GALVmed

Protecting Livestock – Improving Human Lives

Report of Stakeholders' Meeting on Integrated Human and Pig Health Approaches for Cysticercosis Control in India and Nepal.

The Surya, New Friends Colony, New Delhi

16-17 November 2017

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Background:

The context

Taeniasis / cysticercosis caused by pork tapeworm *Taenia solium* is considered as one of the major neglected tropical disease (NTD) of zoonotic origin by WHO and is a leading cause of epilepsy in human. Consumption of undercooked pork obtained from pigs reared in unhygienic, free roaming conditions is a key risk factor for transmission of the parasite to human. Scientifically, the parasite can only be controlled through focused 'One Heath' actions involving interventions directed at prevention and treatment of the disease both in human and pigs, meat inspection etc. besides essentially ensuring personal hygiene and environmental cleanliness more particularly prevention of open defecation.

GALVmed is a not for profit product development and adoption partnership organization which has the objective of ensuring the availability and delivery of livestock health products such as veterinary vaccines, medicines and diagnostics to the farmers on a sustainable basis. GALVmed's priority diseases include zoonotic diseases such as Porcine cysticercosis, Rift Valley Fever (RVF) and Brucellosis. For these diseases, GALVmed's work to date has mostly been on Research and Development with a firm understanding and appreciation that for effective control of these zoonotic diseases in the field, the engagement of human health partners is essential.

In recent years, GALVmed is implementing activities regarding the field testing of a vaccine (TSOL18) in pigs co-administered with oxfendazole (OFZ), a broad spectrum anti-parasitic drug, as a control strategy for *Taenia solium* or pork tapeworm. The TSOL18 vaccine was the outcome of research at University of Melbourne. GALVmed facilitated use of the vaccine and in South Asia and it supported Indian Immunologicals (IIL) to develop the vaccine commercially. Cysvax™ - the commercial vaccine against porcine cysticercosis in Pig has recently been launched in India and Nepal. The life cycle of the pork tapeworm is dependent on the link between humans and pigs. Treatment and vaccination of pigs can break the parasite's life-cycle and thus enable removing the source of infection for humans. However, it is anticipated that significant public advocacy, partnership and funding will be needed to take forward the implementation of taeniasis /cysticercosis control program within India and Nepal with a 'One Health' approach involving partners from multiple specialization.

During May 2017, GALVmed commissioned two consulting organization viz. Vet Helpline India Pvt. Ltd and Heifer International to conduct landscaping study to evaluate how *Taenia solium* control in pigs will integrate within agricultural, medical, food safety and public health framework for India and Nepal respectively.

About the workshop:

The consulting organizations commissioned by GALVmed, conducted the studies in India and Nepal as per designed methodology. The draft report of studies for both the countries was submitted to GALVmed. For GALVmed it was deemed necessary to invite select stakeholders from both the countries for a face to face validation of the reports on one hand and to brainstorm on way forward. To achieve this mandate a workshop titled "Stakeholders' meeting on Integrated human and pig health approach for cysticercosis control in India and Nepal" was organized at The Surya, New Friends Colony, New Delhi from 16-17th November 2017.

Objective of the workshop:

Following was the objective of the workshop:

1. To bring together policy, technical, commercial and development stakeholders and partners from the animal health and human health to share the results of GALVmed activities on Porcine Cysticercosis (PC)
2. To share information on current cysticercosis control programmes in developing countries.
3. To provide feedback and validation of findings from GALVmed commissioned PC Landscaping studies.
4. To explore opportunities for working towards an integrated approach to cysticercosis control in India and Nepal.
5. To call for commitment particularly from policy stakeholders and funding agencies to take action to control cysticercosis.

Expected outcome:

Following outcome was expected:

1. There will be enhanced understanding and appreciation of the prevalence and impact of cysticercosis on animal and human health within India and Nepal.
2. A one health approach to the control of taeniasis / cysticercosis in human and porcine cysticercosis in pig will be proposed for India and Nepal.

