Reducing pig diseases and improving food safety in smallholder pig value chains in Vietnam

Report of the inception workshop held at Hanoi, Vietnam
12 – 14 August 2012
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Summary

In Vietnam, pork accounts for 75% of meat consumed, with its production delivering substantial benefits to the smallholders who supply 84% of the market. However, as previous research by the International Livestock Research Institute (ILRI) has found, pork in Vietnam is often contaminated with microbes or chemicals. This is an issue of growing concern among policymakers and the public: not only are the health impacts unknown but concern over food safety may also act as a constraint to smallholder production.

In light of this, the Australian Centre for International Agricultural Research (ACIAR) is funding a new ILRI-led project on reducing risk in Vietnam’s smallholder pig value chain. The project, *Reducing pig diseases and improving food safety in smallholder pig value chains in Vietnam* (abbreviated ‘PigRisk’ in this report) is led by ILRI in collaboration with the Hanoi School of Public Health (HSPH) and the Hanoi University of Agriculture (HUA). This new project builds on the findings of previous research by ILRI on improving competitiveness of pig producers in an adjusting market in Vietnam, also funded by ACIAR.

The project inception meeting was held in Hanoi, Vietnam on 12–14 August 2012. It was an opportunity to present the project as well as the concepts of risk and risk management to a wide range of stakeholders in Vietnam including government ministry representatives, development practitioners, scientists, private-sector stakeholders and researchers from the areas of animal health, public health, economics and ecology. The project was introduced and discussed at length by participants.

Facilitated by project team members from ILRI and primary project partners from HSPH and HUA, the workshop introduced participants to the key research areas of the project:

- Assessing the human and economic costs of pork-borne diseases in smallholder pig value chains
- The adoption of ‘risk-based’ approaches to food safety and pork-borne diseases as opposed to the currently applied ‘hazard-based’ approaches
- Incentive-based innovation as a means of improving the management of human and animal health risks in smallholder pig value chains

Resulting participant discussion centralized upon the crucial distinction between ‘risk’ and ‘hazards’, and how this affects decision making, at both consumer and policy-making levels. Exploring the concept of incentive-based approaches in improving human and animal health management also elicited strong interest from workshop participants.

Also in attendance at the workshop was the ILRI director general, Jimmy Smith, who highlighted the ongoing challenge of food scarcity and high food prices, and the importance of Southeast Asia in ILRI’s research agenda. Smith also reiterated the significant role of livestock smallholders in responding to this challenge and how projects such as this are vital in providing the support smallholders require to adequately supply affordable and safe food to the market to meet consumer demand.

Report by Delia Grace, Andrew Nguyen and the project team
Editing and formatting by Tezira Lore and Rosekellen Njiru (ILRI)
Workshop agenda

Introductions
- Representative from the Ministry of Agriculture and Rural Development
- Dr Jimmy Smith, Director General, ILRI
- Mr Geoff Morris, Country Program Manager, ACIAR
- Dr Le Vu Anh, Dean, HSPH
- Dr Tran Duc Vien, Rector, HUA

Presentations on key learning from previous research
- What we have learned about smallholder systems: Dr Tom Randolph (ILRI), director of the CGIAR Research Program on Livestock and Fish
- What we have learned about disease risks and food safety: Dr Delia Grace (ILRI), leader of the agriculture-associated diseases theme of the CGIAR Research Program on Agriculture for Nutrition and Health
- What we have learned from previous research in Vietnam and the rationale and objectives of the new project: Dr Lucy Lapar, agricultural economist, ILRI

Presentations on key aspects of the project
- Risk assessment in pork: Dr Nguyen Viet Hung, HSPH
- Animal health assessment (including zoonoses) in smallholder pig value chains: Dr Fred Unger, veterinary epidemiologist, ILRI
- Economic assessment of disease risks in pig value chains: Dr Pham Van Hung, HUA
- Testing innovative intervention with randomized controlled trial (RCT): Dr Hoang Van Minh, Hanoi Medical University

From research outputs to outcome to impact: Mapping the impact pathway
- Mapping the impact pathway: Dr Steve Staal, director of the Markets, Gender and Livelihoods Theme, ILRI
- Expected impacts of the project: Dr Nguyen Viet Hung (HSPH) and Dr. Pham Van Hung (HUA)
- Group exercise on Outcome Mapping: Facilitated by Korapin Tohtubtibtang, monitoring and evaluation and operational support, EcoZD project (ILRI) and Rainer Assé, researcher, social sciences and natural resource management (ILRI)

Feedback from ILRI partners and stakeholders

Wrap up and closing remarks
Opening remarks

Nguyen Viet Hai, deputy director general of the Ministry of Agriculture and Rural Development (MARD)
Vietnam is still very much an agricultural country. The main challenges that the MARD identifies are low productivity from livestock rearing in terms of output per unit and quality of products across the market. Stressing the importance of importance of research, he noted that USD1 of agricultural research here can provide a return of USD 40. MARD is looking to increase the research budget by 10–12% per year, up from the current level of approximately 800 billion Vietnamese Dong.

