# Food safety assessment and challenges along small-scale pig systems in Vietnam

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# Outline

Food safety and role of pork in Vietnam

Food safety risk assessment along the pork value chain

- Exotic/cross breed pig sector, "white" pigs  (90-95%)

Parasitic zoonoses

- Native pork chain (5%)

Conclusion and way forward

# Food safety – Vietnam

- Food safety of great concern to both consumers and policymakers and frequently appears in the media
  - food safety among the two most pressing issues for people, more important than e.g. education or health care

- Repeated episodes of adulterated and unsafe food
  - toxic pesticide residues in vegetables, antibiotics and banned veterinary residues, mass fish intoxication

- Biological, chemical and physical hazards commonly found
  - biological hazards are the most important in terms of known public health impact

# Food safety – Vietnam

- Vietnam has a modern food safety legislation system
  - Limited coordination between involved institutes (3 institutes, led by MOH)
  - Limited implementation of existing regulations, often designed for large scale sector
  - Food exports relatively well managed

- Various approaches have been tried for improving safety of fresh food but still challenges in demonstrating sustainable improvements in food safety
  - VIETGAP, Vietnamese Good Agriculture Practices
  - After nearly a decade current share less than 10%
  - Food safety improvement not clearly demonstrated

- Use of risk based approach and risk communication so far limited
  - Risk perception towards chemical hazards, despite of dominant presence of microbiological hazards

# Background - pork in Vietnam

**Pork** is an **important component** of the Vietnamese diet

- More than 50% of consumed meat is pork

- Annual pork consumption per capita in Vietnam: 29 kg

- 83% comes from very small or small farms

- 76% of pigs are processed mainly in small slaughtering facilities with generally poor hygiene conditions, approximately 30,000

- Preference for fresh, chilled pork, natural protection from imports

- 80% of pork marketed mainly in retail traditional markets

# Challenges - pork value chain in Vietnam

**From an animal health perspective**

- Lack of biosecurity, poor on-farm hygiene (small scale sector)

- Risky management practices (free rooming common for "native" pigs)

- Limited reproductive management

- Pig diseases are common, wide range of notifiable diseases are endemic, including zoonoses