Organization:

Selection of participants:

The consultants could reach out to 263 and 30 policy level stakeholders in India and Nepal respectively. The primary study related to KAP (Knowledge Attitude and Practice) also covered 863 and 259 pig farmers and traders for India and Nepal.

The selection of the participants for the workshop was made mostly from amongst the above list of individuals based on following criteria:

- Representation of prominent government stakeholder organization.
- Representation of each of the 7 study states with respect to India.
- A mix of persons both from human and animal health background.
- Persons representing key subject areas like food safety and sanitation.
- Representative of farmer and development organizations known for activities related to piggery sector.

A total of 41 number of individuals with diversified background and institution attended the workshop.

Conduct of the workshop:

The program details containing objective and expectations, soft copies of a summary report highlighting the disease /control measures and each of the study report for India and Nepal was sent to all the invited participants beforehand. The presentation topic for select participants was prepared based on mutual discussion, keeping in mind the needed flow of information in identified thematic areas, work of speakers' organizations and need for specific input for validation and further enhancement of study reports. In designing the conduct of the workshop,

provision was made for recap of learning of previous days, Q&A, group work and discussions. The meeting kit included print copies of reports besides information on control tools e.g. PC vaccine.

The workshop, more particularly Q&A, group work and other discussions were facilitated for enhanced engagement, appropriate documentation and learning of participants. The secretarial office of GALVmed ensured comfortable stay of participants, refreshments, availability of required environment and accessories for successful conduct of the workshop.

Synopsis of speeches and presentations

Besides a short inaugural session, the workshop was divided into 3 technical sessions viz. (1) Scene setting – Cysticercosis prevalence and control, (2) Porcine cysticercosis landscaping studies and (3) towards an integrated One Health approach -Potential partnerships and a session on group work.

While session on landscaping studies was devoted entirely on presentation, discussion on reports of consultants and their validation; other two sessions included presentations of invited speakers focusing on thematic areas.

The outcome of group work was also presented by respective group leaders.

Inaugural session

Inaugural speech of Dr A C Dhariwal,
Director, National Center for Disease Control (NCDC), New Delhi

Dr Dhariwal, welcomed the participants and gave the first inaugural speech. Appreciating participation of people from diversified institution and background, Dr Dhariwal highlighted that One Health is an important approach and the workshop is timely to bring in needed collaborations. Dr Dhariwal referred to the shared values and problems related to disease control between India and Nepal and hope for more strong country level collaborations. According to him economic importance of animal diseases and the interconnectedness of such diseases, environmental changes with that of human health should be highlighted for focused “One Health” related policy actions. Dr Dhariwal informed the participants that joint human and animal health monitoring and outbreak investigation of disease and problems like Antimicrobial Resistance (AMR) is happening in India in recent years and they are showing results.

Inaugural speech of Dr Gyanendra Gongal,
WHO Regional Office for South-East Asia (Food Safety and Zoonoses)

Welcoming participants Dr Gongal highlighted that Neglected Tropical Diseases (NTDs) affect both urban and rural people in poorest communities particularly girls and women. According to him awareness generation, preventive chemotherapy and initiatives focusing on improved sanitation are important interventions that need public funding and private sector collaborations at various levels. He informed the participants that global collaborations and success stories of disease control are now being documented in the context of NTDs and many of such diseases can be eradicated. He referred to WHO -OIE -FAO tripartite collaborations to ensure good governance at the human-animal interface.

Inaugural speech of Dr Lois Muraguri
Director of Policy and External Affairs, GALVmed

Giving her welcome address, Dr Lois urged participants to consider the fact that 75% of emerging pathogens are transmitted from animals to humans and that 6 out of every 10 infectious diseases in humans are spread from animals. She described the "One Health" concept in detail and expressed happiness that following the One Health approach, GALVmed is facilitating sharing of information between sectors in the context of control of porcine cysticercosis. She urged for improved partnerships among players who may have different perspectives and different levels of resources. This according to her would avoid duplication of effort, enhanced resource management, reduce fragmented outcomes and optimize synergies among parties.

