Nexus between One Health, Nutrition and Food Safety

Hung Nguyen-Viet, Fred Unger, Dang Xuan Sinh, Paula Dominguez-Salas, Delia Grace
Outline

• One Health concept
• Application to food safety and nutrition of animal source food
• Conclusions
History of One Health

• The "one medicine" by Calvin Schwabe’s has it’s origins in his work with Dinka pastoralists in Sudan in the 1960s.

• “There is no difference of paradigm between human and veterinary medicine. Both sciences share a common body of knowledge in anatomy, physiology, pathology, on the origins of diseases in all species”. Schwabe C. (1964)
What is One Health?

The collaborative efforts of multiple disciplines working locally, nationally and globally to attain optimal health for people, animal and our environment
(AWMA, FAO, OIE, WHO, UNSIC, UNICEF, WB)

Expanded One Health encompasses any issues related to human, animal and environmental health

http://www.cdc.gov/onehealth
What is One Health?

- Recognition of inextricable linkage of human, livestock, companion animal and wildlife health.

- Adding values from closer cooperation of human and animal health.
  - More knowledge
  - Better health (human or animal)
  - Economical benefits/ savings

Veterinary medicine

Human medicine

Environmental science
Benefits of One Health

• Improving animal and human health globally
  ➢ collaboration among all the health sciences – transdisciplinary

• Meeting new global challenges through collaboration
  ➢ veterinary medicine, human medicine, environmental and social sciences, wildlife and public health

• Developing centres of excellence for education and training
  ➢ veterinary medicine, human medicine, and public health
PigRISK team 2012-2017

- Vietnam National University of Agriculture
- Hanoi University of Public Health
- Local authorities in Hung Yen and Nghe An
- Involved various Value chain actors and groups
Microbial and Chemical Risk Assessment

- *Salmonella* risk pathways developed for producers, slaughterhouse and consumers, quantitative microbial risk assessment (QMRA) risk for consumer
- Chemical risk assessment: antibiotic residues, banned chemicals, heavy metals

Approach: risk analysis or risk-based decision making

1,275 samples (farms, slaughterhouse, market) collected during 1 year
### PigRISK – QMRA for salmonellosis

<table>
<thead>
<tr>
<th>Age and gender groups</th>
<th>Estimated annual salmonellosis incidence rate (Mean (90% CI)) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children (under 5 years old)</td>
<td>11.18 (0 – 45.05)</td>
</tr>
<tr>
<td>Adult female (6-60 years old)</td>
<td>16.41 (0.01 – 53.86)</td>
</tr>
<tr>
<td>Adult male (6-60 years old)</td>
<td>19.29 (0.04 – 59.06)</td>
</tr>
<tr>
<td>Elder (over 60 years old)</td>
<td>20.41 (0.09 – 60.76)</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td><strong>17.7 (0.89 – 45.96)</strong></td>
</tr>
</tbody>
</table>

The annual incidence of foodborne salmonellosis in the Asian region including Vietnam was 1% (range 0.2-7%) (Havelaar 2015)
Selected key results: Chemical risk assessment