Jimmy Smith, director general, ILRI
Smith began by highlighting the challenge we all face as a result of the food price crisis, noting that there is an ongoing concern about how the world will feed itself. Smallholders are an essential part of the food supply system and should not be forgotten as they can produce food that is both safe and wholesome. The general impression, however, is that the food sold by smallholders in informal markets is not as safe as that sold in conventional markets. This project aims to demonstrate that informal food markets are safe and that they can be safer. The project also aims, from an ILRI perspective, to provide research evidence to the notion that smallholders can contribute to the global and national food supply system. To achieve this, we need to help increase their productivity and make their products safer. As a relatively small institution, we are always looking to build and strengthen greater partnerships to achieve our common goals.

Le Vu Anh (HSPH) and Tran Duc Vien (HUA)
In Vietnam, pig production is the main livestock activity. Pig diseases in Vietnam are a big concern for not only consumers but also for the Vietnamese government. This project will contribute not only in terms of capacity building, but also by responding to the concerns of both the Vietnamese government and Vietnamese households.

Geoff Morris, ACIAR Vietnam country representative
The previous ACIAR-funded, ILRI-led project, Improving the competitiveness of pig producers in an adjusting Vietnam market, demonstrated that smallholders provide an important contribution to the market and will continue to do so in the foreseeable future. However, the project also highlighted the risks associated with their market position. This new project fits into two key ACIAR areas of focus for Vietnam: sustainable food production and smallholder sustainability.

The project will also help ACIAR understand how to better target pro-poor projects. Industrialization in Vietnam is not a reality in the short to medium term, so it is important that we continue to look at how smallholders can continue to be supported. Morris stressed the importance of partnership and that it was not merely restricted to the three implementing institutes (ILRI, HSPH and HUA).
Overview of the PigRisk project

Goal of PigRisk
To improve the livelihoods of the rural and urban poor in Vietnam through improved opportunities and incomes from pig value chains as a result of reduced risks associated with pork-borne diseases.

Objectives of PigRisk
- To assess impacts of pork-borne diseases on human health and the livestock sector and identify critical control points or opportunities for risk management.
- To develop and test incentive-based innovations to improve management of human and animal health risks in smallholder pig value chains.
- To sustainably improve capacity to assess and manage risks to smallholder pig value chains by engaging smallholders and co-generating evidence.

Framework of PigRisk

Embedded in the CGIAR Research Program on Livestock and Fish
Presentations on key learning from previous research

What have we learned about smallholder systems?¹
Dr Tom Randolph, ILRI

The new challenge: how to ensure access to animal source food in 2050?

- Nearly everyone consumes some animal-source food in their diet
- Animal-source foods are dense sources of critical high-quality nutrients
- Nearly a billion people rely on livestock and aquaculture in small-scale production and marketing systems for their livelihoods
- Livestock development often viewed as an opportunity to reduce poverty and enhance food security

An opportunity = the Livestock Revolution

- The accelerating demand in developing countries as urbanization and incomes rise - mainly in the developing countries (see table below)

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual per capita consumption</th>
<th>Total annual consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Meat (kg)</td>
<td>Milk (kg)</td>
</tr>
<tr>
<td>Developing</td>
<td>2002</td>
<td>28</td>
</tr>
<tr>
<td>World</td>
<td>2050</td>
<td>44</td>
</tr>
<tr>
<td>Developed</td>
<td>2002</td>
<td>78</td>
</tr>
<tr>
<td>World</td>
<td>2050</td>
<td>94</td>
</tr>
</tbody>
</table>

Source: Rosegrant et al. (2009)

- Industrial systems will provide a large part of the needed increase in supply to cities and the better-off in some places
- But the poor will often continue to rely on small-scale production and marketing systems
- For example, informal raw milk markets handle over 80% of milk sold in East Africa and India
- Therefore, smallholder production could contribute, by both increasing supplies and reducing poverty, and better manage the transition for many smallholder households

Managing the transition of smallholders out of agriculture

Various estimates for smallholders in Africa and Latin America (Dorward 2009; Wiggins 2012)
- One third will 'step up' to become commercial farmers
- One third will 'step out' and work for others or go to cities
- One third could go either way

¹ Presentation available online at http://www.slideshare.net/ILRI/what-have-we-learned-about-smallholder-systems
Could two-thirds of smallholders be enabled to develop into commercial producers, accumulate capital and transition out of agriculture, and so drive stronger economic growth and avoid social disruption?

To enable agriculture we must fix productivity gaps

A smarter approach – the new CGIAR Research Program on Livestock and Fish

- Focus on the full value chain from farm to table
  - Appropriate technologies and information
  - Institutional and policy strategies
  - ‘Push’ from sustainable systems for inputs and services
  - ‘Pull’ from better understanding of how to access market opportunities
- Target pro-poor transformation of the value chain
- Work from the beginning with development partners
- Generate solutions and evidence to translate into major development interventions

The CGIAR Research Program on Livestock and Fish focuses on nine value chains in eight countries
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What we have learned about disease risks and food safety in the informal food sector
Dr Delia Grace, ILRI

What is the informal food sector in developing countries?
- Markets where many actors are not licensed and do not pay tax (e.g. street foods, backyard poultry, pastoralist systems);
- Markets where traditional processing, products and retail practices predominate (e.g. wet markets, traditional food processing);
- Markets which escape effective health and safety regulation (most domestic food markets in developing countries).