Technical session -1: Scene setting

The session which was chaired Dr Khadak S Bisht of FAO of UN and co-chaired by Prof (Dr) Vedantam Rajshekhar, of Christian Medical College (CMC), Vellore covered the thematic area: 'Control of Neglected Tropical and Zoonotic diseases with special reference to available tools for control of porcine cysticercosis'

Presentation by Dr Gyanendra Gongal, WHO

The presentation provided a broad overview of Neglected Tropical Diseases (NTDs) of human and their control strategies. For NTDs inadequate documented evidences is often the prime reason for low priority given to these diseases as far as public-sector health related investment in developing countries are concerned. Cysticercosis is an important NTD which is of zoonotic significance requiring tools to control the disease in animals like pig. His presentation highlighted the fact that NTDs are proxy for poverty and disadvantage and the diseases mostly effects populations with low visibility and little political voice. These diseases cause stigma and discrimination, especially of girls and women. However, NTDs including taeniaisis /cysticercosis can be controlled, prevented and possibly eliminated using available effective and feasible solutions. The availability of a porcine cysticercosis vaccine is bringing hope for success of control program targeted at important NTDs like cysticercosis. Highlighting the importance of integrated approach and partnership, Dr Gongal shared the list of WHO collaborating centers in the context of NTDs and expressed willingness to support India and Nepal where needed for priority diseases including taeniasis/ cysticercosis. It is important to note that, Shandong Institute of Parasitic Diseases Jining, China is the WHO collaborating center on NTDs with interest in taeniasis/cysticercosis.

Presentation by Dr Bhesh Raj Pokhrel, Department of Health Services, Nepal

The presentation gave an overview of NTDs in the context of Nepal. Taeniasis /cysticercosis is a priority zoonotic NTD for Nepal. The presentation highlighted statistics from 2015-16 annual report of the Department of Health services in Nepal, which indicated altogether 20 cases of confirmed neurocysticercosis.

Dr Manish Kakkar, Public Health Foundation of India (PHFI)

The presentation was based on the work of a multi-sectoral initiative in India under the aegis of the PHFI for integrated prevention and control of Zoonoses. It highlighted the existing institutional framework, research network in India and listed zoonoses priorities for India prepared through a systematic consultative process conducted under the initiative during recent years. Though there is no specific mention of cysticercosis in this

priority list, helminths as a group were identified as a top ten priority. The presentation highlighted the importance of research for evidence and showed the ranking of zoonoses research areas in India based on observed priority. Indicating the priority research options at the foundation under its flagship program 'Roadmap to combat Zoonoses in India (RCZI) the presentation, and mentioned a few areas that may be relevant in the context of porcine cysticercosis. This includes topics like extent and mechanism of helminth drug resistance, evidence of parasitic worms adapting to new host, measurement of impact of worm burden on the morbidity and transmission in human and animals.

Dr Manjari Tripathy, Centre of Excellence for Epilepsy, All India Institute of Medical Sciences.

Titled as "A worm in Brain: The Past, Present and Future and Epilepsy control", the presentation covered in detail about neurocysticercosis and epilepsy. It highlighted the fact that the disease is not confined to poor and one can get it even from vegetables cultivated and procured from open defecation areas. It suggested that improvement in general sanitation and pig husbandry are two key aspect to control of neurocysticercosis. Indicating about an effort at national level in India in recent years to develop a country wide epilepsy control program, the presenter informed that the government in India is yet to consider such a program.

Dr N S N Bhargava, Indian Immunologicals Ltd (IIL).

The presentation introduced participants of the workshop to 'Cysvax™' – the commercial porcine cysticercosis vaccine for pigs produced by Indian Immunologicals Ltd (ILL) in collaboration with GALVmed and University of Melbourne. Highlighting the fact that along with Cysvax™, 10% Oxfendazole solution is recommended to bring down the worm load, the presenter informed that Oxfenvet liquid (the commercial IIL brand of oxfendazole) which is easy to administer to pig will be launched shortly. The presenter informed the participants that, IIL can scale up the production of vaccine based on demand and urged government representatives to explore possibility of procurement under existing government schemes e.g. GOI scheme: Assistance to States for Control of Animal Diseases (ASCAD).

