USAID Partners Meeting on Value Chains and Zoonotic Pathogens

Bangkok, Thailand
December 16-17, 2013

Disclaimer

This report does not necessarily reflect the views of the U.S. Agency for International Development or the Food and Agriculture Organization of the United Nations.

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Acronyms and Abbreviations

AFRIMS	Armed Forces Research Institute of the Medical Sciences
AI	Avian influenza
APHIS	Animal and Plant Health Inspection Services (US)
ARI	Acute respiratory infection
ASEAN	Association of Southeast Asian Nations
ASWGL	ASEAN Sectoral Working Group on Livestock
BCC	Behavior change communications
CAHEC	China Animal Health and Epidemiology Center
CBS	Community-based surveillance
CBT	Cross-border trade
DoC	Day-old chicks
ECTAD	Emergency Centre for Trans-boundary Animal Diseases (FAO)
EID	Emerging Infectious Diseases
EPT	Emerging Pandemic Threats
FAO	Food and Agriculture Organization of the United Nations
HPAI	Highly pathogenic avian influenza
ICDDR,B	International Centre for Diarrhoeal Disease Research, Bangladesh
IHR	International Health Regulations
ILI	Influenza-like illness
IPC	Infection prevention and control
LBM	Live bird market
LPAI	Low pathogenic avian influenza
MERS-CoV	Middle East Respiratory Syndrome-Coronavirus
MOA	Ministry of Agriculture
MOH	Ministry of Health
OFFLU	OIE-FAO Network of Expertise on Animal Influenza
OIE	International Organization for Animal Health
PCR	Polymerase chain reaction
PRRS	Porcine Reproductive & Respiratory Syndrome
RDMA	Regional Development Mission, Asia (USAID)
SARS	Severe Acute Respiratory Syndrome
UN	United Nations
US CDC	United States Centers for Disease Control and Prevention
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
USFWS	US Fish and Wildlife Service
WHO	UN World Health Organization

Executive Summary

The USAID Partners Meeting on Value Chains and Zoonotic Pathogens held in Bangkok during December 16-17, 2013 was attended by representatives from Betagro, Chulalungkorn University, FAO, OIE, PREDICT, PREVENT, US CDC, USDA, U.S. Fish and Wildlife Service, WHO and USAID.

The purpose of this meeting was to develop a focused control strategy (or strategies) to mitigate the risk of emergence, spread, and maintenance of zoonotic viral agents along animal value chains (including farms and markets). The meeting participants will (1) review what is known about livestock and wild animal value chains (including farms and markets) and their role in the emergence, spread, and maintenance of zoonotic viral threats; (2) identify knowledge gaps; and (3) prioritize key questions remaining to be answered.

Dennis Carroll, Director, Pandemic Influenza and Other Emerging Threats Unit, USAID, gave opening remarks.

The two-day meeting began with a plenary on an overview of value chains. This was followed by a series of presentations organized around sessions on “What have we learned?” “What can be done within value chains to reduce risks?” and “What else we have to do?”

The meeting’s focus was to describe how animal diseases, and particularly HPAI diseases, could be spread through production and marketing networks, i.e., value chains. Therefore, these chains must be taken into account in planning strategies for disease prevention and control. Several participants pointed out that within value chains there are many stakeholders who are affected differently by diseases and their control. Some are affected by disease risk, while others are affected by prevention and control measures. The Emerging Pandemic Threats (EPT) program work should consider these persons and look at the links between production systems, markets and consumers, and assess risks for disease spread so that effective risk reduction interventions can be developed. The meeting recognized that value chains are driven and controlled by people; therefore understanding people’s motivations is a key element in determining the risks of disease spread and developing effective health policies.

The wrap-up by Dennis Carroll noted that this meeting’s focus on value chains is a way to help the EPT program look forward. And as we move forward in our work, what will we be able to take with us from this experience? We will continue to examine the role of livestock, its value chains and its interface with wildlife and waterfowl. Will our work show a proof of principle that can be applied to coronavirus or other virus families? This meeting is just the opening of a dialogue around this theme.