How do we assess food safety in informal food sectors?
- Risk-based approach is the gold standard but poorly adapted for developing countries
- Using participatory methods can increase stakeholder engagement and capacity while helping generate information in data-scarce environments
- We have developed a number of tools including participatory appraisals; focus group discussions; questionnaires; direct observation and biological sampling
- Over the past decade, ILRI and partners have implemented the following:
  - 30 risk assessments in informal markets
  - 10 consumer preference studies
  - 8 food safety policy analyses
  - 4 risk management studies
  - Around 30 graduate students trained

The informal food sector is very important
- Across a range of foods and countries, typically 80-90% of animal-source food is produced by smallholders and sold in wet markets
- Supermarkets are emerging but tend to stock staples and processed good rather than fresh animal-source foods

<table>
<thead>
<tr>
<th>Vietnam</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td>80% of pork comes from farmers with &lt;100 pigs</td>
<td>48% of pork comes from farmers with &lt;50 pigs</td>
</tr>
<tr>
<td>97% of pork is sold in wet markets</td>
<td>80-90% of pork sold in wet markets</td>
</tr>
</tbody>
</table>

The informal food sector delivers many benefits
Livestock are an important asset for poor people
- 1 billion people earning less than USD 1.25/day depend on livestock
- 65% of Vietnamese households keep pigs

Generates employment
- 100 litres of milk generates 5.6 jobs making milk sweets in Bangladesh and 10 jobs selling milk snacks in Ghana
- Informal dairy sector in Kenya generates 735,000 jobs; the formal only 105,000

Provides cheaper food
- China: supermarket meat 10% premium
- Kenya: pasteurized milk 25-40% premium

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But there are increasing concerns over food safety in developing countries
Across 7 studies in sub-Saharan Africa and Asia we found
- Many/most consumers say they are concerned over food safety (40 to 97%)
- Consumers are willing to pay a 5-10% premium for safety
- Younger, wealthier, town, supermarket shoppers were willing to pay more for safety
- Consumers showed their concern by buying 20-40% less during animal health scares

In some cases these concerns are well justified, in others they are not
- Only 4% of consumers in Vietnam reported gastro-intestinal illness in the previous 2 weeks (and there was no relation with pork or meat consumption)
- More than double this number of consumers in Nigeria reported illness in the previous 2 weeks (and there was a strong relation with meat consumption)
- As many as 23% of consumers in Nagaland reported illness (no relation with pork, meat or vegetable consumption but strongly related with hygiene)
- A shocking 43% of Nigerian butchers reported illness (strongly related to group, gender, hygienic practice and eating own products)

And findings are often counter-intuitive
- In Hanoi, supermarket pork had more faecal bacteria than wet-market pork
- In India and Kenya, more formal sector milk failed to meet standards
- In Uganda, farmers who were more visited by authorities had worse milk

HIGH LEVELS OF HAZARDS MAY NOT RESULT IN HIGH LEVELS OF RISK
WE CANNOT ASSUME RISK; WE HAVE TO ASSESS IT

Fortunately, improvements in food safety can be feasible, effective and affordable
- Branding and certification of milk vendors in Kenya: led to improved milk safety and saved economy USD 33 million.
- Peer training, branding, innovation for Nigerian butchers led to 20% more meat samples meeting standards and cost $9 per butcher but resulted in savings USD 780/per butcher per year from reduced COI.
- Providing information on rational drug use to farmers, led to a four-fold increase in knowledge, two-fold increase in practice and 50% decrease in disease.
What we have learned from previous research in Vietnam

Dr Lucy Lapar, ILRI

Pork accounts for 40% of meat expenditure by Vietnamese households

The previous study found among consumers
- A strong preference for fresh pork over chilled or frozen pork
- Tendency towards preferring lean meat: 75% prefer lean meat whereas in the past, fat meat was preferred
- Wet markets are strongly preferred: 97% purchase pork from permanent open markets or traditional temporary outlets

The previous study found for producers
- Most (80%) pork comes from household farms
- Household-based production can generate gross margins of USD 0.2-0.8 per kg live weight pig produced
- Farms are getting bigger but 56% of farms keep two or fewer pigs
- Small farmers can reduce costs by using own-produced feed

The previous study found the following benefits for small-scale pig production
- Pigs contribute 14% of rural household income or 24% of income from agriculture
- Each 100 kg of live pig generates USD 62 in added value along the value chain
- Producers receive 56-65% of the retail price of pork
- Smallholder pig production generates employment estimated at about 4 million full-time workers along the pork supply chain, valued at about USD 3.3 billion or approximately 5.5% of Vietnam’s GDP in 2007
- Women’s labour accounts for at least half of total labour days in household pig production

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Concerns about food safety

- Nearly half the consumers (43%) had concerns about pork.
- The most common concern was fear of disease from pork, followed by fear of chemical contamination, un-fresh pork and bad smell.
- Only 1% expressed nutritional concerns.