Angie Colston, GALVmed and Dr I Poudel, Heifer Nepal

The presentation introduced the participants to KAP (Knowledge Attitude Practice) surveys and various trials conducted to check the efficacy of porcine cysticercosis control tools in pigs. The successful trials were conducted in Nepal, Tanzania, Uganda and Zambia. Preliminary data from two of the field trials have shown that three monthly intervention with Cysvax™ vaccine and Paranthic™ 10% (Oxfendazole brand, MCI Sante Animale, Morocco) eliminated cysts in pigs in Nepal and Uganda. The intervention regimen was found to be safe (with no adverse reaction) and there is high level of compliance and acceptance. The presentation highlighted some of the anecdotal evidence from pig farmers that there were economic benefits.

Dr Habibur Rahman, International Livestock Research Institute, New Delhi

The presentation covered in detail the animal disease surveillance and reporting system in India and highlighted the need of awareness of field level functionaries to use the system effectively to capture information about cysticercosis which is essential for assess the impact of the disease burden in animals and for sound policy decisions.

The session ended with a valuable remark of the Chairman that porcine cysticercosis vaccination should be bundled with classical swine fever vaccination program.

Technical session - 2 Porcine cysticercosis landscaping studies

The session which was chaired Dr Dilip Sarma, Director, ICAR-National Research Centre on Pig, India and co-chaired by Dr Manish Kakkar of Public Health Foundation of India, introduced the workshop participants to the findings of GALVmed sponsored landscaping studies conducted in Nepal and India.

The presentation on each of the landscape reports was made by the organizations commissioned viz. Vet Helpline India Pvt Ltd (for India) and Heifer International (for Nepal)

The India presentation highlighted the general policy environment, institutional set up for animal disease reporting and control, initiatives for intersectoral collaboration, the framework for disease control, surveillance, meat inspection besides effect of the disease on trade in pork and pork products. Considering the importance of environmental cleanliness in the control of the disease it also indicated the landscape of sanitation and waste water use in India. The learning on the landscape is likely to help stakeholders to take a holistic approach and collaborate for a One Health national taeniasis / cysticercosis control program. One of the important aspect of India report presentation was the use of available population based government data to highlight the magnitude and spread of epilepsy problem. The presentation highlighted an analysis where district level data from three states in India are used to show the correlation between reported cases of epilepsy (recorded under broad heading of other neurological disorder) and the pig population. The analysis indicated the potential of using available multiple population based government data such as reported cases of other neurological disorder, census data on pig population and Individual household latrine coverage data to target future cysticercosis control program. Referring to findings of knowledge attitude and practice survey the presentation indicated that public funding will be essential for enhanced adoption of porcine cysticercosis control tools e.g. Vaccines, anthelmintic etc. and to bring about positive behavioral change of majority of pig farmers, traders and field level development workers.

The Nepal presentation highlighted in detail the findings of literature review on prevalence of cysticercosis and baseline survey of pig farmers and policy stakeholders on knowledge, attitude and practice. Important analysis of the presentation included annual growth of epilepsy cases in Nepal in relation to pig population growth.

The presentations were followed by session on validation where participants raised questions related to study methodology, literature review. (Missing papers), ‘One health’ policy environment and on Knowledge Attitude Practice study.

Some participants raised the issue of small sample size per study state in India context and informed about additional published scientific papers that can be included in the literature review of India study.

The participants discussed on the study limitations and accepted the reports as potential base documents for further field level initiatives to create awareness and develop action plan for control of taeniasis / cysticercosis in both the countries.

The session continued with a group work, where participants were facilitated to discuss among themselves and present on following aspects:

- What evidence is missing for GOI / individual states / Nepal to prioritize cysticercosis control by respective government?
- Is there any gap in policy, administrative and legal framework?
- Who are the key stakeholders (Public / Private) who needs to be involved?
- Any specific learning or best practice related to implementation of 'One Health' projects?
- How the group intends to take forward cysticercosis control agenda in future?

