of Punjab</td>
<td>Islamabad</td>
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<td>46</td>
<td>16 March</td>
<td>Mr Ruken Niaz khan</td>
<td>In charge of socio-economic impact assessment of PPR project (Brainbox)</td>
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<td>17 March</td>
<td>Dr Sher Muhammad</td>
<td>Director General (extension) Livestock and Dairy Development Department of KP</td>
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<td>Dr Ahmed Naveed</td>
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<td>Staff of diagnostic lab (under DG extension)</td>
<td>Peshawar, KP</td>
<td>Lab was not supported by project</td>
</tr>
<tr>
<td>52</td>
<td>18 March</td>
<td>Dr Ihsanullah khan</td>
<td>TAD officer of KP</td>
<td>Peshawar, KP</td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>20 March</td>
<td>Dr Laeeq ahmed</td>
<td>Assistant Director Livestock and Dairy Development Department, in charge of Jhelum district</td>
<td>Jhelum, Punjab</td>
<td></td>
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<tr>
<td>54</td>
<td>20 March</td>
<td>Dr Qazi khuram Nawaz</td>
<td>Person in charge of Jhelum district diagnostic lab</td>
<td>Jhelum, Punjab</td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>20 March</td>
<td>Various</td>
<td>Veterinary officers and veterinary assistants in Jhelum</td>
<td>Jhelum, Punjab</td>
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24 Balochistan Projects: BAP (GCP/PAK/113/USA) and AusABBA (GCP/PAK/126/AUL)
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<th>No.</th>
<th>Date</th>
<th>Name</th>
<th>Title</th>
<th>Location</th>
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<tr>
<td>56</td>
<td>20 March</td>
<td>Various</td>
<td>Village visits with farmers, veterinary officers and veterinary assistant and random visits</td>
<td>Villages Pin Swekha and Toba and urban area, Jhelum, Punjab</td>
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<tr>
<td>57</td>
<td>21 March</td>
<td>Dr Rehman Ghani</td>
<td>FAO Staff in head office: Livestock Officer</td>
<td>Islamabad</td>
<td></td>
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<tr>
<td>58</td>
<td>27 March</td>
<td>Dr Qasim Raza</td>
<td>FAO Staff: National Livestock Expert in Balochistan projects</td>
<td>Quetta, Balochistan</td>
<td>Formerly head of Quetta district Veterinary Hospital</td>
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<tr>
<td>59</td>
<td>27 March</td>
<td>Dr Yassa Khan</td>
<td>FAO Staff: Livestock Associate</td>
<td>Quetta, Balochistan</td>
<td></td>
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<tr>
<td>60</td>
<td>28 March</td>
<td>Dr Farhat Abbas</td>
<td>Professor in Virology and in charge of viral vaccine production (including PPR), Centre for Advanced Studies in Vaccinology and Bio-technology (CASVAB)</td>
<td>Quetta, Balochistan</td>
<td>Visit to vaccine production site</td>
</tr>
<tr>
<td>61</td>
<td>28 March</td>
<td>Dr Shakeel Baber</td>
<td>Professor in Biotechnology, Centre for Advanced Studies in Vaccinology and Bio-technology (CASVAB)</td>
<td>Quetta, Balochistan</td>
<td></td>
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<tr>
<td>62</td>
<td>28 March</td>
<td>Dr Essa Kakar</td>
<td>TAD officer Balochistan</td>
<td>Quetta, Balochistan</td>
<td></td>
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<tr>
<td>63</td>
<td>28 March</td>
<td>Dr Abdul Rehman</td>
<td>In charge of ELISA lab, Disease Investigation Lab (DIL), Livestock Department</td>
<td>Quetta, Balochistan</td>
<td>Visit to diagnostic lab</td>
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<tr>
<td>64</td>
<td>28 March</td>
<td>Various</td>
<td>Two staff of ELISA diagnostic lab (DIL)</td>
<td>Quetta, Balochistan</td>
<td></td>
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<tr>
<td>65</td>
<td>28 March</td>
<td>Dr Mahmood Bilal</td>
<td>Director, Disease Investigation Lab (DIL), Livestock Department</td>
<td>Quetta, Balochistan</td>
<td></td>
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<tr>
<td>66</td>
<td>28 March</td>
<td>Dr Ghulam Rasool Taj</td>
<td>Deputy Director, Quetta District Veterinary Hospital, Livestock Department</td>
<td>Quetta, Balochistan</td>
<td></td>
</tr>
<tr>
<td>67</td>
<td>28 March</td>
<td>Various</td>
<td>Five veterinary officers and stock assistants of Quetta District Veterinary Hospital</td>
<td>Quetta, Balochistan</td>
<td></td>
</tr>
<tr>
<td>68</td>
<td>29 March</td>
<td>Dr Abdul Hanan</td>
<td>Director General of Balochistan Agricultural Research and Development Centre</td>
<td>Quetta, Balochistan</td>
<td></td>
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<tr>
<td>69</td>
<td>29 March</td>
<td>Various</td>
<td>Nine representatives of Farmer Marketing Cooperatives from districts: Kilasafula, Nushki, Chari, Mastung, Loralai and Quetta.</td>
<td>Quetta, Balochistan</td>
<td>Supported by Balochistan Projects</td>
</tr>
</tbody>
</table>
7. List of Annexes


Annex 1. Potential research areas for Peste des Petits Ruminants (PPR) in Pakistan.

Annex 2. Review of vaccination approaches for Peste des Petits Ruminants in Pakistan

Annex 3. Terms of Reference