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Addressing Food Safety in Animal Source Foods for Improved Nutrition

Speakers: Andrew Bisson (USAID), Hung Nguyen-Viet (ILRI), Silvia Alonso (ILRI), Dennis Karamuzi (Land O'Lakes)

Moderators: Carla Fernandez de Castro (KDAD) and Jennifer Lane (Land O'Lakes)

January 25, 2017

Livestock, Animal Source Foods & Household Nutrition Learning Series

LAND O'LAKES INTERNATIONAL DEVELOPMENT

TOPS Small Grant

ILRI INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

- May 4, 2017 – Animal Source Foods: Evidence Informed Project Design for Nutrition Impact (Nairobi, Kenya)
- June 2016 - Livestock & Livelihoods: Measuring and Promoting Nutrient Rich-Value Chain Commodities
- October 2016 - Livestock Markets, Animal Source Foods & Human Nutrition: Balancing Program Tensions, Maximizing Impact & Avoiding Harm
- January 2017 – Addressing Food Safety Concerns in Animal Source Foods for Improved Household Nutrition

https://www.landolakes.org/Where-We-Work/Africa/Kenya/Livestock-Household-Nutrition-Learning-Series

jklane@landolakes.com

Andrew Bisson, USAID Bureau for Food Security

Andrew Bisson is the Livestock Adviser for the Bureau for Food Security at USAID. Andrew gained his DVM at Glasgow Veterinary School, UK and worked in small holder private veterinary practice before completing an MSc in Tropical Veterinary Medicine at Edinburgh University. He has field experience working with pastoral and small holder livestock production systems, strengthening animal health service delivery including community-based animal health, transboundary and zoonotic disease control, Avian Influenza control and One-Health, livestock market system development and resilience building with a focus on dryland communities. He has lived and worked in a number of countries in East and West Africa, Asia and the Middle East through appointments with DFID, Tufts University, FAO, ACDI-VOCA, FHI and Mercy Corps prior to joining BFS.

Hung Nguyen-Viet, International Livestock Research Institute (ILRI)

Hung Nguyen-Viet is the acting regional representative for East and Southeast Asia and senior scientist in food safety and Ecohealth at the International Livestock Research Institute (ILRI). He is based in Hanoi and a honorary professor at the Hanoi University of Public Health (HUPH). Prior to HUPH and ILRI, he completed a postdoc with the Swiss Tropical and Public Health Institute in Basel, Switzerland. Dr. Nguyen-Viet's research focuses on the link between health and agriculture, food safety, infectious and zoonotic diseases with an emphasis on the use of integrative approaches (One Health and Ecohealth). He co-founded and led the Center for Public Health and Ecosystem Research (CENPHER) at the HUPH until 2013. Since 2012 he has been coordinating the regional program "Ecohealth Field Building Leadership Initiative in Southeast Asia.

Silvia Alonso, International Livestock Research Institute (ILRI)

Silvia Alonso works for ILRI, as a Scientist epidemiologist in the Animal and Human Health team. She is a veterinarian with postgraduate training in epidemiology and public health. She graduated in veterinary medicine in Spain and completed a PhD in food safety at the University of Bologna, Italy, where she also worked for few years as a research assistant. She holds a MSc in Epidemiology from the London School of Hygiene and Tropical Medicine and is a Diplomate of the European College of Veterinary Public Health. Before joining ILRI, Silvia worked for 5 years as a lecturer at the Royal Veterinary College where she gained experience in teaching and training at undergraduate and postgraduate level, both nationally and internationally. Her research looks at the interface between livestock production and human health, including nutrition.

Dennis Karamuzi, USAID Rwanda Dairy Sector Competitiveness Project II

Dennis Karamuzi will outline the steps taken by the Government of Rwanda (GoR) and RDCPII in increasing the supply of clean milk for both rural and urban consumers. Working directly with milk collection centers and farmer cooperatives, the USAID Feed the Future funded RDCPII and GoR increased the supply of clean milk available to processors while decreasing the overall supply of adulterated milk. Using a multipronged approach, the project tackled the issue of improving accountability of producers and processors for clean milk while also increasing the supply and affordability of milk.

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Animal Source Foods and Food Borne Diseases: The Good, the Bad and the Challenges

Speaker: Andrew Bisson, USAID Bureau for Food Security

Animal Source Foods (ASF) and Food borne diseases: The Good, the Bad and the Challenges

Outline

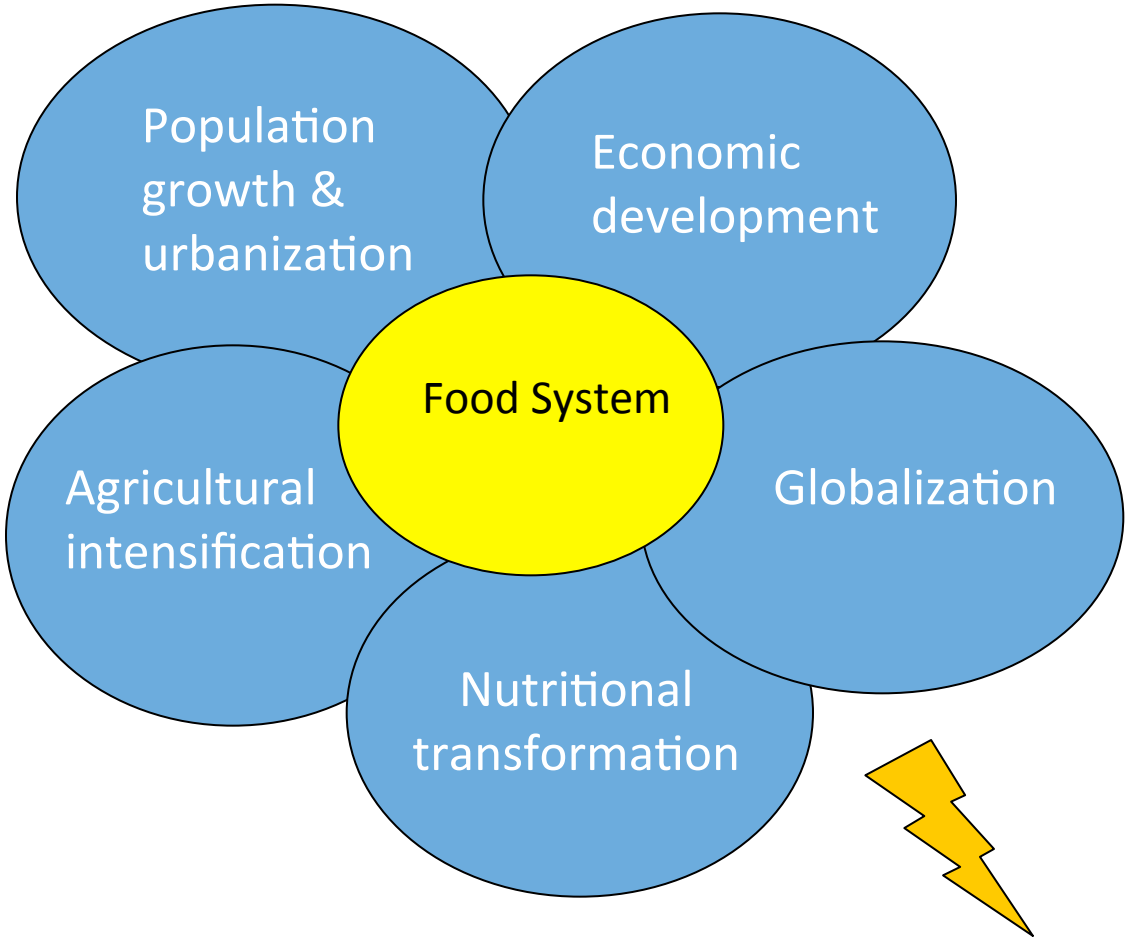
- Rising Demand for Animal Source Foods
- Animal Source Foods and their contribution to the burden of food borne disease
- Key challenges of informal ASF marketing systems