- Limited surveillance and response capacity

- Very limited resources of farmers to change

  - Feed highest cost contributor for producer

  - Very low perception on food safety issues

# Food safety risk assessment along the pork value chain
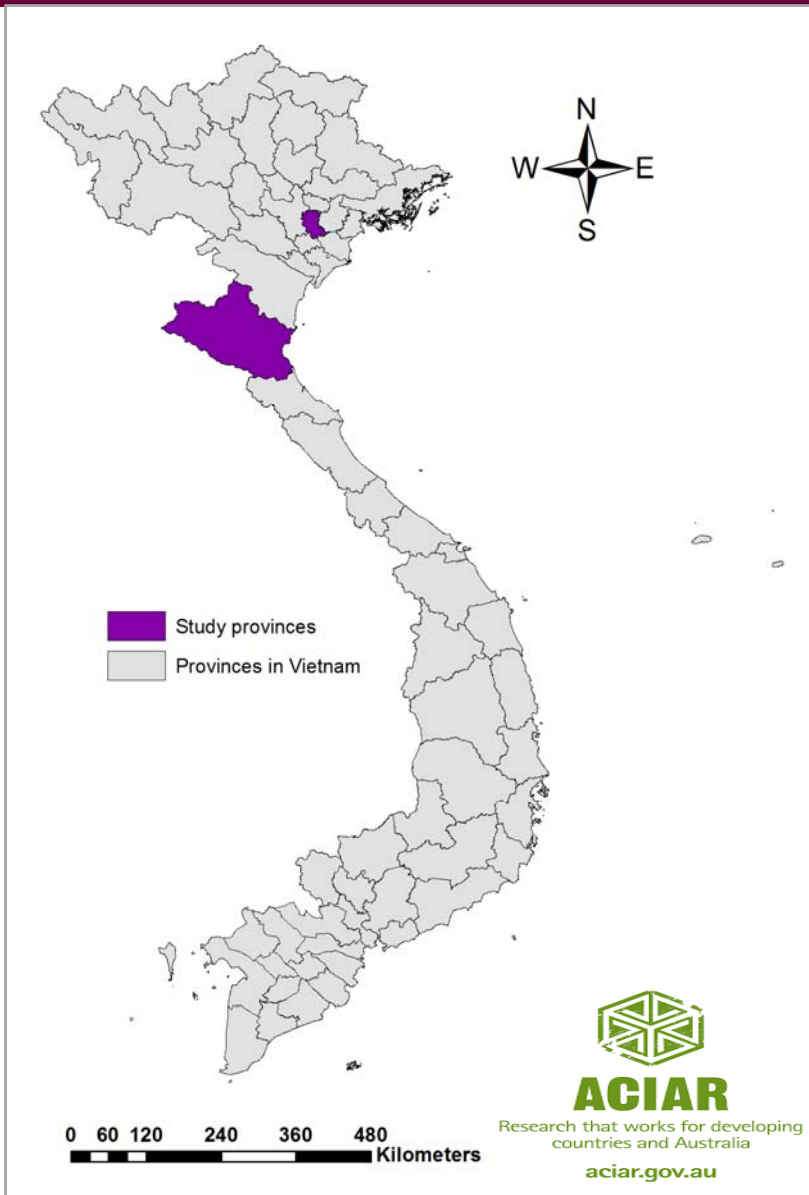


PigRISK project (2012-2017)

*To **assess impacts of pork-borne diseases on human health and the livestock** and identify control points for risk management.*

## Integrated approach

- Interdisciplinary team: vets, public health experts, economist, animal scientists, modeller

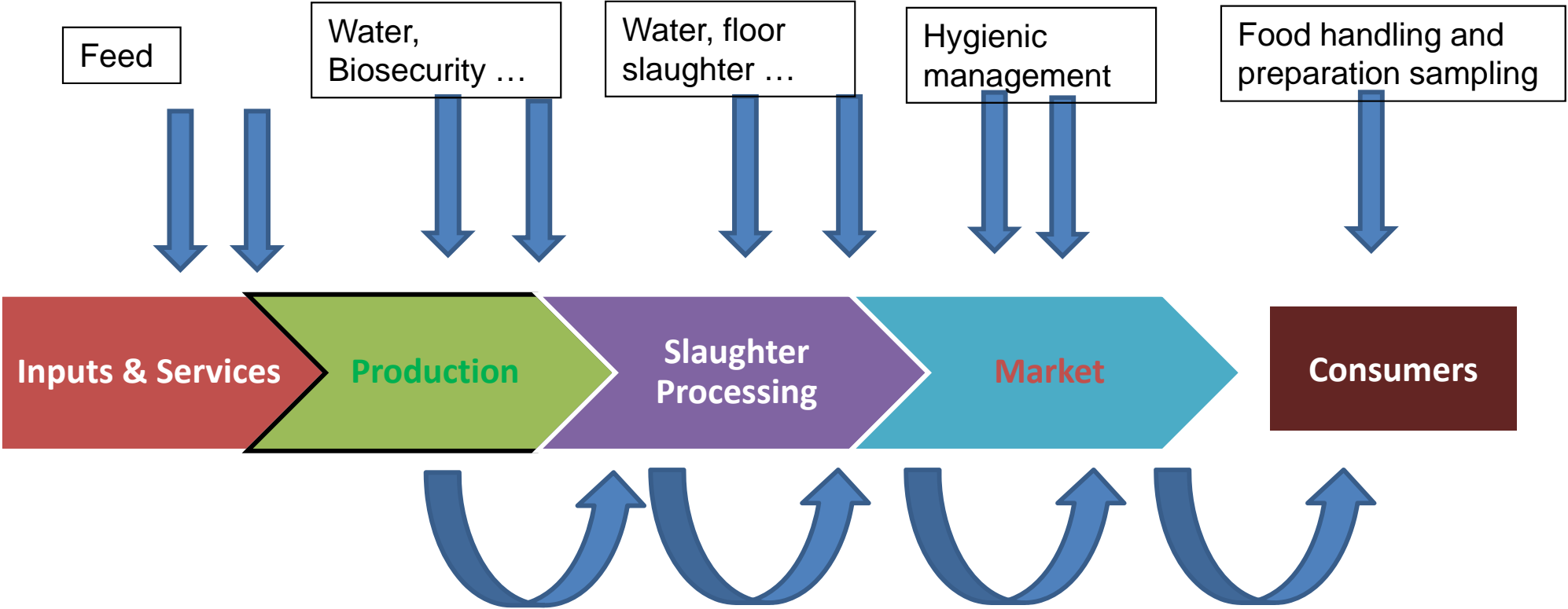- Data collected along the entire pork VC