Summary of input received form group work

The participants listed following

Missing evidence:

- Absence of population based surveillance data collected by public agency.
- Actual burden of the disease.
- Risk factors and detail epidemiology.
- Absence of cost effectiveness data pertaining to use of porcine cysticercosis control tools.
- Limited understanding on *Taenia asiatica* prevalence in India and Nepal
- Evidences as to whether people will pay more for better quality pig?

Gaps in policy:

- Taeniasis / neurocysticercosis is not notifiable. Compliance related to mandatory notification of porcine cysticercosis is negligible.
- Absence of regulation and other means in many states to ensure scientific rearing of pigs, to prevent roadside slaughtering and to ensure enforcement of meat inspection.
- Policy support for creation of official slaughter houses for public use.
- Policy to create a para professional category for meat inspection.
- Stringent sanitation related regulation.

Key stakeholders to involve in control programs:

- Animal Husbandry and Veterinary Department (National / State)
- Human health Department / National Health Missions (At national and state level)
- Local civic bodies e.g. Panchayat or municipalities.
- Urban and rural development departments.
- Water and sanitation department (National / State).
- Non-Governmental organizations (NGOs)
- Educational institutions (Veterinary and Human Health)
- Independent Veterinarians and medical service providers.
- Pig farmers (Organized / Unorganized)
- Private sector pig breeders' associations
- Vegetable growers' associations.
- Butchers / pork retailers.

- Private slaughter houses / Pork processing industries
- Consumers

Specific learnings or best practices related to implementation of One Health:

- Avian Influenza control program in India and Nepal.
- Multi disease approach meeting the immediate need of client.

Specific actions to take forward cysticercosis control agenda:

- Engagement to ensure political will.
- Strengthening of surveillance system / reporting of cases.
- Development of local level mechanism for inter sectoral collaboration e.g. between health and veterinary and sanitation department for cysticercosis control
- Development of appropriate Information, Education, and Communication (IEC) materials in local language.
- Support for mass awareness program on the disease and the need of hygiene and sanitation.
- Support for research for diagnostic facility in live pigs.
- Support for vaccination and deworming of pigs.
- Clubbing of cysticercosis control program with other pig diseases.
- Support for pilot projects to learn on implementation issues.
- Incentive to farmers for adopting scientific rearing practices.

Partnership opportunities

The group work was followed by a presentation by Dr M Islam Barbaruah that highlighted the following institution / programs as potential partner for a national cysticercosis control program in India and Nepal. This is excluding nodal departments / agencies like National Center for Disease Control (NCDC) and Department of Animal Husbandry, Dairying and Fisheries (DADF) for India and Department of Health Services and Department of livestock services for Nepal.

1. Swachh Bharat Abhiyan (Clean India Mission) of Ministry of Drinking Water and Sanitation, Government of India.
2. Global Health Security Agenda (GHSA)-Zoonotic Disease Action Package and International partners like CDC, WHO and OIE.
3. Soil Transmitted Helminth Control programs.
4. Scheduled Caste Sub Plan (SCSP) and Tribal Sub-Plan (STSP) fund mechanism of Government of India.
5. Professional societies of neuro-surgeons in both countries e.g. Indian Epilepsy Society (Partnership for enhanced reporting of epilepsy cases originating from neurocysticercosis.
6. Any National program for epilepsy control and
7. Center of excellence for epilepsy study. e.g. AIIMS in India.
8. National institutions related to research in Pigs e.g. ICAR National Research Centre on Pig (India), IVRI's outreach program on Zoonosis (India).
9. International Livestock Research Institute (Smallholder Piggery linked projects)
10. National and international NGOs e.g. Heifer International (Nepal), Tata trust and its associated NGOs (India).

Technical session - 3: Towards an integrated One Health approach-potential partnerships

The session which was chaired by Dr H Rahman of ILRI and co-chaired by Dr B. Rijal of Animal Husbandry and Veterinary department, Government of Meghalaya covered the thematic area: One Health approach: Potential partnerships.