The important role of livestock and animal source foods

Photo credit: Land O'Lakes

- **Increasing incomes and poverty alleviation**
- **Improved nutritional outcomes**
- **Building resilience**

Drivers shaping ASF systems

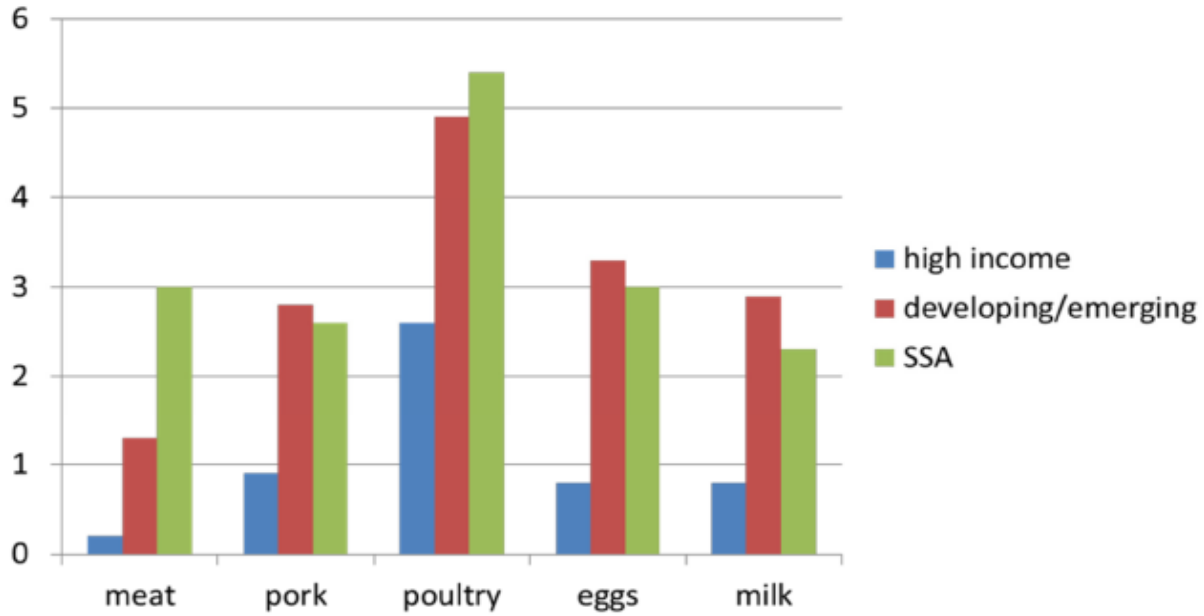


Governance and Enabling environment

- Policies
- Institutions
- Regulation
- Infrastructure
- Communications/ education

Struggling to keep pace with surging growth in demand for ASF

Annual % growth in consumption of livestock products between 1995 and 2005



FAO, 2012

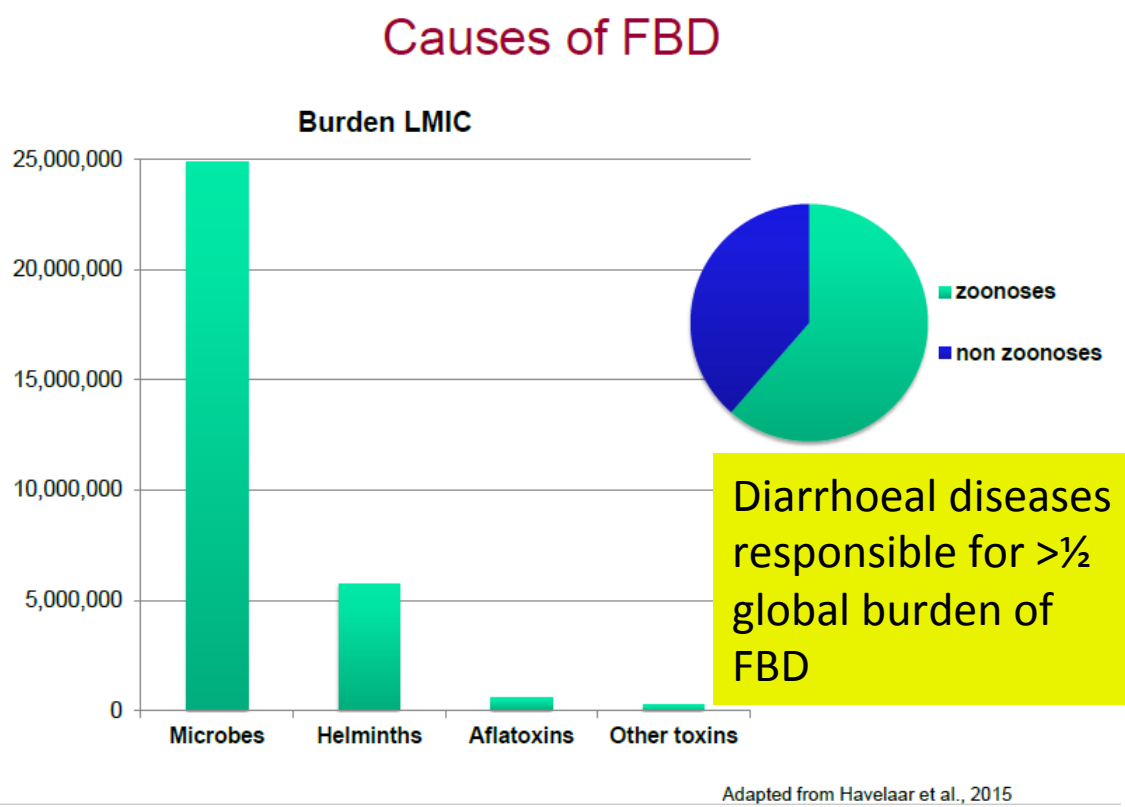

WHO ESTIMATES OF
THE GLOBAL BURDEN
OF FOODBORNE DISEASES
FOODBORNE DISEASE
BURDEN EPIDEMIOLOGY
REFERENCE GROUP
2007-2015
World Health
Organization