## Study sites
2 provinces

Hung Yen: peri-urban

Nghe An: rural

Each provinces 3 districts and 3 communes in selected provinces

# Pig Risk - VC approach

Feed

Water, Biosecurity …

Water, floor slaughter …

Hygienic management

Food handling and preparation sampling

**Inputs & Services** → **Production** → **Slaughter Processing** → **Market** → **Consumers**

From farm to fork

# Framework

**1  Risk profiling & hazard identification**  Literature review, PRA, Risk pathways

**2-4**

**Risk assessment**

- **Microbial Risk Assessment**
- Chemical Risk Assessment
- Animal Health Risk Assessment
- Economics (e.g. health. COI)

**Value chain**

- Rapid assessment, Base line
- Economic assessment
- ….
- ….

**5**

**Interventions (2017)**

- Intervention 1
- Intervention 2
- Intervention 3
- Intervention 4

**6** Engaging stakeholders and co-generating evidence., Advocacy, Communication, OM/OH/TOC

Source: Sinh et. al. 2016

# 1. Risk profiling & priority hazard identification

| Pork related food-borne hazards |
|---|
| **Parasitic** |
| • Cysticercosis |
| • Trichinellosis |
| • Toxoplasmosis |
| **Bacterial e.g.** |
| • *Bacillus cereus* |
| • *Brucella suis* |
| • *Campylobacter* spp. |
| • *Salmonella* spp. |
| • *S. aureus* |
| • *Streptococcus suis* |
| • Shiga toxin producing *E. coli* |
| • *Yersinia enterocolitica* |
| **Chemical** |
| • Antibiotic residues |
| • Aflatoxins |
| • Steroids/growth promoters |
| • Heavy metal |

**Biological hazards**
***Salmonella* spp.**
*Streptococcus suis*
*(Coliforms and E. coli)*
*Chemical hazards:*
*AB residues*
*Growth promoters*
*Heavy metals*

Source: Literature review, 2013



*Source: PigRISK Project proposal*

# 3. Risk and economic assessment

## Estimate of costs of pork-borne illness in consumers

**Sampling for biological hazards** (*Salmonella* spp.):

- Overall **1,275 samples** (farm, slaughterhouse, market) over 12 months
  - Increasing prevalence along chain
  - Farm: drinking water: 19%
  - Carcass: 38**%**
  - Retailer: 45%

**Chemical hazards:**

- **Presence of banned substances** (e.g. chloramphenicol and the growth promoter salbutamol in pig feed and sold pork)

**Risk modeling and *Salmonella* QMRA**

- Generate information from data set of:
  - ✓ *Salmonella* prevalence at farm, slaughterhouse and market (%) (hazard characterization)
  - ✓ *Salmonella* concentration at market (MPN/g) (hazard characterization)
  - ✓ Literature review (dose-response issues)
  - ✓ Information from aligned surveys and FGD (e.g. age, dose-response, exposure assessment {cross-contamination})

- Finalized *Salmonella* QMRA modeling, stratified by:
  - ✓ Area e.g. Hung Yen and Nghe An
  - ✓ Age group: <5 years; 6-60 years; >60 years

**Selected results:**

- **Annual incidence of salmonellosis due to boiled pork consumption: 12.6 (0.5 – 42.6)**

That means that approximately 1 to 1.5 over 10 consumers face a *Salmonella* related infection annually.