The session was enriched with following presentations:

Presentation by Dr Gyanendra Gongal, WHO

The presentation covered control strategies of taeniasis and cysticercosis and WHO perspective on One Health. It highlighted that zoonoses is a focus area of WHO's Asia Pacific Strategy for Emerging Diseases (APSED). The presentation also indicated that there is a tripartite (FAO /OIE / WHO) coordination mechanism for Asia Pacific region that can support One Health initiative at country level.

Presentation by Dr Naveen Kumar Gupta, NCDC-India

The presentation covered a detail account of intersectoral coordination in India for prevention and control of zoonotic diseases and elaborated about NCDC's Integrated Disease Surveillance Program (IDSP). Government is taking initiative to integrate IDSP to National Animal Disease Reporting System (NADRS) and National Animal Disease Referral System (NADRES). Though cysticercosis is a recognized endemic zoonosis in India, IDSP only gives flexibility to states for monitoring of neurocysticercosis as state specific disease. However, the presentation showed that Indian state is currently capturing data on neurocysticercosis.

Dr Vedantam Rajsekhar, CMC Vellore

The presentation discussed in detail about various prevalence related technical and community level studies. Quoting relevant research, the presentation showed the prevalence of neurocysticercosis leading to active epilepsy in Indian population at 1/1000. The presentation also mentioned research that indicated that Indians are highly exposed to *T. Solium* antigens. Communities with pigs have higher levels of antigen. The observed sero-prevalence was indicated at 15.9%. The statistics on prevalence aptly highlighted the need for public investment for increased awareness and control measures.

Dr S B Barbuddhe, ICAR-National Research Centre on Meat

The presentation covered pork safety aspect and indicated the need for enhancing the consumer awareness. It also highlighted the fact that slaughter house workers and pork retailers, butchers are important value chain partners for any designed cysticercosis intervention program.

Dr Dilip Sarma, ICAR – National Research Centre on Pig.

The presentation gave a detail overview of piggery sector in India. Highlighting the growing demand for quality pork the presentation indicated the need for control of diseases like porcine cysticercosis in the pig which is essential to ensure trade related capacity of domestic producers. Porcine cysticercosis control related activities can be integrated with existing development programs.

Dr. Salina Manandhar – Department of Livestock Services, Nepal

The presentation gave an overview of present working mechanism for integrated disease control in Nepal. Since Nepal is going through a political federalization process, it will be both a challenge and an opportunity to improve the mechanism essentially operationalizing the one health concept. The presentation outlined an integrated cysticercosis control program that can be undertaken in Nepal in a planned mode involving all related sectors.

The session ended with comment of President of Nagaland Pig Farmers' Association Rev N Subong Aier He has pointed out that the time has come for action. The farmers are willing to invest in deworming and vaccination as this results in safe pork and resultant better price of produce. However, porcine cysticercosis control tools e.g. vaccine and drug for deworming must be made available farmers everywhere.

Recommendations:

A designed 'One Health' cysticercosis control program assumes immense importance in the context of government agenda of preventive health focus and achievement of SDG goal target 3.3 related to Neglected Tropical Disease (NTDs). Participants reviewed following key recommendations, detail of which can be obtained from the respective landscape reports.

1. Create awareness about taeniasis / cysticercosis amongst farmers and pork consumers.
2. Promote personal hygiene, environmental cleanliness (Prevention of open defecation) and better pig husbandry practices, possibly bringing smallholder free range farmers under collectives such as cooperatives, producer groups etc.
3. Orient field level officials, medical / veterinary professionals to ensure reporting of cases related to neurocysticercosis / porcine cysticercosis.
4. Support funding of need based research aimed at exploring epidemiology, risk factors and prevalence of cysticercosis and development of diagnostic kits.
5. Review population based data (where available) to develop risk based, targeted, one health cysticercosis control program at national Level. Such program should be aligned with any future National epilepsy / helminth control program.
6. Prepare model instruction for reference of pig slaughter houses specifying the procedure of meat inspection in pig and the policy to be followed for condemning carcasses. Encourage slaughter houses / processing plants procuring pigs from traders / farmers to give value for porcine cysticercosis vaccinated pigs.
7. In places where there is no government framework for joint actions as far as zoonotic disease control are concerned, notify constitution of joint technical group and earmark resources for their functioning.
8. Ensure demand based commissioning of low cost community slaughter houses (managed and operated by community level institution).
9. Train selected people from community or animal health workers at community level on basic aspects of meat hygiene and inspection. This can make meat inspection efficient and thus help in control of taeniasis / cysticercosis.