<table>
<thead>
<tr>
<th>Chemical hazards</th>
<th>Limit of detection (µg/kg)</th>
<th>Liver</th>
<th>Kidney</th>
<th>Meat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. positive/ n (%)</td>
<td>Residue level [mean (min–max)] µg/kg</td>
<td>No. positive/ n (%)</td>
<td>Residue level [mean (min–max)] µg/kg</td>
</tr>
<tr>
<td>Tetracyclines</td>
<td>50</td>
<td>0/18</td>
<td>–</td>
<td>0/18</td>
</tr>
<tr>
<td>Fluoroquinolones</td>
<td>30</td>
<td>0/18</td>
<td>–</td>
<td>1/18</td>
</tr>
<tr>
<td>Sulfonamides</td>
<td>2/18 (11)</td>
<td>68 (45–91)</td>
<td>2/18 (11)</td>
<td>87</td>
</tr>
<tr>
<td>Sulfamethazine</td>
<td>15</td>
<td>2</td>
<td>68 (45–91)</td>
<td>1</td>
</tr>
<tr>
<td>Sulfadoxine</td>
<td>15</td>
<td>0</td>
<td>–</td>
<td>0</td>
</tr>
<tr>
<td>Chloramphenicol</td>
<td>0.15</td>
<td>2/18 (11)</td>
<td>0/18</td>
<td>0/18</td>
</tr>
<tr>
<td>β-agonists</td>
<td>3</td>
<td>2</td>
<td>4.24 (2.77–5.71)</td>
<td>0</td>
</tr>
<tr>
<td>Salbutamol</td>
<td>3</td>
<td>0</td>
<td>–</td>
<td>0</td>
</tr>
<tr>
<td>Clenbuterol</td>
<td>3</td>
<td>18/18 (100)</td>
<td>17.5 (10.4–31.6)</td>
<td>18/18 (100)</td>
</tr>
<tr>
<td>Heavy metals</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead</td>
<td>70</td>
<td>10/18 (55)</td>
<td>117 (71–303)</td>
<td>7/18 (39)</td>
</tr>
<tr>
<td>Cadmium</td>
<td>10</td>
<td>10/18 (55)</td>
<td>117 (71–303)</td>
<td>7/18 (39)</td>
</tr>
<tr>
<td>Arsenic</td>
<td>50</td>
<td>0</td>
<td>12.5 (10.4–31.6)</td>
<td>0</td>
</tr>
</tbody>
</table>

Bold reflects the name of group of chemicals

Most of samples: negative or did not exceed current MRL
Costs per treatment episode and per hospitalization day for foodborne diarrhea case were US$ 106.9 and US$ 33.6 respectively.

51.3%: Indirect cost (costs of times to patient, their relatives due to the patient’s illness)

33.8%: Direct medical costs

14.9%: Direct non-medical costs (patient and their relatives)
Vietnam food safety: translational research

- CGIAR/ILRI niche - risk assessment and policy / regulatory analysis for fresh foods in domestic markets
- WB convenes overall support to government
- Long-term (>10 year) engagement – Government, WB, VN research, CGIAR partners, CGIAR
ASIA AND THE PACIFIC SYMPOSIUM ON SUSTAINABLE FOOD SYSTEMS FOR HEALTHY DIETS AND IMPROVED NUTRITION

Bangkok

Analysis of interrelations between environmental sanitation systems, health status and well-being

Health status
- Exposure to pathogens (viruses, bacteria, protozoa, helminths)
- Health-related and help-seeking behaviour

Health risks - impacts
Affected population

Dynamic interactions between systems and interventions

Physical environment
- Food chain
- Excreta, wastewater, water
- Nutrients: N, P
- Chemical pollutants

Social, cultural and economic environment
- Risk perceptions and behaviour
- Values and norms regulating access
- Economic status

Ecological risks and use of resources
Vulnerability, resilience, and equity patterns

Critical control points: comprehensive biomedical, epidemiological, ecological, social, cultural, and economic assessment

Interventions (biomedical, systems, engineering, behavioural or in combination): Efficacy, effectiveness and equity studies measured in relation to risks
Livestock interventions and nutrition

What we seem to know

- Agriculture interventions impact the pathways (LDF to nutrition), but **not necessarily** translate into nutrition outcomes
- **Livestock** interventions:
  - *DO* improve production, incomes, and expenditure,
  - *CAN* improve nutrient intake and diets, and
  - *MAY* improve nutritional outcomes in children and women

- More positive impact if interventions that target **broader types of “capital”** (beyond increased livestock productivity)
- Greater impact if coupled with **nutrition education** component and/or targeting **women**
Examples of issues related to ASFs

- Milk: curative properties; divine properties; not boiled (loss of nutrients)
- Beef: are kept for the household’s chief; not for pregnant women (excessive bleeding during the delivery)
- Pork: Not consumed by Muslims (religious taboo); dirty
- Eggs: Children could suffer from stunting and become thieves; Pregnant women have a higher risk to have bold children
- Small ruminants: religious celebrations but limited meat and milk consumption
Take-home messages

1. **Institutional challenges**: acceptance, policy engagement
2. **Capacity building**: One Health workforce
3. **Incentives**: how to share credits, added values of One Health among members, partners
4. **Deeper coordination** between sectors to realise food safety and nutrition goals.
5. Improving the translation of evidence and research into policy, more cases to show **added values of One Health/Ecohealth**
Thank you for your attention!