**Average ranking of major concerns about meat safety**

<table>
<thead>
<tr>
<th>Food safety concern</th>
<th>Hanoi</th>
<th>Ho Chi Minh City</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diseases of livestock</td>
<td>1.2</td>
<td>1.1</td>
<td>1.2</td>
</tr>
<tr>
<td>Hormone used in animals</td>
<td>2.8</td>
<td>3.0</td>
<td>2.9</td>
</tr>
<tr>
<td>Antibiotic use</td>
<td>3.0</td>
<td>2.9</td>
<td>3.0</td>
</tr>
<tr>
<td>Hygiene in market outlet (including meat seller)</td>
<td>3.8</td>
<td>2.6</td>
<td>3.2</td>
</tr>
<tr>
<td>Hygiene in slaughtering</td>
<td>3.9</td>
<td>2.8</td>
<td>3.4</td>
</tr>
<tr>
<td>Concentrate feeding of animals</td>
<td>3.7</td>
<td>4.1</td>
<td>3.8</td>
</tr>
<tr>
<td>Other</td>
<td>3.5</td>
<td>3.1</td>
<td>3.2</td>
</tr>
</tbody>
</table>

In response to a pig disease outbreak, 87% of consumers in Hanoi reduced consumption

**Economic models suggest large-scale producers will supply 5-12% of pork in 10 years**

**Conclusions**

- Smallholder pig producers are competitive in producing pork that meets the demand requirements of Vietnam’s fresh meat market.
- Household pig producers are able to generate incomes from pig raising by exploiting areas where they have cost advantage.
- Expanding options for own-produced feeds, in terms of choices and quality, can enhance smallholders’ competitiveness, particularly in areas that are far from commercial feed sources, and complemented with improved access to extension.
- Limitations in available land and household labour will be constraints to scaling up by household pig producers.
Presentations on key aspects of the project

Risk assessment in pork
Dr Nguyen Viet Hung (HSPH)

Reducing disease risks and improving food safety in smallholder pig value chains in Vietnam

Risk assessment component: planned activities

Objectives

1. To assess impacts of pork-borne diseases on human health and the livestock sector and identify critical points/opportunities for risk management.
2. To develop and test incentive-based innovations to improve management of human and animal health risks in smallholder pig value chains.
3. To sustainably improve capacity to assess and manage risks in smallholder pig value chains by engaging stakeholders and co-generating evidence.

Project framework

Risk assessment

Quantitative Microbial Risk Assessment (QMRA)

Risk analysis

Hazard vs. Risk

Risk assessment (RA): Is there a problem? How serious the problem is?

Risk management: how to reduce risk

Risk communication: Communication of risks to managers, stakeholders, public officials, and the public.

Quantitative Risk assessment

Food safety risk analysis: Codex vs. informal marketing system
Activities

- Risk profiling and priority hazard identification
- Risk assessment
- Economic assessment of disease burden on humans and CBA

1. Risk Profiling and priority hazard identification

- Brief and quantitative summary of relevant information on a specific food safety issue or animal disease.
- Hazard, impact on human and/or animal health, population affected, incidence and prevalence, epidemiology of transmission, stakeholder concerns, relative importance of the hazard, and options for management, etc.
- Recommendations whether or not to further address the problem and the recommendation to whether or not to commission risk assessments. This needs to be done in collaboration with national stakeholders to reflect priorities.

Food-borne disease

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Foodborne disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salmonella</td>
<td>Foodborne diseases</td>
</tr>
</tbody>
</table>
| Escherichia coli | |}

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Chemical risk assessment

- Heavy metals (lead, mercury, arsenic, cadmium, ...)
- Polychlorinated dibenzodioxins (PCDDs), dibenzofurans (PCDFs), hexachlorobenzene (HCB), polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), polychlorinated diphenyl ethers (PCDEs), polybrominated diphenyl ethers (PBDEs), 10 polyurethane-urea, phthalates, arachidonic, fluorine, phenoxethene, antifouling, fluoranthene, pyrene, benzanthracene, chrysene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, dibenzo(a,h)anthracene, benzo(k)fluoranthene, and indeno(1,2,3-cd)pyrene, antibiotics, etc.
- February 2015, officials in Vietnam found belb64, a banned chemotherapeutic drug in some pig-raising households in Dong Nai.
- Environmental health risk assessment framework.

Sampling (1)

- At farm: environmental impact
- Slaughter house
- Market
- Consumption
- Predictive microbiology (microbial growth)
- Combined assessment on consumption, market, SH etc. with interview of the value chain actors...
- Modeling

Sampling (2)

- Pork foods, way of preparation, and eating habits identified by the survey.
- Raw and cooked, in the case of (iv), prepared pork meat samples will be collected at four points for testing: i) Small scale slaughterhouse, ii) Market, iii) Market and supermarket, iv) Consumer handling (undercooking and cross-contamination) and iv) Consumption (exposure to pathogens).
- Environmental samples (farm, water, soil)
- Variability, seasonal bias samples will be collected in two different seasons on a distribution of 8 months.