10. Engage with civil servants / local governments to create appropriate one health structures, ensuring convergence of developmental schemes related health care, sanitation and water supply etc. in taeniasis / cysticercosis hotspot areas.
11. Facilitate availability of tools e.g. vaccines and drugs. Role of private sector companies who makes it feasible the delivery of disease control tools (e.g. Drugs for control of taeniasis, vaccine for pig etc.) is crucial for success of the future control program.

Way forward: Participants commitment:

Select participants of the workshop who are either representing an institution or a State joined for way forward session at the end of the workshop. They highlighted their commitment which are listed in below:

Mr Manoj Sinha, Jharkhand Tribal Development Society(JTDS)

We will disseminate information about cysticercosis and its control to 7000 women self-help groups in 6050 villages where our organization is actively working.

Dr Deepak B Rawool, Indian Veterinary Research Institute (IVRI)

We will make all endeavors to create awareness about cysticercosis and its control in villages covered under *Mera Gaon Mera Gaurav scheme* of Government of India. The scheme has been conceptualized in which scientists of ICAR and Agricultural Universities identifies villages near the Institutions for providing advisories and consultations to farmers for increasing farm productivity and production.

Dr Dilip Sarma-ICAR, National Research Centre on Pigs

We have 15 centers through which awareness about cysticercoses will be created amongst 10,000 farmers. The institute has already identified 5 villages for clean pork production. It will also popularize designed low cost mini slaughter houses for hygienic pork production. A pilot campaign with Cysvax™ vaccination will also be considered.

Dr Bhesh Raj Pokhrel, Department of Health Services, Nepal

We will initiate steps for good coordination with livestock services department for joint control of cysticercosis. We will also create awareness about cysticercosis amongst community health workers

Dr S A Laskar, Veterinary Consultant, IDSP Assam-

We will disseminate information about need of control of porcine cysticercosis during joint orientation trainings.

Dr Khadak S Bisht, Regional Support Unit for SAARC, FAO of UN

We will discuss about the report and the workshop at FAO-RAP, Bangkok for possible support to countries.

Dr H Rahman, International Livestock Research Institute (ILRI), New Delhi

ILRI is functioning in 23 countries and we will check if any of these countries has porcine cysticercosis control program in collaboration with ILRI. Food safety and smallholder agriculture is one of the core area of ILRI and we

will explore if cysticercosis related interventions can get the priority. We will also inform scientists in partner organizations working in piggery related projects in Assam and Nagaland to help in creating the awareness.

Dr Vinay Garg, NCDC, New Delhi

National deworming day is organized every year. We will explore if awareness regarding cysticercosis can be created during the school visits organized as a part of the event.

Dr B Rijal- Directorate of Animal Husbandry and Veterinary, Meghalaya

We have already initiated Cysvax™ vaccination and regular deworming program for pigs within the state. A new plan for government funding will be designed where PC vaccination will be clubbed with vaccination for classical swine fever. We will also take initiative to strengthen PC related data collection from districts.

Dr P Pandey-Agriculture, Animal Husbandry & Co-operative Department, Government of Jharkhand

We will create a joint working group with all stakeholders and organize a meeting at state level. This meeting will assign responsibilities to various participants.

Dr. L. Temsu Ao, Directorate of Animal Husbandry and Veterinary, Government of Nagaland.

We will organize a consultative meeting with the health department to facilitate preparation of a state level action plan. A pilot program will be organized to assess the feasibility of clubbing PC vaccination with CSF vaccination.