Currently scenarios are modelled to test the effectiveness of interventions at market and household in reducing the annual salmonellosis incidence

- E.g. what would be the effect of a 25% reduction in *Salmonella* in pork at market for the annual salmonellosis incidence in human (12.% original model to ?)
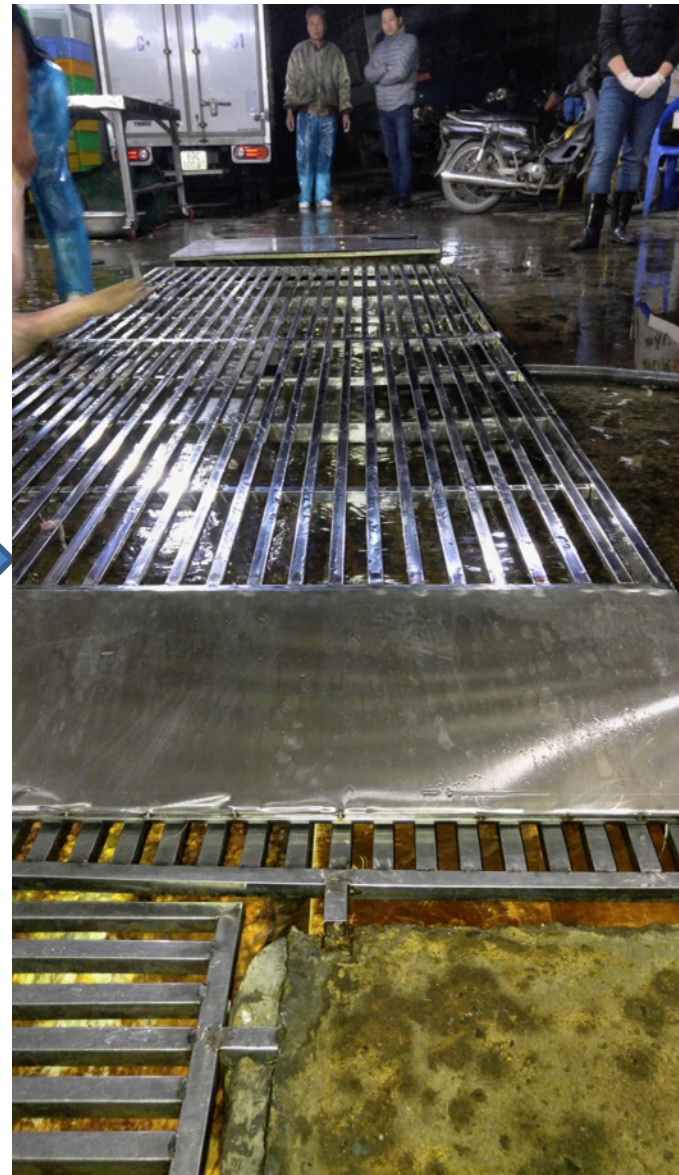
Source: Sinh, 2015

Grit has to be adapted to the existing slaughterhouse structure
(handle 2 pigs)
Pilot trial: significant reduction of coliforms

Investment 400 USD

Source: Unger, 2015

# Scoping study on indigenous pig systems (2015)



Source: Unger, 2015

# Background and objectives

**Background:**
Native pork considered by consumers as naturally "safe", e.g. use of home made feed resources
"Prime" price, 2-3 times more than "white" pork
Often produced by ethnic minorities