Challenges

- Difficulties to follow farm to folk: do we need to trace pork from farm to fork?
- Chemical risk assessment: what will be the key hazard (technique for hazard ranking)?
- Risk factor vs. Phylogeny study to identify etiology of diseases
- Uncertainty
Animal health assessment (including zoonoses) in smallholder pig value chains

Dr Fred Unger (ILRI)

Introduction - Knowledge gaps

- What are the key animal health (Ah) constraints & their impact
  * Animal health
    - Disease
      » Which diseases
      » Production diseases versus zoonoses or FBO
    * Emerging versus neglected
  * Feed
  * Management (e.g. housing)

Knowledge gaps

- Where is the disease risk created
  - Prior to farm
  - On - farm
  - Later along slaughter and processing
- How the risk can be best managed
- What are possible control points to manage the risk

Considerations – disease spread & drivers

- Pathogens are spread by movements of inputs, animals and animal products, fomites, people, equipment and during transport (Supporting tool: Risk assessment)
- Movements of inputs, animals and products within the value chains are driven and controlled by people (Supporting tool: VCA)
- Understanding the motivations for movement is essential for evidence-based mitigation options and effective control (VCA & RA and socio-economic, social sciences)

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5 Presentation available online at http://www.slideshare.net/ILRI/animal-health-assessment-including-zoonoses-in-smallholder-pig-value-chains
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Objective 1 – Animal health Assessment

Objective 1:

To assess impacts of pork-borne diseases on human health and the livestock sector and identify critical points/opportunities for risk management.

Methodology – address Objective 1

Impact of AH constraints

1. Risk profiling – (a) review and (b) rapid (value chain) assessment
2. Specific assessment of AH constraints
3. Risk assessment

Methodology – address Objective 1

1a Risk profiling – review

Method: Literature review
Output: Report
List relevant diseases and first prioritization, e.g., related to:
- Importance for specific sector/production type (small scale, breeding, fattening, age groups)
- Basis for selection of specific target diseases
Further triangulation in next steps

Considerations on pig diseases

- Pig diseases with potential impact on AH
  - FMD, PRRS
  - Multi-factorial (respiratory) diseases
  - Endo/ecto-parasites
  - Housing/feeding related
  - Production system (breeding/fattening)

- Zoonotic or FBD diseases
  - e.g., Trichinella, Cysticercosis

Review

Summary table on AH constraints

<table>
<thead>
<tr>
<th>Disease/pathogen</th>
<th>Prod control/age class</th>
<th>Surveillance/control</th>
<th>Diagnostic &amp; tests</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRRS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aftinobacillosis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cysticercosis</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
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Methodology - objective 1
Aligned with for PH risk and socio-economic risk component

1b Risk profiling - rapid (value chain) assessment
- Basic understanding of AH constraints and of their impact
- Further prioritisation – list of 1-2 key pig diseases
- Information for pathway identification
- Map of animal production (AP) and AH constraints

Tasks: PIG, ID, checklist, F.. techniques

Contents: Pig keeping constraints
- Input system (feed, housing, bio-security)
- AH constraints (mortality, morbidity)
- Animal health services including drug shops
- Access to markets

Methodology - objective 1
Aligned with for PH risk and socio-economic risk component

2. Specific assessment of AH constraints
Output: In-depth understand of AH constraints including

Use of output:
- Calculation of epidemiological rates, disease burden
- Risk pathway potential risk mitigation options, risk assessment
- Triage: identification of different sources and techniques

(Questionnaires, producer and slaughterhouse, etc.)

To support identification risk question and intervention (objective 2)

Methodology - objective 1
Aligned with for PH risk and socio-economic risk component

2. Specific assessment of AH constraints cont.
Targeted VC Actor: Producer (input also from other actors)

Components:
- Survey in pig producing households (HH)(including biological sampling)
- Abattoir survey (biological sampling)
- Longitudinal survey at pig producing HH (biological sampling)
- Collection of community level surveillance reports of pig disease incidence and pig mortality

Specific assessment of AH constraints
Survey in pig producing HH (including biological sampling)

Objective: Assess AH impact for selected pig diseases

Methodology:
- Up to 50 HH from 2 areas (stratified by different types of VC)
- Subset of HH depending on number selected diseases
- HH questionnaire, observations
- Sample size/HH prevalence estimates based on pathogen (1-3)
- Risk assessment implications from available budget (limited)

- Targeted biological sampling
- Foiled sampling

Specific assessment of AH constraints
Additional slaughterhouse data collection

Objective: Assess AH constraints for selected diseases

Aligned with PH survey

Methodology: Up to 30 slaughterhouses from 2 areas
- Questionnaire, observations, pre-slaughter inspection
- Optional confirmatory biological sampling (pre-slaughter)