WHO ESTIMATES OF
THE GLOBAL BURDEN
OF FOODBORNE DISEASES
The burden of foodborne diseases is substantial
Every year foodborne diseases cause:
almost
in 10
people to fall ill
33 million
healthy life years lost
Foodborne diseases can be deadly, especially in children <5
420 000
deaths
Children account for
almost 1/3
of deaths from
foodborne diseases
FOODBORNE DISEASES ARE PREVENTABLE.
EVERYONE HAS A ROLE TO PLAY.
For more information: www.who.int/foodsafety
#SafeFood
Source: WHO Estimates of the Global Burden of Foodborne Diseases. 2015.
World Health
Organization

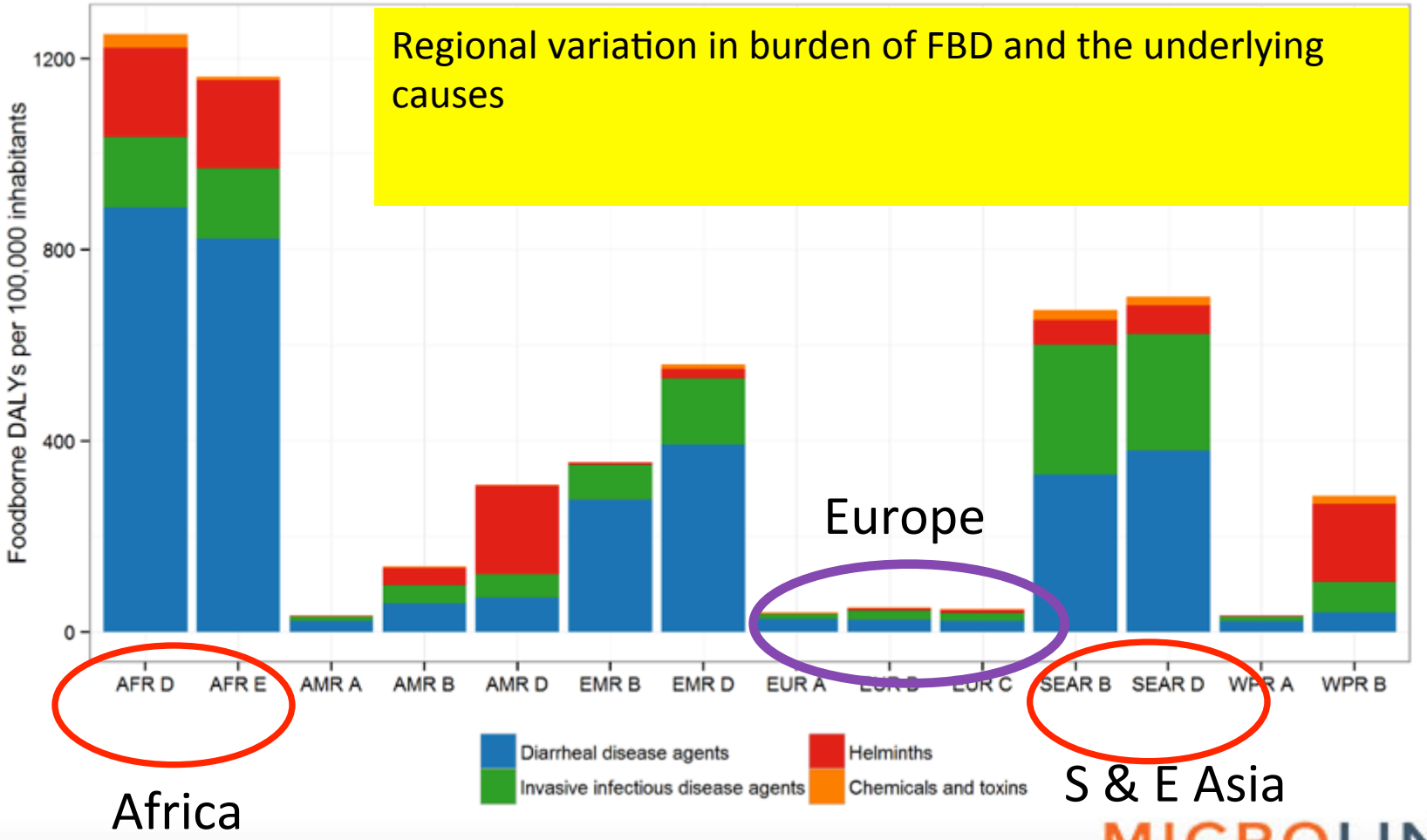
Causes of foodborne disease?

30-80% of FBD are ASF origin

- **Microbial pathogens**
  (viruses, bacteria)
- **Food borne parasites**
  (Helminths and protozoa)
- **Toxins**
  (including mycotoxins & chemicals)
  (linkages with stunting and immunosuppression)



WHO Global Estimates and Regional Comparisons of the Burden of Foodborne Disease in 2010 (Havelaar et al, 2015)



Wet markets and the informal sector

- Most FBD is the result of consuming fresh, perishable foods from informal markets

(formal markets not necessarily safe)

- Regulatory control is difficult in informal markets (Do no harm!)
- Need to balance trade-offs between food safety, livelihoods and access to ASFs ('meat in the middle')

Practical solutions in low resource settings:

- 'Farm to fork' approach
- Use of risk management
- Recognize/support the risk laden informal sector
- Stakeholder engagement and training
- Create inclusive pathways to formalization
- Align improved policies and practices to incentives and motivations of actors and consumers
- Use of appropriate technologies
- Strengthen policy/ food system governance

Photo: Land of Lakes

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Risk assessment for food safety management in Vietnam

Speaker: Hung Nguyen-Viet, *International Livestock Research Institute (ILRI) & Hanoi University of Public Health*

Contribution

- Delia Grace
- Fred Unger
- Max Barot
- Lucy Lapar
- Dang Xuan Sinh
- Tran Tuyet Hanh
- Pham Duc Phuc
- Hoang Van Minh
- Tran Thi Ngan
- National Food Safety Risk Assessment Taskforce