Objectives and Participants

Background: Since 1940, most new diseases in humans have originated in either livestock or wild animals. As human populations have continued to grow, there have been parallel increases in the size and interconnectivity of systems to produce, move, and market livestock and, in some cases, wild animals as well. The sheer volume of "food" animals now being produced and the overlap of value chains for livestock and wild animals have increased the risk for zoonotic emergence and spread as evidenced by the detection of a number of new viruses associated with value chains over the past 20 years. These include H5N1 and H7N9 avian influenza, Nipah virus, SARS coronavirus, H1N1 pandemic influenza, and (presumably) MERS coronavirus. Recent studies have shown that introducing "best practices" into animal productions systems can reduce the presence of zoonotic pathogens and their spillover into human populations. In order to make further gains in reducing the risk of zoonotic spillover, it is necessary to document what is currently known about animal value chains and identify what additional information is needed so that a focused set of disease control interventions can be developed and applied.

Meeting Objective: To develop a focused control strategy (or strategies) to mitigate the risk of emergence, spread, and maintenance of zoonotic viral pathogens along animal value chains (including farms and markets).

Purpose of discussion: (1) review what is known about livestock and wild animal value chains (including farms and markets) and their role in the emergence, spread, and maintenance of zoonotic viral threats; (2) identify knowledge gaps; and (3) prioritize key questions remaining to be answered.

Proposed participants:

- CDC/Bangkok
- FAO
- OIE/Bangkok
- PREDICT
- PREVENT
- USDA/Bangkok
- WHO
- USAID

[See Annex 1, Meeting Agenda; and Annex 2, Participant List.]

Opening

Subhash Morzaria, Regional Manager of the Emergency Centre for Trans-boundary Animal Disease, FAO Regional Office for Asia and the Pacific (ECTAD-RAP), opened the meeting with a brief review of the meeting's purpose. He commented that this was an appropriate time for the meeting on value chains as H7N9 infections are expected to occur during this influenza season. He also pointed out that FAO works on value chain issues on almost a daily basis, so it is good to bring this together with health issues.

Dennis Carroll, Director, Pandemic Influenza and Other Emerging Threats Unit, USAID, gave opening remarks. It has been 8.5 years since he first heard about value chains. Little did we know that at the start of this work on H5N1 that there would be such a close working relationship between emerging human health and animal health issues. The resources invested and the knowledge learned in the work on animal health and H5N1, including the tracking of the virus along the value chain from farm to market to human exposure, helped pave the way to understand the emergence of H7N9. Based on the success of identifying and tracking H7N9, we are in good shape to track other emergent threats. The hope is that through this meeting we will come to some understanding about what is it that we do know, and what we don't know about value chains and disease emergence, and how do we apply this to our work going forward.

Andrew Clements further emphasized that the purpose of this meeting was to focus on a single topic, value chains, and assess how it can help with the work of the EPT program. What is the knowledge out there on this topic, and how do we take advantage of this opportunity?

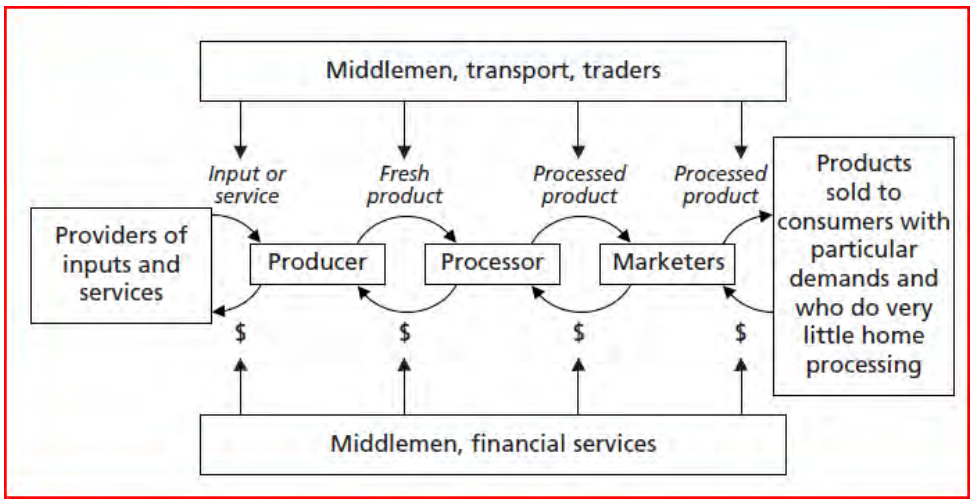
Session 1: Plenary

Objective: Provide an overview on concepts of animal value chain analysis and its related approaches and applications to disease prevention and control.