Specific assessment of AH constraints
Longitudinal survey at pig producing HH (up to 60)

Objective: Determine AH impact over time (e.g. calculate incidences for selected diseases and provide more data for risk assessment & disease burden)

Methodology: Up to 60 HH from two provinces repeatable revised over time (12 months)
- Optional confirmatory biological sampling if required
- Questionnaire, observations

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Specific assessment of AH constraints

Collection of community level surveillance reports of pig disease incidence and pig mortality

Objective: Determine AH impact of selected diseases
(Triangulation with other data collected)

Methodology: Animal health offices from study districts will be at regular intervals (monthly) contacted over 12 months each

3. Risk assessment / Risk analysis

The four components of risk analysis

1. Hazard identification (specific risk question!)
2. Risk assessment (RA) (qualitative/quantitative)
3. Risk management
4. Risk communication

Qualitative RA:
Probabilities are assessed and described textually on a scale from negligible to very high
Quantitative RA:
Determination of risk using quantitative terms

http://www.anh-link.org/en/services/modeller_chapter_5.1.1.htm

Risk assessment

General question to be answered before:

• Which processes within different production and marketing systems carry (highest) risk for disease spread e.g. input sector (feed)

• What are their relative contributions to overall risk?

Risk assessment

• Hazard
• Potential Transmission routes (pathways)
• Transmission parameters (e.g. survival time, susceptibility)
• Release
• Exposure
• Consequences

Source: Literature, undertaken surveys (prevalence’s, incidences) EO

Risk assessment

Hazard identification

e.g.: Specific pathogen - prioritization required
• How to choose specific disease/hazard?
  (parasitic, viral, bacterial, epidemic, endemic)
• Which production type and age class affected?

Risk issue: e.g. risk of introduction, risk of transmission

Data need(s) e.g.:
  pathogen (prevalence, survival potential etc.)
  animal (e.g. susceptibility)
  movement (products, animals, fomites) V&L pathways, required management (e.g. bio-security, housing, feeding)
  policies (e.g. surveillance)
  people/VG actors (e.g. perception, awareness, incentives)

Objective 2:
To develop and test incentive-based innovations

Repeated randomized control trials

• A specific animal health constraint will be addressed identified under objective 1 by using and testing a set of targeted interventions (or package)
  – Feasibility
  – Affordability
  – Chance for success
  (e.g. parasitic burden)

Aligned with economic component (e.g. CBA)
Literature

- FAO, 2011: 
  *Practical approach to animal disease risk management. 
  FAO Animal Production and Health Guidelines, FAO, 2011*

- DEFRA UK (Department for Environment, Food and Rural Affairs) 
  Risk of introduction e.g. Rabies, Swineczause, EA, FMD, HFN1, HFN2 etc.

- EFSA European Food Safety Authority 
  *Risk assessment related to zoonoses, zoonotic hazards*

- A Quantitative Risk Assessment for the onward transmission of Highly Pathogenic Avian Influenza (H5N1) from an infected small-scale broiler farm in Bogor, West Java, Indonesia 
  (Mili de Groot et al. 2010)
Economic assessment of disease risks in pig value chains
Dr Pham Van Hung (HUA)

1. Rapid value chain assessment

Value chains in general

Input supplier
Producer
Processor/ Collector
Wholesaler
Retailer

Supporting services
Transport, storage
Consultancy services
Finance, accounting

Products
Money
Information

Risks

Risk Analysis

Risk identification - Alternatives
- General scenario
- Risk assessment
- Likelihood of occurrence
- Factors affecting level of risk assessment
- Potential consequences
- Priority ranking (i.e., risk of introduction of contagious disease)

Risk management - Possible strategies
- Level of acceptance
- Cost of preventing measures (private and social)
- Benefits (private and social)
- Are they worthwhile to implement?
- How to implement?

Exchanges of information and opinions on risk between risk analysts and stakeholders
All collaborations in the chain or policy makers

Pig Supply Chains In Upland, Nghe An province

Source: Lucy Laptar et al. (2010)

Reducing pig diseases and improving food safety in smallholder pig value chains in Vietnam: Report of the inception workshop

How to do

Act. 1.1: Risk profiling & priority hazard identification
- To identify which of the several hundred pathogens are most relevant
- Method: Desk study based on systematic literature review

How to do – Secondary data
- At national level: reports of MARD (Dept. of Animal Husbandry), MOH, GSO (General Statistics Office)
  - database for disease frequencies (pig/pork) by time and space
  - tendencies of disease to be taken into account (risk factors, scenarios)
- At local level: reports of local authorities, offices of animal husbandry, commune’s health stations
  - areas with diseases (pig/pork) for sampling (risk?)
- Articles on livestock/pig (production, marketing, consumption…) in Vietnam and 2 provinces

How to do

Act. 1.2: Rapid value chain assessment
- Mapping of value chain
- Identifying potential factors that influence adoption and effectiveness of incentive-based risk reduction interventions
- 2 study sites selected:
  - Nghe An represents more rural and less developed production
  - Ha Tinh represents more developed production
- Each province, 3 districts will be purposively selected (rural to rural, rural - periurban, periurban to urban value chains)