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TRƯỜNG ĐẠI HỌC Y TẾ CÔNG CỘNG HANOI UNIVERSITY OF PUBLIC HEALTH

Australian Government
Australian Centre for International Agricultural Research

CGIAR RESEARCH PROGRAM ON Agriculture for Nutrition and Health

CGIAR

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)
  - f

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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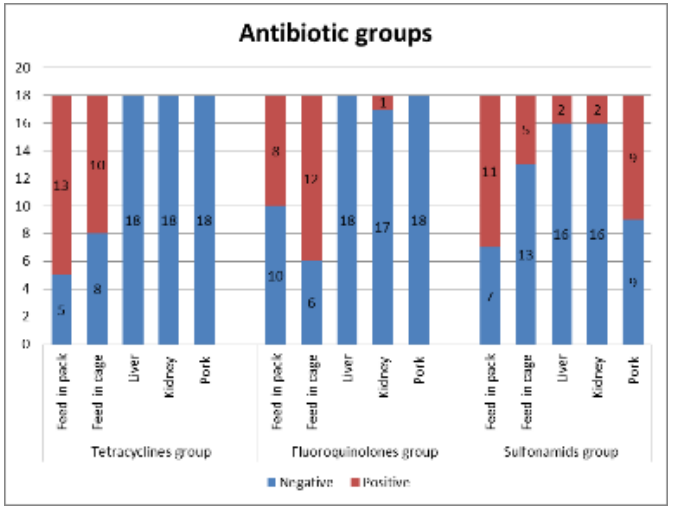
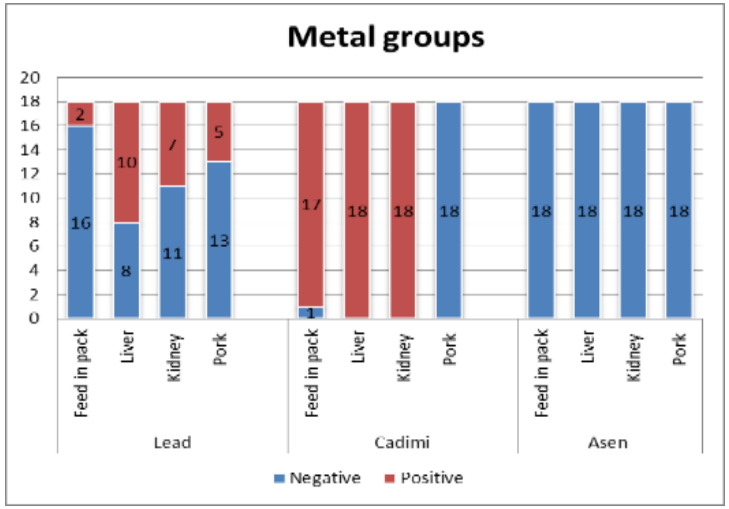
Dang Xuan Sinh et al, 2017, IJPH

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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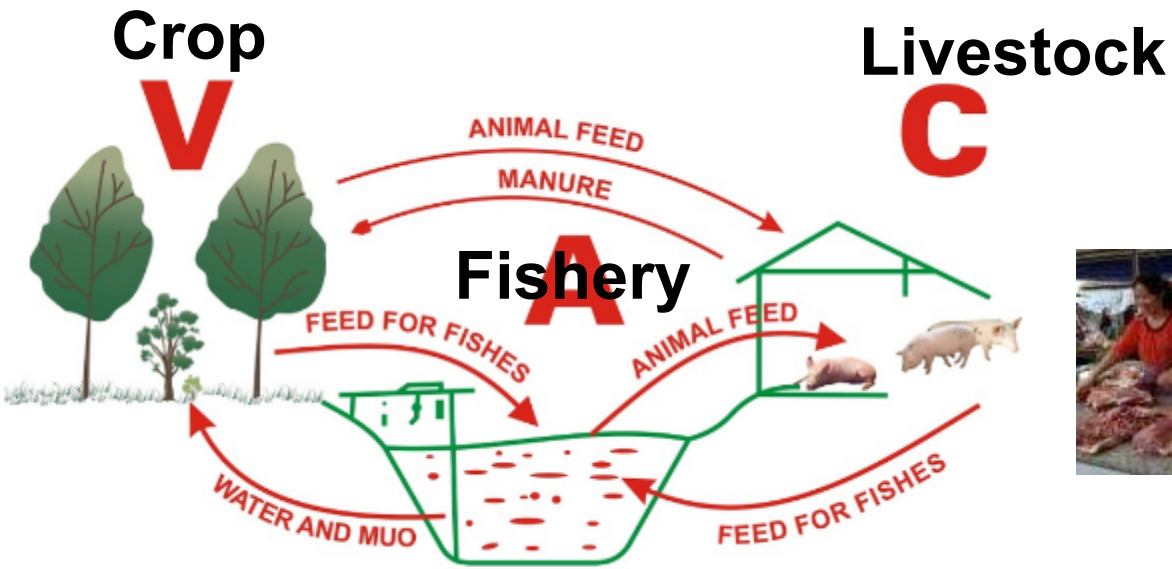
Tuyet Hanh et al, 2017, IJPH

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



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.

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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

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Improving markets to protect food access: an intervention in informal dairy markets in Kenya

Speakers: Silvia Alonso, International Livestock Research Institute

Milk – *the white gold*

Highly nutritious:

- Macro/micro nutrients
- High bioavailability
- improve anthropometric indices
- reduce nutritional deficiencies among undernourished children

Compared to other ASF:

- Very suitable for children
- More available
- More affordable

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Raw milk

Most available and **affordable** form of dairy in many low income countries

In rural areas in LIC fresh raw milk is easily available (incl. self-production)

In urban areas co-exists with pasteurized milk:

- ❑ Wide distribution channels (incl. door to door)
- ❑ Cheaper
- ❑ Taste preference
- ❑ Cultural values

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Raw milk and public health

Concerns over the safety of raw milk

- Is it a health risk in Kenya?
- Is pasteurized milk safer?

Raw milk and public health

Concerns over the safety of raw milk

- ❖ Is it a health risk in Kenya?
- ❖ Is pasteurized milk safer?

PUBLIC HEALTH INTERVENTIONS IN KENYA

- Based on increased regulation and penalization of raw milk VC actors (unsuccessful)
- Promoting selling of boiled milk
- Ban raw milk VC and promote pasteurization

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The “informal” (raw milk) dairy sector

- Poor infrastructure, lack of cold chain, informal agreement mechanisms between actors, often unlicensed, poorly regulated (government and self-regulation)

The “informal” (raw milk) dairy sector

- Poor infrastructure, lack of cold chain, informal agreement mechanisms between actors, often unlicensed, poorly regulated (government and self-regulation)

- But… Informal dairy markets have an essential role in at least three main aspects:
  - **Food security** (especially diet and nutrition needs of children)
  - Source of **livelihoods** for the population (higher prices for producers, gives jobs to a good amount of people)
  - Support **women and youth**

A ban in the informal sector

- A ban of raw milk could have unintended consequences
  - livelihoods of many people
  - access to nutritious food
  - Increased price of pasteurized milk

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While in the long term markets will formalize, in the short and medium terms interventions that seek to suppress informal markets can be **ineffective**, **anti-poor** and **gender-inequitable**

So do win-win options exist that will protect <u>nutrition</u> and <u>livelihoods</u> provided by these markets and still protect <u>public health</u>?