**Objectives:**
Evaluate the **potential of integrated indigenous pig systems** to improve livelihoods and safe pork consumption for **poor ethnic minority** smallholders in the **Central Highlands** of Vietnam.
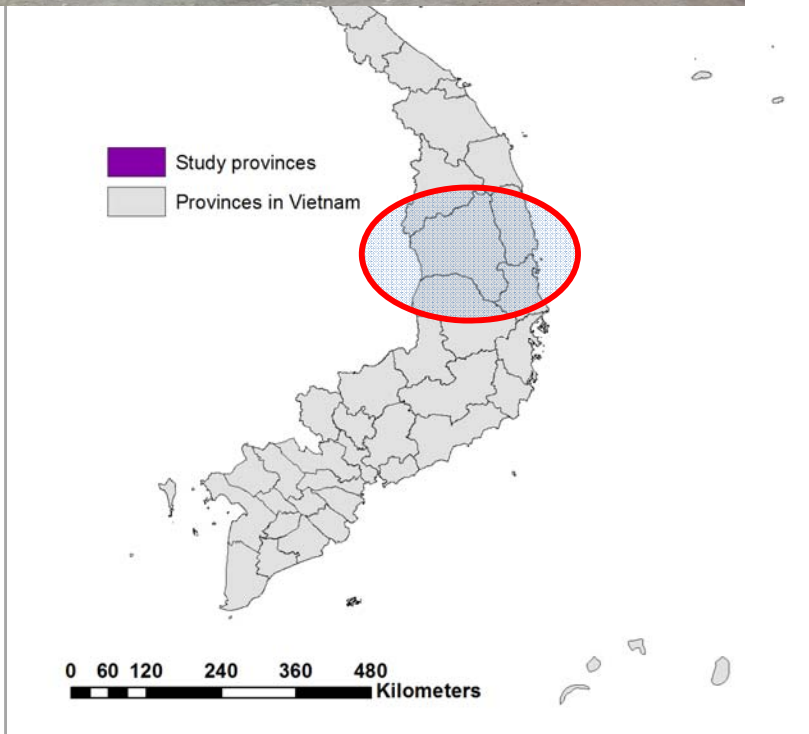
# Scoping study on indigenous pig systems (2014-2015)
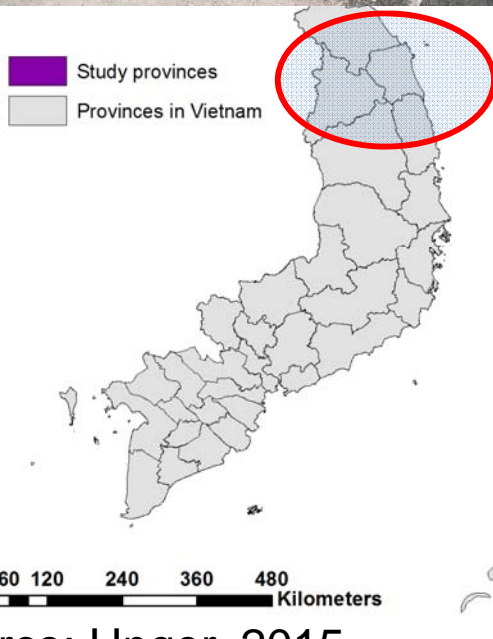


**Methodology:**

Integrated approach
- Components:
  - Market access/opportunity study
  - Value chain study
  - Breeding component
  - Gender study
  - **Food safety**

Study design (food safety)
- Serological sampling for *Trichinella* and cysticercosis and perception study
- 8 communes
- At lest 100 households with native pigs and 200 pigs