Jan Hinrichs opened the first session by presenting an overview on value chains and their use in studying the risks and impacts of animal and zoonotic diseases on livestock systems. Value chain approaches integrate social and economic analysis, epidemiology and risk management.

The value chain approach recognizes that animals and livestock products flow through a chain from farms to consumers. It recognizes that the chain is a complex system of multiple transactions that is influenced by social, cultural and economic drivers and relationships. The value chain consists of activities implemented by various actors to bring raw materials through a chain of processing and transactions to the sale of final value added products. The slide below describes how chains have inputs that are used to produce and transport commodities towards consumers.

What are animal value chains?



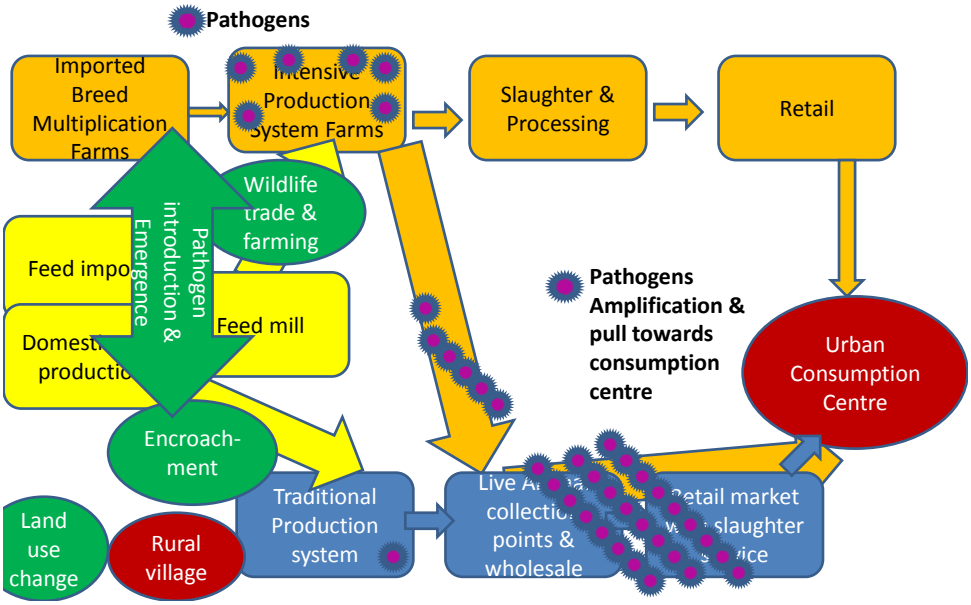
Source: FAO 2011 – A value chain approach to animal disease risk management

Using a value chain in the surveillance for emerging diseases is useful because it describes farming systems in a context. It describes weak links and opportunities that can amplify disease risk. Value chains have a number of influences (e.g., consumer demand, agro-ecological factors, farming system and access to technology, access to resources, livelihoods, poverty, frameworks of laws, institutions, governance, people's/actors behaviors, cultural customs and rules, interfaces and drivers) any of which can become an important driver of disease emergence and spread.

The biggest driver is consumer demand. As population grows, there is more demand for food, particularly for protein production. Asia already has a high population density and high food expenditures. To meet the demand for protein, the specialization of farms into intensive meat and egg production has occurred. As Sub-Saharan Africa moves towards a larger middle class population, these same demands will increase there as well.

The slide below shows linkages between traditional low intensity production systems and emerging intensive production systems as well as interfaces with wildlife.

Interfaces and Drivers



Hinrichs then explains three different ways to analyze value chains:

- Farming system analysis
    - Geo-statistical analysis of agro-ecological risk factors for disease emergence and spread
    - Risk modeling to identify disease emergence hot spots
    - FAO farming system definitions and database
- Animal value chain analysis
    - Focus input and product flow driven by economics/incentives
    - Assess risks for disease emergence/spread, critical control points and incentive compliant interventions/policies
- Social Network Analysis
    - Analysis of animal movement and actor behavior to identify risk factors and critical control points

After the presentation, several questions were asked. The presentation described the growth of intensive production farming, so what is the difference between intensive and non-intensive production farming? Hinrichs stated that this is a good question that has yet to be answered. The definitions between the two differ by animal and are amongst other factors subject to production purpose and method of breed replacement.