How to do

Method: Rapid Value Chain Assessment (RVCA)
→ The steps involved:
1. Analysis of community profile results
2. District level investigations
   - Priority setting with district staffs and business community to create a list of potential product chains (and diseases/pathogens)
   - Developing selection criteria, rating for criteria and a selection matrix
   - Wholesale, trader and retail interview (seasonal supply and demand and trends over time, purchase conditions (timing, contracts, cash, processing packaging requirements)
   - Mapping chains in local areas

Source: Lai et al. (2016)
2. Primary Data collection

1. Survey of a total of 400 pig producing households in 3 districts of 2 provinces (Nghe An and Hung Yen)
   - 3 districts: 1 rural, 1 peri-urban, and 1 near/close urban area (pig city)
   - 4 communes/district: 3 high pop. density + 1 low pop. density (~17 households/commune)
2. Survey of slaughterhouses (SH) in 2 provinces (Nghe An and Hung Yen) (up to 30)
3. Subset (up to 60) of pig producing households in 2 provinces iteratively revisited over time (12 months)

4. Dataset of commune level surveillance reports of pig disease incidence and pig mortality. Total of 72 reports will be collected by animal health officers at regular intervals (monthly) over 12 months in 3 districts each in Nghe An and Hung Yen

5. Survey of a total of 400 household consumers in urban centers of Nghe An and Hung Yen

6. Dataset from household consumption monitoring survey of selected households. 5 households x 3 districts x 2 provinces x 12 months = 360

7. Survey of other value chain actors
   - Suppliers
   - Traders
   - Butchers
   - Transporters
   - Retailers
   The sample size of each actor is based on RVCA and information collected from the level of districts, communes (and provinces)

Value chains assessment

- Analysis of actors along a chain
- Identify and quantify the key animal health and production constraints
- Key diseases in the commune/region
- Identify practices related to AH.

3. Economic risk assessment
What to do

- Act. 1.3. Risk and economic assessment
  ⇒ Expected output:
  a. Identify the AI/production constraints
  b. Estimate of costs of pig diseases at farm level
  c. Estimate of costs of pork-borne diseases in market actors along the pork value chain
  d. Estimate of pig disease burden in smallholder pig systems

How to do

How to do

Estimate of costs of pig diseases at farm level

- Accounting approach
  • To define the proper costs (HH) by disease
  • Classify HHs according to Risk/Disease A (with and without/occuring and not occurring)
  • Estimate/calculate the difference in terms of product quantity, productivity, production costs ($Δ$)
  • Estimate/calculate the difference in terms of health care expenditure (for illness related to the Risk/Disease A) ($Δγ$)
  • Economic cost of the Risk/Disease A is equal to $Δ + Δγ$
  • With assumptions on disease annual incidence (based on Act. 1.1)

Estimate of pig disease burden in smallholder pig systems

- Economometrics approach
  • To indicate which factors are more important and possibly be considered to intervene
  • Based on cross-sectional data collected from HH survey
  • Estimate a cost function, where independent variable could be: direct losses in production, producer’s awareness/preference, AI/input service access, location/market access, (zoonotic/non-zoonotic) disease (estimates the prevalence of 1-2 key diseases)
  • Direct losses = $\text{feed/weight/productivity reduced, mitigating/treatment cost (medical/non-medical)}$

THANK YOU FOR YOUR ATTENTION!
Testing innovative intervention with randomized control trial (RCT)\(^7\)

*Dr Hoang Van Minh (Hanoi Medical University)*

**Research outline**

Incentive-based innovations in improving management of animal and human health risks in smallholder pig value chains in Vietnam: Cluster randomized controlled trial

Assoc. Prof. Hoang Van Minh, MD, PhD
Nguyen Viet Hung, PhD

**Hypothesis**

Incentive-based interventions

Improvements in knowledge, attitude and practice

Reductions in animal and human health risks

**Objectives**

1. To *assess the effectiveness* of the incentive-based innovations in improving management of animal and human health risks in smallholder pig value chains in Vietnam
2. To identify factors associated with the impacts

**Study design**

Cluster (Group) randomized controlled trial

**Sample size**

Expected reduction in human health risk among the controls=12%
Expected reduction in human health risk among the intervention=57%

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Data collection

Quarterly follow-up to capture seasonal variations and limit recall biases

Statistical analysis
- Both descriptive, analytical statistics
- Intention-to-treat analysis
- Repeated measures, cluster adjustment
- Multilevel modeling

Issues to be considered
- Intervention standards
- Co-intervention (interventions other than the intended ones)
- Contamination
- Drop-out
- Etc
From research outputs to outcome to impact: Mapping the impact pathway

Mapping the impact pathway

Dr Steve Staal

Impact pathways

Steve Staal
International Livestock Research Institute (ILRI)
Pham Van Hung
Hanoi University of Agriculture (HUA)
Nguyen Viet Hung
Hanoi School of Public Health (HSPH)

Inception workshop, Melia hotel, Hanoi, 13th August 2012

Definitions

Outputs are program deliverables – New evidence, new approaches and tools, new strategies packaged so as to be available to target users

Outcomes are changes in practices, capacity and policies – Producers, researchers, market actors, investors and decision-makers making use of the Outputs and doing things differently, and gaining new capacities

Impacts are changes in real people’s lives and the environment they live in – Because of changes related to Outcomes, people’s lives are improved through increased income, or better health, or more access to livelihood assets

Impact Pathway embedded directly

Output-Outcome-Impact Pathway

Traditional Log-Frame Approach – outputs are assumed to directly have impact – but how?