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Upscaling the informal market

Training and certification

Milk quality/ milk hygiene
business skills / value addition
Sustainable/self-sustained

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business skills / value addition
Sustainable/self-sustained

FINDINGS:

- Improved milk safety
- Happy traders/ customers
- Limited government buy-in
- Successful in other contexts

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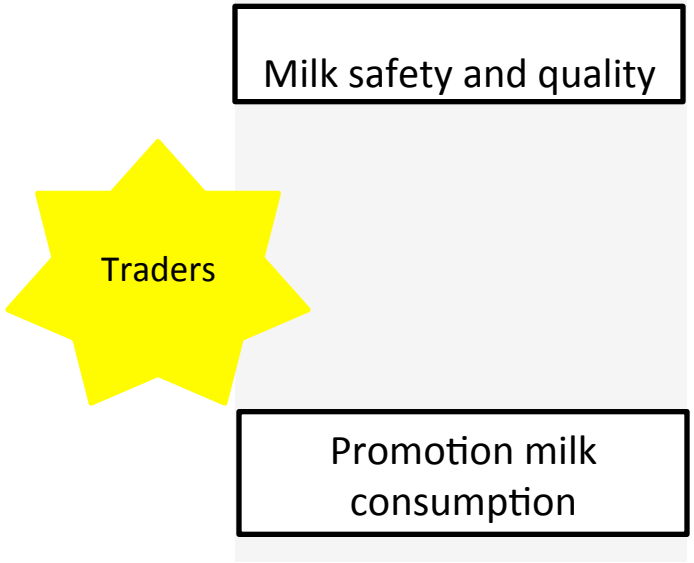
Giving T&C another chance!

"**MoreMilk: making the most of milk**" project (2016-2021)

TCM scheme to improve *milk safety* and *health & nutrition outcomes* in children in peri-urban Nairobi

- **T**raining: milk quality, safety and hygiene
- **C**ertification: "quality mark"
- **M**arketing: milk consumption messages to mothers/consumers

MoreMilk for better health and nutrition



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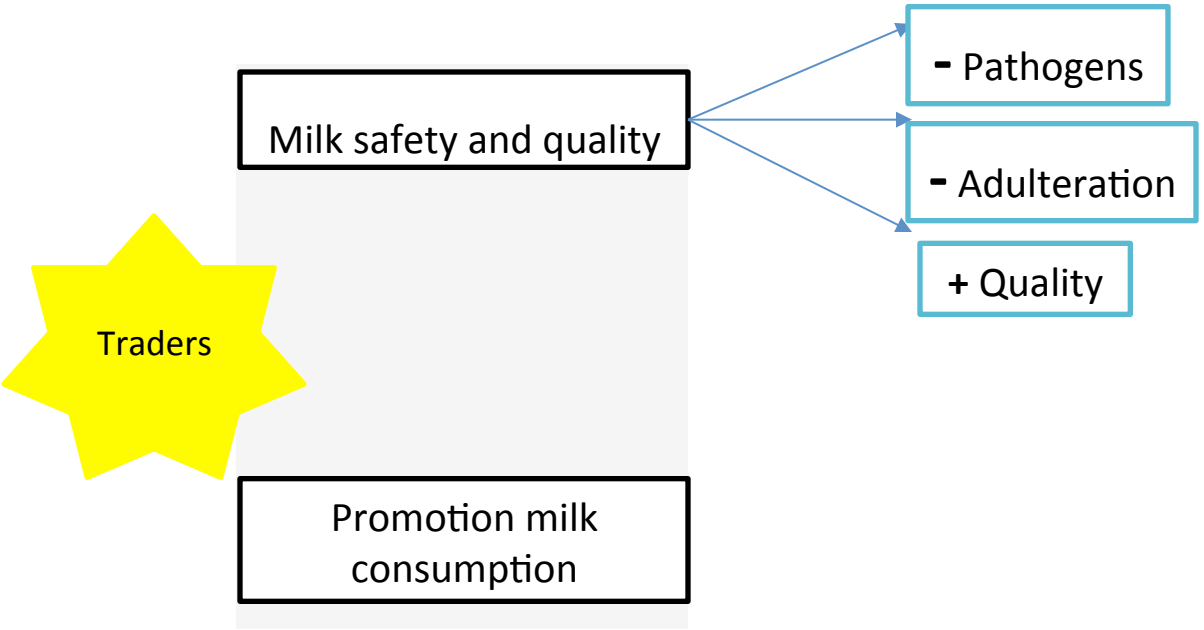
MoreMilk for better health and nutrition