Another participant pointed out that in relation to H5N1, early production systems were classified as bio-security levels 1-4. This shows that there is a need to set definitions for each level of the production system. This is compounded by the fact that different systems generate different value chains, and while there is interconnectivity between value chains, they need to deal with it separately.

A participant described value chains as a tool to focus in on viral diversity. Systems, both formal and informal may blend and allow viral agents to spill into each other. In all probability ecosystems are being developed in different places along the value chain. We need to develop the tools to view value chains and interfaces at a higher granularity so that we can predict viral emergence.

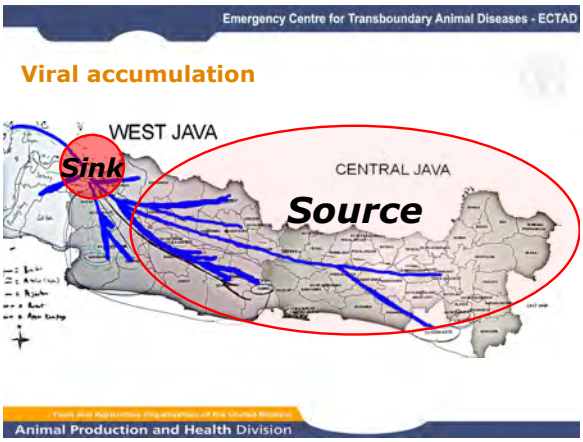
Session 2: What have we learned?

Session 2.1: Experience from animal value chain studies

Objectives: To share the experience in applying the approach of the value chain analysis to different livestock particularly the methodology, information yielded, gaps and constraints in applying such approaches and recommendations to improve.

Eric Brums: Poultry

This presentation is an exploration of epidemic surveillance conducted in Indonesia. Specifically, why did a region that contained the highest number of human H5N1 cases have the lowest numbers of sick birds? Through studying the value chain, and using epizone classifications, the Indonesia team was able to map the source of viral accumulation and amplification, and describe the "sink" where cases eventually occur, pointing out that these are not in the same geographical spaces.



There are two takeaway messages from this work. Human demand can predict exposure risk. In large urban areas, mega-markets that service demand can concentrate pathogens through accumulation and amplification. This also makes rare pathogens easier to find. Secondly, animal value chains mimic ecological habitats exhibiting "meta-population dynamics". These dynamics can be modeled, and pathogen migration can be described and quantified.

Jan Hinrichs: Swine

The swine value chain in Myanmar is described. Three types of farming systems characterize it: low-tech rural, intermediate peri-urban and large high tech farms. Pigs move from farms to collector yards to the slaughterhouse. An outbreak of porcine reproductive and respiratory syndrome (PRRS) provides an example of how outbreaks move through the value chain and produce impacts at the farmer, trader and market levels. A PRRS outbreak in 2011 resulted in changing trade patterns, reduced demand, resulting in subsequent reduction in numbers of pigs slaughtered and finally decreased consumption, with demand being replaced by chicken sales. FAO Myanmar has established a GIS database on commercial

pig farm locations and production capacity. This helps in showing trade flows and supports disease control interventions.

Ed Newcomer: Wildlife

Traditional wildlife trafficking routes between Asia and the United States involved illegal wildlife products moving from Asia to the USA and Western Europe. In recent years, the People's Republic of China has become an increasingly dominant consumer of wildlife products and live wildlife. Increasingly, the US Fish and Wildlife Service is combating illegal exports of wildlife native to the USA destined for markets in China. Wildlife from SE Asia and South Asia is also being illegally trafficked to markets in China. Success in combating this illegal trade will depend on cooperation between law enforcement partners in the USA, SE Asia, South Asia, and China.

Wildlife trafficking poses a risk as a potential transmission route for various zoonotic diseases. Three case examples were provided: 1) Parrot smuggling from Mexico to California suspected to be tied to Newcastle's Outbreak, 2) Vietnamese national Involved in a conspiracy to smuggle live songbirds strapped to the legs of co-conspirators traveling on commercial airlines, and 3) a US national traveled to Thailand, purchased a juvenile primate, drugged the animal, and smuggled it into the USA inside a pregnancy prosthetic device.