Dr CM Singh, All India Institute of Medical Sciences (AIIMS), Patna. Bihar

We will ensure cysticercosis related awareness creation in community and school health programs. Frontline workers will be trained so that they can further disseminate disease information and control options. Undergraduate MBBS students can be informed about NTDs especially cysticercosis.

Dr Damodar Singh, Central Agriculture University, Aizawl, Mizoram

Will include porcine cysticercosis related discussions during university level extension activities- training, awareness programs.

Mr NSN Bahrgava, Indian Immunological Ltd.

Will pursue registration of vaccine in more countries where PC is endemic. Will assist state governments in India in preparing proposals for central government before 1st Feb 2018, to ensure vaccine for next year.

List of participants:

SNO.	NAME	ORGANISATION	STATE
1	Rev N Subong Aier	President Nagaland Pig Farmers Association (NPFA)	Nagaland
2	Dr B Rijal	Director, AH Veterinary	Meghalaya
3	Mr Manoj Sinha	Additional Project Director, Jharkhand Tribal Development Society(JTDS) Ranchi	Jharkhand
4	Dr Prabhat Kumar Pandey	Department of AH & Fisheries & Registrar Co-Operative Societies	Jharkhand
5	Dr. L. Temsu Ao,	Joint Director, Directorate of AH &VS	Nagaland
6	Dr Dilip Sarma	Director NRC-Pig ICAR	Assam
7	Dr SA Laskar	State Veterinary Consultant, IDSP	Assam
8	Dr SB Barbuddhe	Principal Scientist, ICAR- NRC Meat	Hyderabad, Andhra Pradesh
9	Dr CM Singh	Professor of Community Medicine AIIMS Patna	Bihar
10	Dr Rajiva Dingar	Directorate of AH	Uttar Pradesh
11	Dr H Rahman	ILRI	Delhi
12	Dr Manish Kakkar	PHFI	Delhi
13	Dr A.C. Dhariwal	Director, NCDC	Delhi
14	Dr Naveen Gupta	Division of Zoonosis, NCDC	Delhi
15	Dr S M Nataraju	Vet Consultant IDSP, NCDC	Delhi
16	Dr Saurabh Goel	NCDC	Delhi
17	Dr. Davendra Kumar	NCDC	Delhi
18	Dr. Ashok Talyan	NCDC	Delhi
19	Dr Vinay Garg	NCDC	Delhi
20	Dr G.Gongal	WHO	Delhi
21	Dr. John Kemp,	IDSP	Nagaland
22	Dr V Rajshekhar	CMC, Vellore	Tamil Nadu
23	Dr Bandana	Public Health officer, EDCD Kathmandu.	Nepal
24	Dr Ishab Poudel	Heifer International	Nepal
25	Dr NPS Karki	Heifer International	Nepal
26	Dr Salina Manandhar	Chief, Veterinary Public Health DLS	Nepal
27	Dr Khadak Singh Bisht	RSU Coordinator, Regional Support Unit for SAARC FAO of UN	Nepal
28	Dr Bhesh Raj Pokhrel	Senior public health administrator, EDCD, DLS	Nepal
29	Dr M Islam Barbaruah	Vet Helpline India Pvt Ltd. (GALVmed Consultant for India)	Assam
30	Dr Bhagat Lal Dutta		Assam
31	Dr Kowshick Raghavan		Assam
32	Dr Manjari Tripathi	Centre of Excellence for Epilepsy, AIIMS	Delhi
33	Mr NSN Bhargava	IIL, Hyderabad	Andhra Pradesh
34	Dr Nyanthung Kikon	IDSP	Nagaland

35	Dr W Stone Dann	Veterinary Consultant IDSP	Meghalaya
36	Dr Deepak B Rawool	Senior Scientist, IVRI	Uttar Pradesh,
37	Dr Arlyne Beeche	Senior Program Officer, IDRC	Delhi
38	Dr Peetambar Kushwaha	GALVmed Staff	Delhi
39	Dr Mamta Dhawan		Delhi
40	Dr Lois Muraguri		Edinburgh
41	Dr Angie Colston		Nairobi