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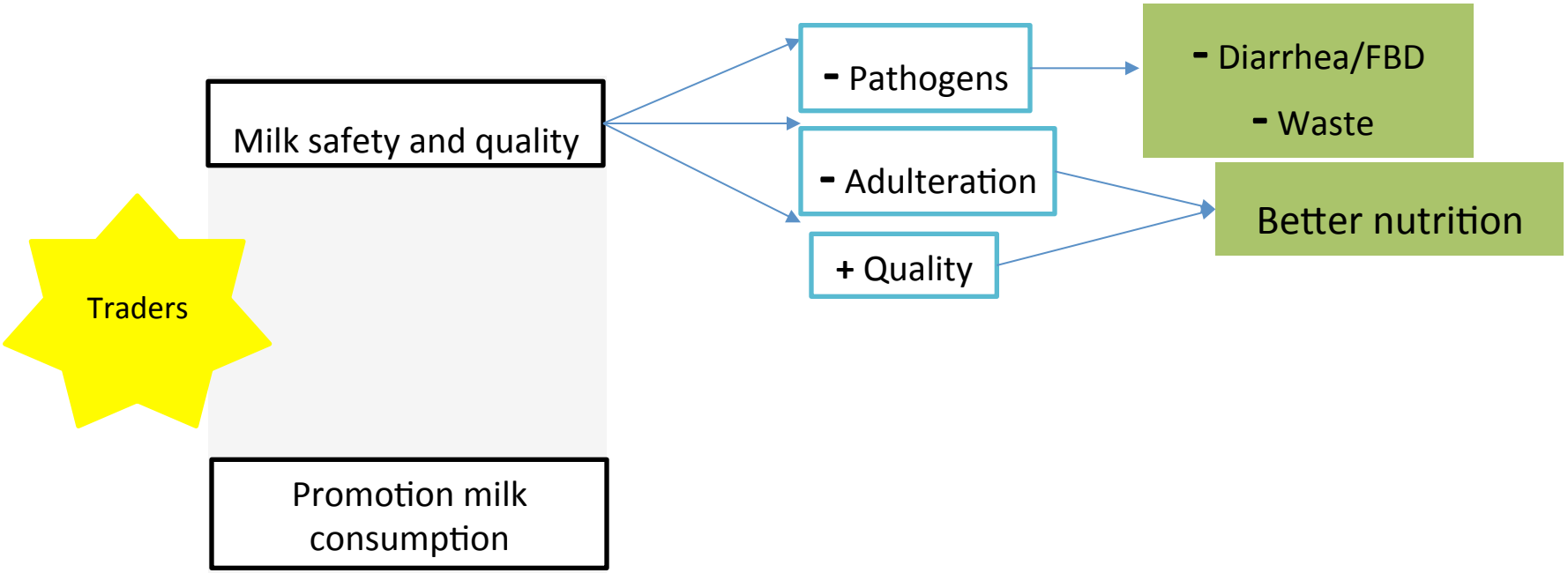
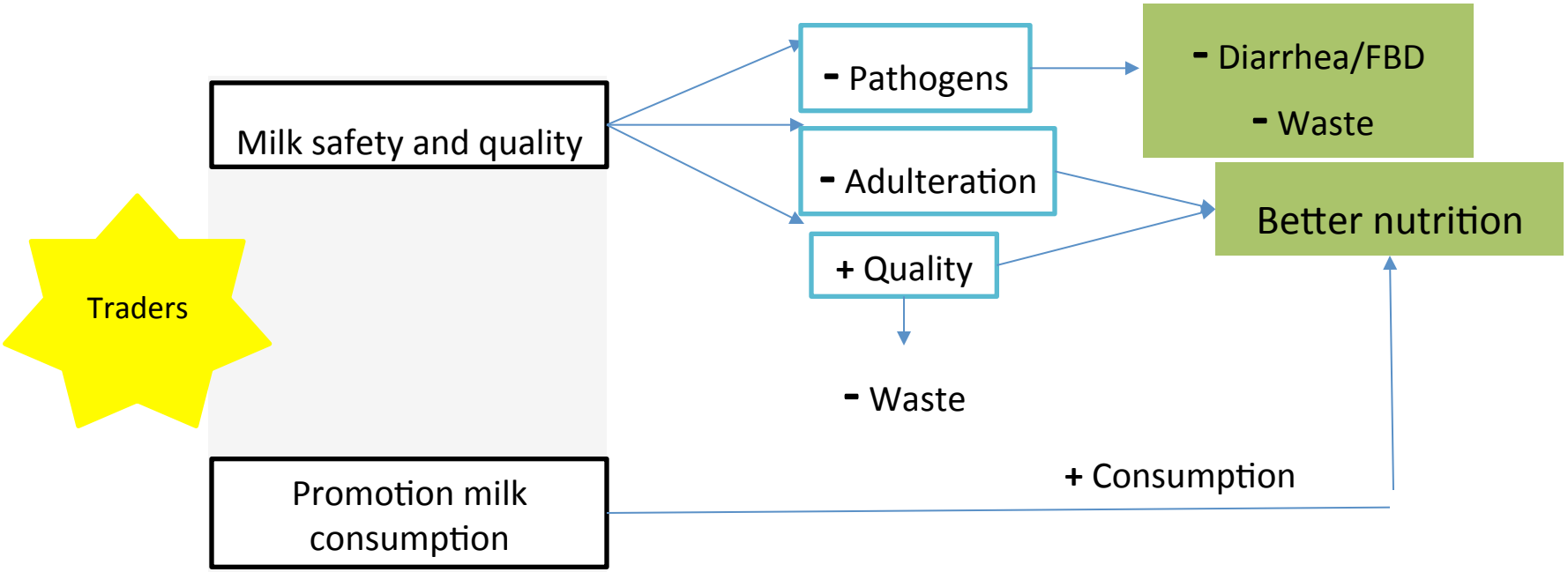
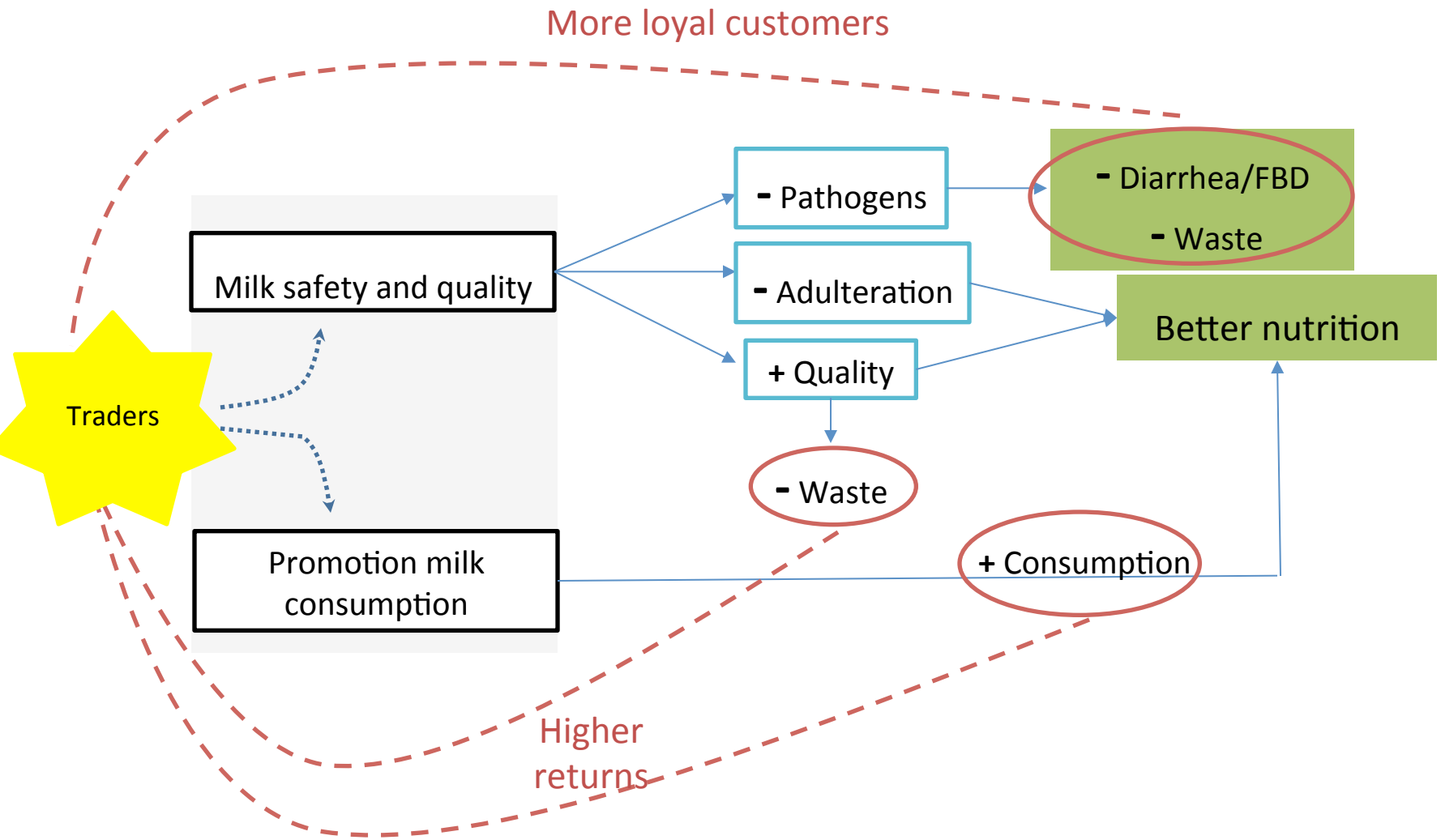
MoreMilk for better health and nutrition