International wildlife trafficking is facilitated through the widespread use of the Internet. In an effort to combat the use of the Internet in illegal wildlife sales, the USFWS initiated Operation Wild Web in 2012. With participation from agencies within the US and in the ASEAN (Thailand, Singapore, and Indonesia), Operation Wild Web resulted in over 150 apprehensions in just a two-week period. The operation resulted in widespread media attention and a reduction in Internet advertisements for illegal wildlife.

A comment was raised about the penalties for this illegal trade. Admittedly, the penalties and sentencing can be minor compared to other crimes. It was stressed that the primary focus of law enforcement is on intentional illegal activities and trafficking but noted that regulations and compliance can be complex for parties attempting to legally import or export wildlife samples for pathogen surveillance.

Astrid Tripodi and John Edwards were asked to comment briefly on value chain work conducted in Vietnam. The recently completed value chain study showed interesting changes over time. Because there is a ban on cross-border traffic, it is difficult to get information from respondents since they would be describing criminal activity. However, clandestine movement probably occurs with the assistance of law enforcement agencies being involved. There is also a practice of smuggling spent hens from China.

Work done in earlier phases in relation to H5N1 has shown that spent layer hens move from northern parts of China and are found in markets in Guangxi Province. The mechanisms for their illegal movement to Vietnam are unclear. The movements of spent hens in China have been disrupted as a result of the response to H7N9. There is still more to learn about the utility of "information-sharing" activities and the impact of control measures.

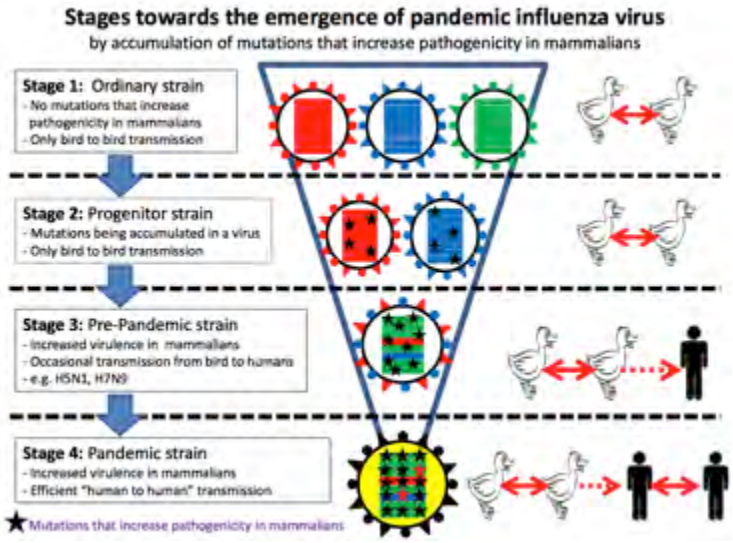
Session 2.2: Applications to risk assessment - Monitoring the pathogens

Objectives: To share the experience in monitoring different pathogens along the value chain particularly the methodology, information yielded, gaps and constraints in applying such approaches and recommendations to improve.

Ken Inui: Epi-zones

The control of animal viral diseases is contingent on shutting down the movement and transmission of the virus. There are three tools that help us with this goal: 1) Value chain studies, 2) Virus surveillance and 3) Molecular epidemiology. These tools have helped us fine-tune methods of surveillance. Epi-zones are geographical areas where closely related viruses were shared, and frequent virus exchange is expected. Epi-zones are dynamic and changing. Because they do not follow political boundaries, surveillance and control should be based on epi-zones, and not by country. An H5N1 epi-zone map for Asia is shown here.

There are four stages (below) towards the emergence of pandemic influenza virus. In Stage 2, mutations are being accumulated in a virus, and there is still only bird-to-bird transmission occurring. This stage, called the progenitor strain, is the optimal stage to intervene to prevent progression to Stages 3 and 4 and possible bird-to-human, and human-to-human transmission. To strengthen surveillance of progenitor strains, there needs to be full genome characterization of all influenza A viruses, and work on epi-zone analysis of mutations.

