FEED THE FUTURE

AGRILINKS




Risk assessment for food safety management in Vietnam

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Outline

- Animal source food and food safety in informal markets in Vietnam
- Evidence from risk assessment for food safety: pork and fish value chains within a One health / Ecohealth context
- From food safety research to policy translation

Food safety in Vietnam

- Food safety among the **most pressing issues** for people in Vietnam, more important than education or health care
- Vietnam has a **modern food safety legislation** system but the use of risk based approach is limited
- Risk perception towards **chemical hazards** is important
- Willing to pay 5-10% premium for food safety
- Food exports relatively well managed but **deficits in domestic markets**

Importance of pork for food security in Vietnam

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

- More than 70% of consumed meat is pork, 27kg/capita/year
- 83% produced by very small or small farms
- 76% of pigs are processed in small slaughtering, nearly 30,000
- Preference for fresh "warm" pork supplied in retail

  traditional markets (80% of all pork marketed)
  - affordable, address local demands
  - often escape effective control

- Consumption of risky pork products is common (raw fermented/blood pudding)

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PigRISK: Pork safety in Vietnam (2012-2017)

Risk assessment

- *Salmonella* risk pathways developed for producers, slaughterhouse and consumers, quantitative microbial risk assessment (QMRA) risk for consumer
- Chemical risk assessment

Farm → *Transportation to SH* → *Slaughterhouse* → *Retailer* → *Consumers*

- Feed in bags, remaining feeds at the cages, environment
- Liver
- Kidney
- Pork
- Consumption survey

1275 samples (farms, slaughterhouse, market) collected during 1 year

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PigRISK - microbial (*Salmonella*) contamination

Actor	Sample type	Prev (%)
Producer	Drink water	19.4
Producer	Floor swab	36.1
Producer	Waste water	38.9
Slaughter house	Carcass swab	38.9
Slaughter house	Feces	33.6
Slaughter house	Mesenteric	35.6
Slaughter house	Floor swab	22.4
Slaughter house	Water	20.4
Market	Overall	34.1

Selected key results: QMRA

Streptococcus suis in slaughter pigs (N=147): *S. suis* type 2, low prevalence (1.4%)

Potential risk behaviors such as consumption of "Tiet canh" (raw pig blood food) was common in slaughterhouse workers (43.1%)

Cross-contamination survey (*Salmonella*) (N=153): using the same cutting board induced the highest risk of cross-contamination with *Salmonella* (66.7%), followed by the same knife (11.1%) respectively

Health risk by QMRA:

-The annual incidence rate of salmonellosis: **12.6% (90% CI: 0.5 – 42.6).**

-The factors most influencing the risk: household pork **handling practice** and **prevalence in pork** sold in the market.

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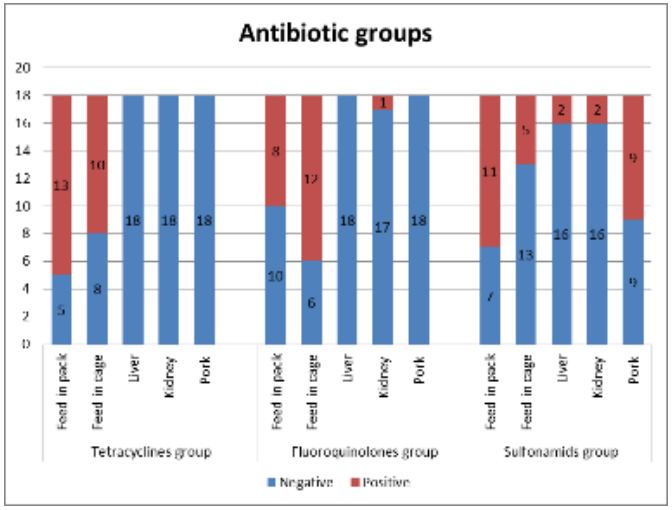
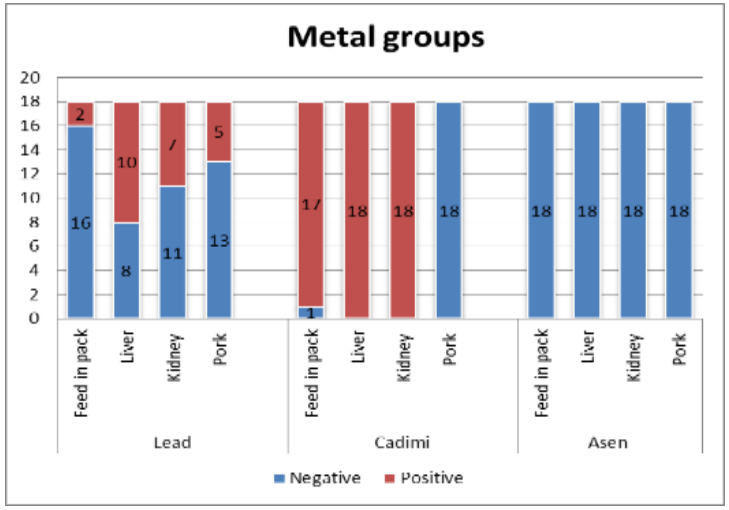
Dang Xuan Sinh et al, 2017, IJPH

PigRISK - chemical hazards

514 pig feed, kidney, liver and pork samples were pooled into 18 samples were analyzed for antibiotic residues, β-agonists, and heavy metals, compared with current regulations.