MoreMilk for better health and nutrition



MoreMilk for better health and nutrition



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Take home messages

- Raw milk and raw milk markets – essential roles in many countries (nutrition, health, livelihoods)
- Can't look at food safety in isolation
- Food safety interventions: **one size DOES NOT always fit all.** Interventions that penalize informal actors can do more harm than good.
- Take holistic look at problem and find **innovative approaches**
- **Light-touch interventions** in informal markets can improve food safety, and contribute to improved health and nutrition outcomes.

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A Multipronged Approach to Cleaning Up the Milk Supply in Rwanda

Speaker: Dennis Karamuzi, Land O'Lakes International Development

USAID FROM THE AMERICAN PEOPLE

ABS

LAND O'LAKES INTERNATIONAL DEVELOPMENT

RDCP I (2007-2012):

Limited regional focus, few milking cows, low sector marketing capacity, nascent consumer demand

RDCP II (2012-2017):

Builds on GOR sector policy, sector-level leadership, growing urbanization and middle class demand, new investment in transport, processing, retail

- **USAID:** project funder $14,999,988
- **Land O'Lakes International Development:** lead project implementer
- **ABS-TCM, Nairobi Kenya:** training on animal husbandry
- **INSPIRED:** Developing financial products for dairy farmers with Rwandan banks
- **University of California, Davis:** Training on mastitis prevention, animal care and milk safety.

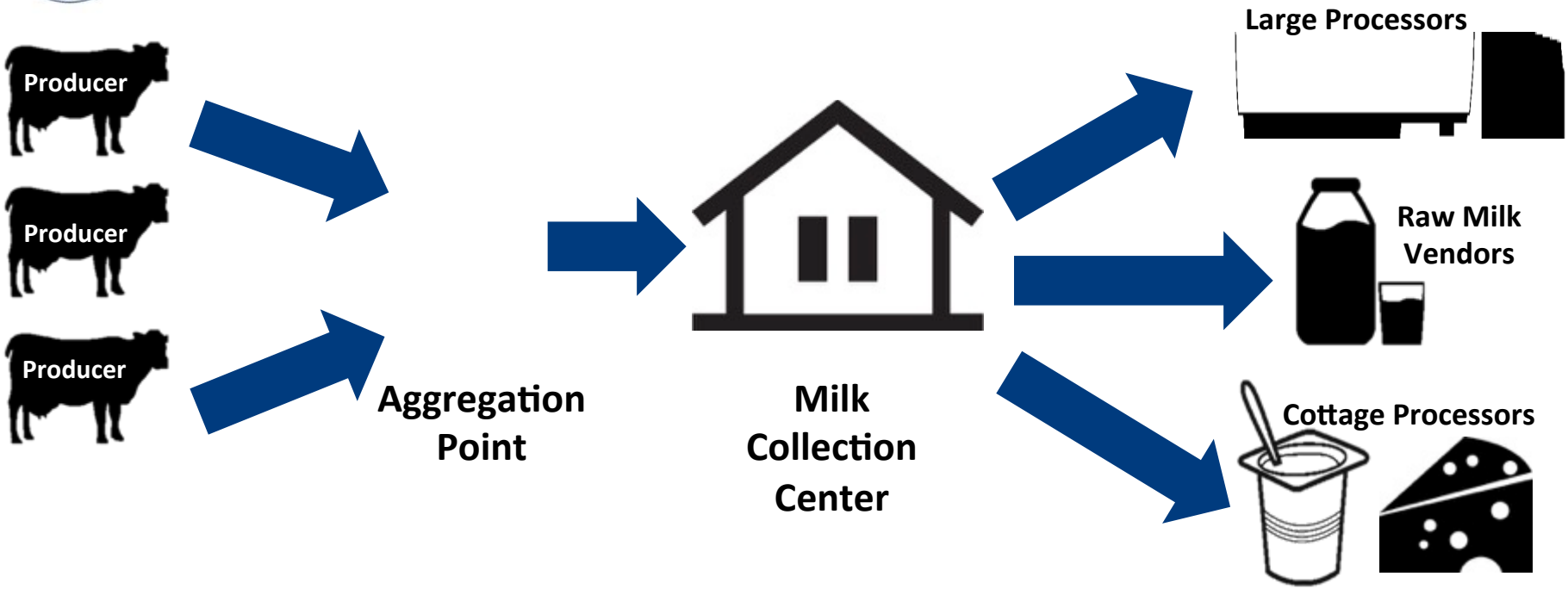
RDCP II Partnership: A 10-year Investment

RDCPII Goal

"Rwandan Dairy Products Competitive in regional markets"

NDS Goal

"A competitive dairy sector providing quality dairy products which are affordable, available and accessible to all Rwandans and other consumers in the region (Dairy Sector Working Group, July 2012)."



PUSH effect - production

Input support Feed plans Breeding plans Herd Health	Quality Training Equipment & Kitting Incentives System