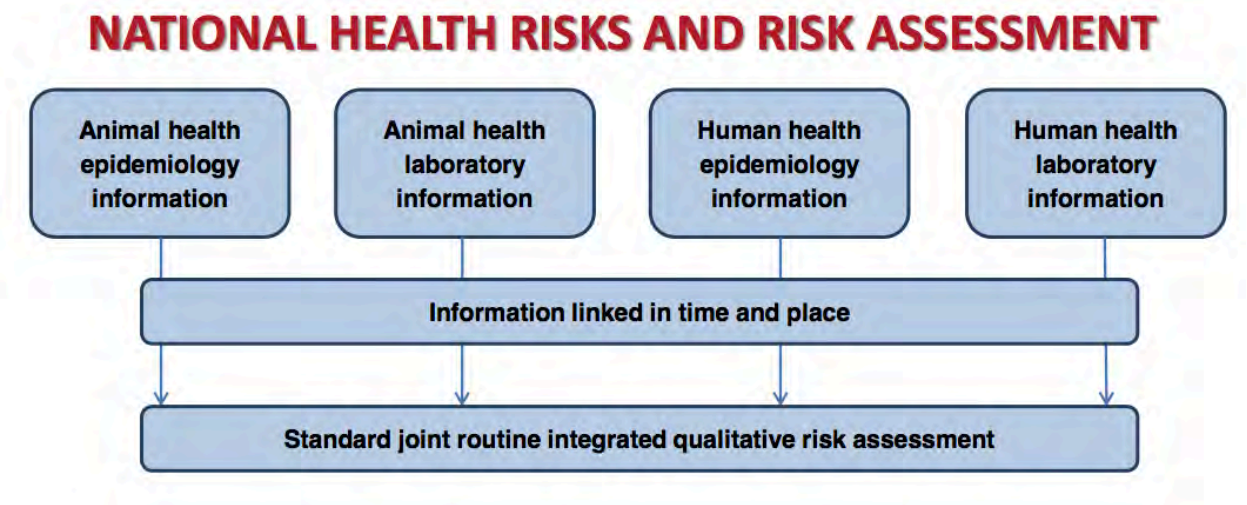


Finally, studies of the passage of avian influenza virus in pigs have shown that receptor-binding sites have changed from avian to mammalian type after three passages. This indicates that pigs are an incubator converting avian flu to human flu. Therefore, there should be enhanced influenza surveillance in pig populations.

Filip Claes: Four-way Linking Project

Effective control of influenza in animals requires understanding the specific national-level risks at the human-animal interface. This understanding requires availability of information from at least four information "streams" - epidemiological and laboratory, from animal and human health. The information must also be linked according to where and when events took place. Linked information can then be examined and assessed by national experts using a standard process or mechanism for routine integrated qualitative assessment. The Four-way linking project involves the mapping of public health and animal health stakeholders and data exchange, including:

- Mapping the national systems and infrastructure for epidemiologic and laboratory investigations by the animal and human health sectors
- Identifying strengths and linkages among the four information streams
- Identifying gaps as well as key areas for strengthening
- Engaging the national partners



Review missions have traveled to Egypt, Viet Nam, Indonesia and Bangladesh. Main gaps identified included lack of mechanism for routine formal communication between human and animal health sectors, and lack of a mechanism for joint risk assessment. While joint field investigations are undertaken, they are not always followed up with ongoing coordination, joint debriefing and reporting. There is also a need for better coordination at sub-national levels, and a need for more data collected and shared particularly regarding the isolates including sequencing information. There also needs to be a mechanism for information sharing from research groups with government agencies.