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





Tuyet Hanh et al, 2017, IJPH

Selected key results: Chemical risk assessment

Chemical hazards	Limit of detection (µg/kg)	Liver		Kidney		Meat	
		No. positive/ *n* (%)	Residue level [mean (min–max)] µg/kg	No. positive/ *n* (%)	Residue level [mean (min–max)] µg/kg	No. positive/ *n* (%)	Residue level [mean (min–max)] µg/kg
Tetracyclines	50	0/18	–	0/18	–	0/18	–
Fluoroquinolones	30	0/18	–	1/18	–	0/18	–
Sulfonamides		**2/18 (11)**		**2/18 (11)**		**9/18(50)**	
Sulfamethazine	15	2	68 (45–91)	1	87	5	155.5 (36–263)
Sulfaquinoxalin	15	0	–	0	–	0	–
Chloramphenicol	0.15	0	–	0	–	**3/18 (17)**	0.54 (0.34–0.76)
β-agonists		**2/18(11)**		**0/18**		**1/18 (5)**	
Salbutamol	3	2	4.24 (2.77–5.71)	0	–	1	1.09
Clenbuterol	3	0	–	0	–	0	–
Heavy metals		**18/18 (100)**		**18/18 (100)**		**5/18 (28)**	
Lead	70	10/18 (55)	117 (71–303)	7/18 (39)	128 (71–208)	5	74 (70–79)
Cadmium	10	18/18 (100)	17.5 (10.4–31.6)	18/18 (100)	223 (126–383)	0	–
Arsenic	50	0	–	0	–	0	–

Most of samples: negative or did not exceed current MRL

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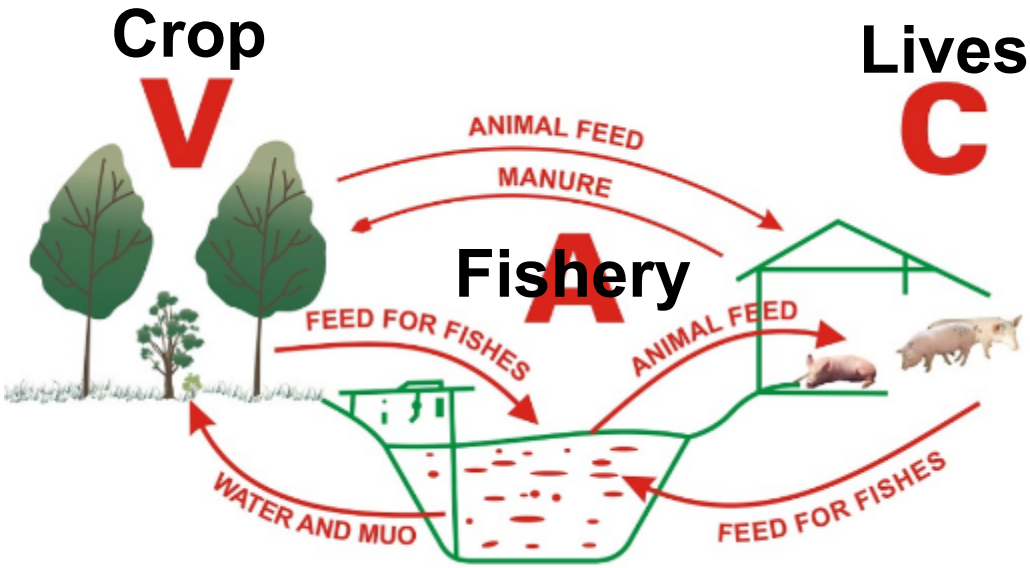
Tuyet Hanh et al, 2017, IJPH

Contaminated fish and health risk in an integrated agriculture system



Health and environmental issues & livestock?

Nguyen-Viet et al, 2014

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Risk assessment: fish from wastewater in Hanam province

- Wastewater from Hanoi and sanitation system → canal → fish contaminated by heavy metal and pathogens → health risk
- Conducting a risk assessment of tapalia



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Toan et al (2014)

Risk assessment: fish from wastewater in Hanam province

- Tilapia from Nhue river.
- Highly contaminated Pb level, but low risk for tilapia
- Local people seem to be aware of the risk, they sell contaminated fish/vegetables to other to

Mẫu	n	Positive (%)		Pb (µg/kg)	Cd (µg/kg)
		Pb	Cd	µ	µ
Canal water	27	100	40,7	3,7	0,04
Talapia	27	100	96,3	149	5,6

	Pb	Cd
NOAEL	1,4 mg/kg/day(2)	0,01 mg/kg/day
LOAEL	0,5 mg/kg/day(2)	3,5-7,5 mg/kg/day2)
MRL	10 µg/dl(3)	0,1 µg/kg/day
TDI	25 µg/kg/week	25 µg/kg/day

TDI	Talapia consumption per	
	Time / day	month
Pb (µg)	7,8 ± 4,61	9,7 ± 5,76
Cd (µg)	0,35 ± 0,206	1,88 ± 1,113

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Toan et al (2014)

Key messages from pork and fish risk assessment

- "One Health" food safety risk assessment
- Risk misperception: what people worry about and what makes them sick are not the same
    - Chemical risk is low in both pork and fish
    - *Salmonella* risk is high (annual incidence rate of salmonellosis was estimated to be 12.6%)
- The factors most influencing the estimate were household pork handling practice followed by prevalence in pork sold in the central market.

Policy translation: food safety

2011 Meeting with VFA, Photo: CENPHER

2012 Meeting with DAH
Photo: CENPHER

2016

Meeting with Deputy Prime Minister Vietnam, 2 Dec 2016 (Photo: Tuyet Hanh)

Top Takeaways

1. Pork and fish are important for Vietnamese diet. Balance between formal and “wet/traditional” markets
2. Risk assessment: useful tool for food safety management but adaptation and capacity are needed
3. Risk misperception: what people worry about and what makes them sick are not the same
4. Control & command approaches don’t work but solutions based on working with the informal sector more promising
5. Food safety policy influence: persistence, opportunistic and time sensitive