Fixing the missing middle – recognizing the importance of actors and decision-makers to make use of research outputs and do things differently

Impact pathway

- Evidence generation
- Capacity building
- Evidence use by partners

Generating scientific evidences

- The impact of animal, human health and economic risks along the value chain of smallholder pork production
- Combined impact assessment of multiple burden pork-borne diseases
- Where and how to better manage these risks

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*8 Presentation available online at http://www.slideshare.net/ILRI/impact-pathways*
## Capacity building for partners

- Build capacity on applying risk-based approaches to food safety (research and training, short course) and value chain research for staff and students of HSPH, HUA and partners.

## Evidences for partner use

- Targeted partners: development, private sector, policy makers...
- Evidences for partners’ use:
  - Development partners: apply research outputs for pro-poor, small-scale oriented interventions.
  - Private sectors: farmers, transporters, slaughterhouses, butchers, consumers: practices to improve food safety and livelihood.
  - Government partners: livestock, health, food safety: enabling policy.

## Discussion (2-3 groups)

- How to use the research evidences from this project to support positive changes of stakeholders of the value chain (policy, private sector, development: KAP)?

  - 30 mn of group discussion
  - Chair and reporter (powerpoint)
  - Report at plenary
  - Facilitation: Rainer and Korepin
Group exercise on Outcome Mapping

Hung Nguyen-Viet (HSPH) posed the following question: How will evidence from this project be used by three important groups of stakeholders: development organizations, policymakers and the private sector?

**Group 1: Development organizations**
Evidence would be used in communicating to stakeholders in order to influence changes in knowledge, attitude and behaviour. The communication process should involve all stakeholders, especially those along the value chain. This would lead to an increase in ownership, awareness, and a greater contribution to impacts.

Intervention would also be decided using evidence generated by this research. Such an intervention was expected to minimize risk for human and animal health, as well as any other economic risks.

**Group 2: The private sector**
The group understood the evidence of this research as knowledge of risks along the value chain. The outputs would help in problem identification. Once communicated to the targeted stakeholder, this process would influence changes in attitude and behaviour.

The evidence should be packaged appropriately for specific audiences. For stakeholders in the private sector, a communication strategy should be devised with a convincing incentive-based approach, with a clear cost-benefit analysis. This should be more likely to be adopted vis-á-vis affecting desirable changes in attitude and behaviour.

Use of evidence in training for the stakeholders, especially regarding risks and hazards points in the value chain, was always a good basis for attitude and behaviour changes. The training should be provided without charge by development organizations or government bodies. Integrating knowledge from the research in university courses would be another effective way of knowledge transfer.

Further strategies to utilize evidence for the benefit of the private sector might involve improved communication to boost trust among consumers on products from the smallholders.

**Group 3: Policymakers**
The group reflected upon the policymaking process: proposal making at district/provincial levels, pilot models in the area of concern and MARD or national level assessments of the piloted model. Impacts in terms of policy changes would not occur in a short term. However, evidence should be communicated through diverse and broad channels. Introducing the evidence in postgraduate courses would be beneficial since most of the students in such courses would eventually work in government units, and thus have a higher chance to communicate to policymakers.
# Annex: List of workshop participants

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of participants</th>
<th>Organization</th>
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<tbody>
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<td>1</td>
<td>Geoff Morris</td>
<td>ACIAR Vietnam Country Manager</td>
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<td>2</td>
<td>Vu Thi Hau</td>
<td>Assistant Country Manager</td>
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<td>3</td>
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<td>Director General, International Livestock Research Institute (ILRI), Nairobi</td>
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<td>4</td>
<td>Steve Staal</td>
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<td>7</td>
<td>Fred Unger</td>
<td>CIM Expert and Veterinary Epidemiologist, ILRI, Chiang Mai</td>
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<td>8</td>
<td>Lucie Lepar</td>
<td>Agricultural Economist and Country representative, ILRI, Hanoi</td>
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<td>9</td>
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<td>Communication Specialist, ILRI, Hanoi</td>
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<td>Jeff Gilbert</td>
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<td>11</td>
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<td>Clare Kemp</td>
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<td>18</td>
<td>Stefano Cassini</td>
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**Collaborators and stakeholders**

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<td>21</td>
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<td>program manager, an expert on swin</td>
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<td>52</td>
<td>Hai Phuong</td>
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