PULL effect - consumption

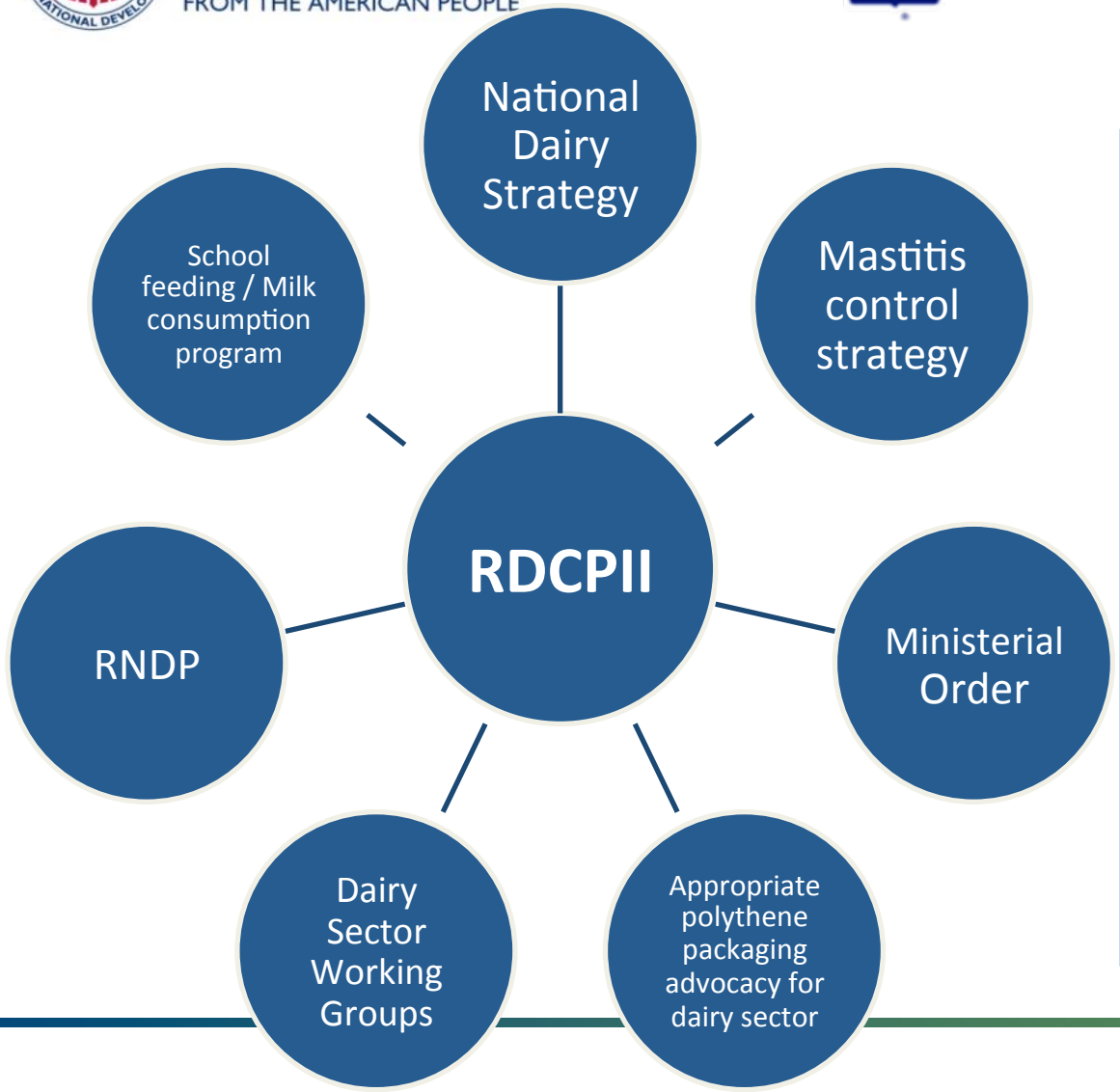
Quality Training Equipment & Kitting QMS	QMS Incentive based pricing Relations

Primary Producer → **Milk Collection Center** → **Milk Processing Plants** → **Milk Sellers, Supermarkets, Milk Bars & Kiosks** → **End User**

USAID FROM THE AMERICAN PEOPLE

ABS

LAND O'LAKES INTERNATIONAL DEVELOPMENT



REPUBLIC OF RWANDA

MINISTRY OF AGRICULTURE AND ANIMAL RESOURCES (MINAGRI)

National Dairy Strategy

April 2013

Policy – enabling environment

- Lack of enforcement of milk quality regulations
- No incentives provided for improved quality milk
- Limited cold chain
- Traditional consumer preferences dictate quality expectations
- Limited processing facilities
- Lack of electricity in some areas
- Limited Packaging materials

Milk Quality challenges

Quality of milk a priority

- Combining 'Software' and 'Hardware' to achieve quality goals
- Development of the Seal of Quality Concept
- Distribution of milk quality testing kits
- Enhancing milk transport logistics
- Advocating for certification services through support to RALIS
- Trained cheese makers and their staff about milk quality, testing, processing and marketing of their dairy products.

Milk Quality

- **Individual MCCs aggregate milk from hundreds of small producers** with 1 or 2 cows – high risk of contaminated milk entering bulk cooling tanks
- **SOQ-enabled milk collectors –** "Gate-keeper" for raw milk quality *pushed to aggregation points* that can ensure compliance from producers
- **Less milk rejected** from MCCs
- **Provides instant feedback** to producer on milk quality

SOQ-enabled Milk Collectors

FROM HERE (Using bans and bamboo)

TO HERE (Batch Pasteurizer – 1000 liters)

FROM HERE (Poor operating area)

TO HERE (Clean area, Quality butter)

- **Kigali's raw milk traditionally marketed through "kiosks" –** shops with stainless steel tanks that don't always properly cool milk.
- **Cost-effective for consumers,** who can avoid costly packaging by purchasing small quantities of milk
- Before RDCP II, **kiosks had very little sanitation oversight** by authorities
- Bulk milk sold in the **Milk Zone is screened and pasteurized**
- **Links best practices for raw milk safety with consumer demand** for low cost and convenience

Milk Zones


Taste, Healthy Livin
INYAN

Shisha Wumva: Feel the Goodness

- **Milk consumption campaign** that associates milk with a healthy body
- **Backed by best practices** at farm, MCC, processor and retail outlet
- **Links the entire sector** around best practices for milk safety and quality
- **Allows for differentiation from "informal market"**
- **Promotes consumer demand**
- **Promotes investor confidence**

Complementary to “one cup per child”

Multipronged Approach

MILK products for ALL

TOP TAKE-AWAYS

1. Increased access to affordable, nutritious, cleaner **MILK**
2. Balance between PUSH & PULL elements is ESSENTIAL
3. ON-FARM testing of **MILK** – extended accountability along value chain
4. Incentive Based Payments for adhering to **MILK** safety standards
5. Government policy enforcement of clean **MILK** standards
6. Bulk tank sales of clean **MILK** into consumer container at desired amount
7. Processor collaboration with milk collection centers
8. Nationwide Milk Consumption Promotion Campaign

USAID FROM THE AMERICAN PEOPLE

ABS

LAND O'LAKES INTERNATIONAL DEVELOPMENT

SHISHA WUMVA

Nywa Amata

Thank you

TOP TAKE-AWAYS

1. **Nutritious AND Safe Animal Source Foods**
There are strong demand drivers but also significant microbial food borne disease risks. Integrate food safety into ag-nutrition programming

2. **Use risk assessment and risk management** to achieve greatest impact

3. **Work with the informal sector**; identify incentives to control risks and provide an inclusive pathway to formalization appropriate to culture and context

4. **Farm to Fork - I**mplement control measures (good practices, technologies, behaviors and regulation) across the food system

5. **Big carrots, small sticks -** Balance light touch regulatory approaches with positive support to stakeholders and create incentives to meet realistic standards

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Contact: jmaccartee@usaid.gov or koplanick@usaid.gov

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