Source: Unger, 2015
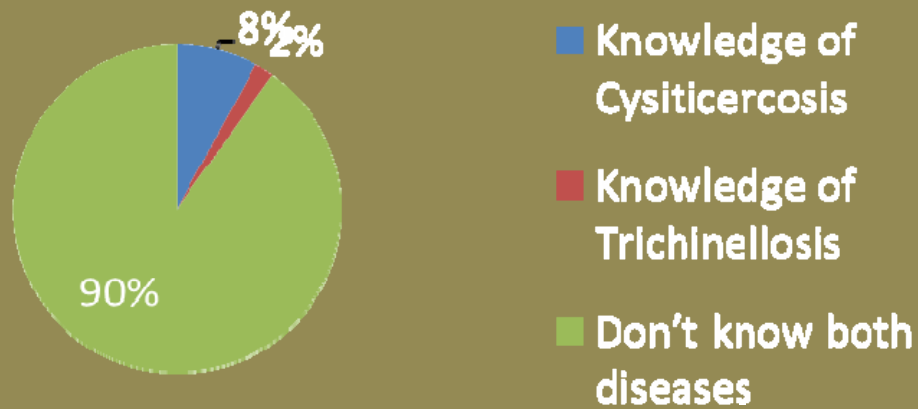
Central Highlands – native pig study
Selected results

Free range versus pen use, among households with indigenous pigs (N=262)

- free range — 57%
- semi free range — 7%
- pen — 36%
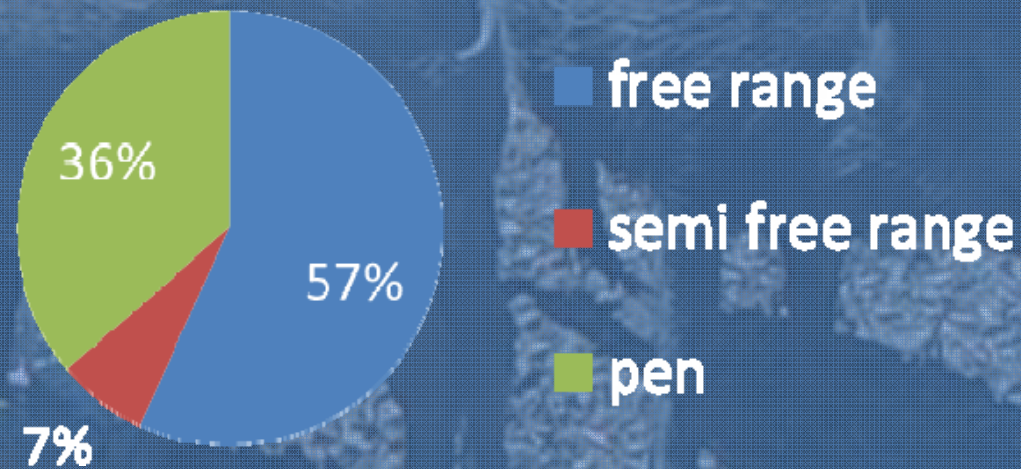
# Central Highlands – native pig study
## Selected results

**Knowledge of targeted zoonotic parasitoses (N=262)**



Pie chart:
- 8%
- 2%
- 90%

Legend:
- Knowledge of Cysiticercosis
- Knowledge of Trichinellosis
- Don't know both diseases

**Among those 10% none of them aware about mode of transmission from pig to human**

**Preliminary results for seroprevalence in pigs:**
- *Trichinella* and cysticercosis  1-2% (to be further validated)

Source: Unger, 2015

# Conclusions and way forward

- High presence of microbiological hazards along the pork chain determined

- First ever made QMRA for pork (*Salmonella*) and cost of illness study provided

- Interventions

  – Suitable incentives -  greatest challenges HOW to  FIND in a resource poor context

- Native pig system

  – Risky management practices are common

## Way forward:

- Test of potential interventions in a second phase of the project

- 4-5 specific pork value chains will be selected and tested for food safety improvement ("naturally safe" pork chain, canteens and industry, large development project)

Source: Unger, 2015

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