Jonna Mazet: Viral family surveillance in farmed wildlife

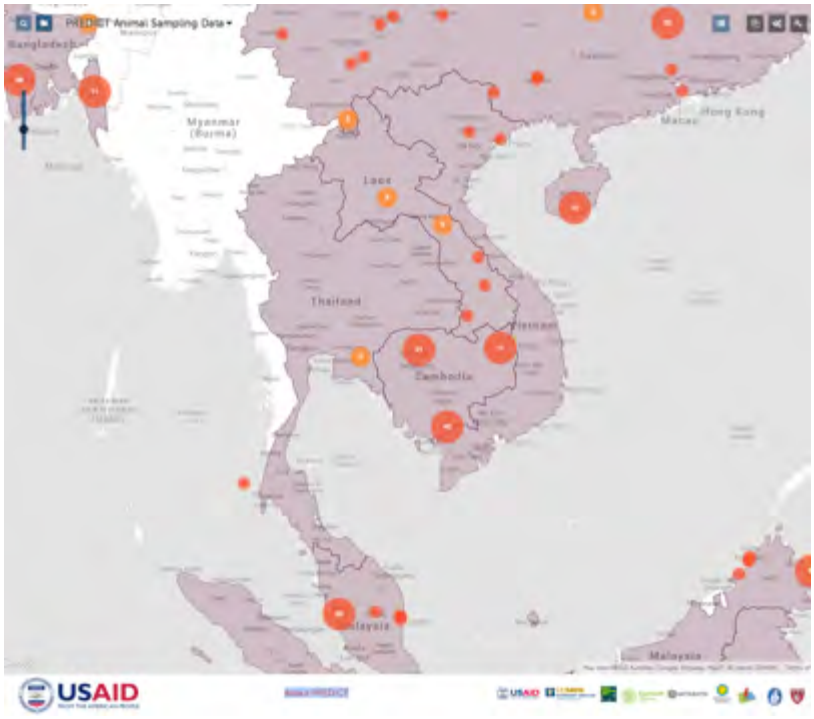
The Predict project monitors for the presence of potentially zoonotic viruses globally. The strategy is an iterative and adaptive process that includes:

- Targeting key interfaces and species
- Modeling to help target surveillance
- Pathogen diagnostics and discovery
- Informatics and reporting

This strategy has helped validate the surveillance focus of EPT. We know that:

- 88% of zoonotic viruses transmitted to humans over the past decade are from wildlife
- Among viruses transmitted from wildlife
    - 38% are transmitted by vector
    - 62% by direct or indirect contact transmission
- Rodents, bats or primates are implicated in transmission of 85% of all known zoonoses
- Birds transmit 28% of the viruses (some overlap)
    - When considering zoonoses transmitted from wildlife to humans over the past decade, adding wild birds to a surveillance strategy targeting rodents, bats, and non-human primates, would only result in finding two additional viruses over and above those identified by targeting the other three taxa

With this information, what advice should be given to governments? Since these are still rare diseases, can a case be made to more efficiently target surveillance with limited budgets? In addition to budgets, there are attitudes in the human health sector that zoonotic viruses don't need to be monitored. Because we know that zoonoses will account for the majority of emerging infectious diseases, we can best target surveillance where people and animals are coming into intimate contact, especially where there may be a domestic animal amplifier, such as in a market setting or where people are living in recently disturbed areas to expand agriculture or other industries. The graphic below shows PREDICT data sampling sites in SE Asia.



A comment was made that this was indeed a big challenge. How do you use animal health surveillance data to help understand and deal with it as a possible public health issue? Do the insights gained from understanding the value chain help twin animal surveillance and human surveillance? Can value chains play a role to help governments think differently about what surveillance strategies should look like? How can we harmonize animal health surveillance to help public health surveillance make better use of their resources?

Finally, Jonna Mazet stated that the places of highest risk will be where agricultural land practices are changing and where people and animals mix. We are going to find the emergent viruses in or around human dwellings, and as we learned from the Indonesia presentation, we start by looking in these "sinks" and then moving upstream to the "sources".

Session 2.3: Applications to the risk assessment - Monitoring risk behaviors, interface among sectors and drivers

Objectives: To share the experience in monitoring different risk behaviors and drivers particularly the methodology, information yielded, gaps and constraints in applying such approaches and recommendations to improve.

Susan Zimicki: KAP

This session asks two questions: 1) What risk behaviors do we need to monitor, and, 2) What do we want to know? Risk behaviors are composed of practices that either expose or protect people from risky contact with animals and animal products, or that result in cross-species exposure of animals. To better understand these behaviors we need to also understand social norms, awareness of alternatives, and knowledge of risk. Additionally, we need to place these determinants within a context that explains regulatory structures and economic systems. We also want to know what people are doing in regards to these risks, and why are they doing it?

The EPT Prevent project has been conducting research into these questions. Hunters, vendors, farmers, market workers and consumers have been interviewed on a series of questions to learn more about their awareness and practices around animal markets. The interviews have been difficult to conduct because of the clandestine nature of the markets. Observational studies of the markets also indicate issues of biosecurity and hygiene. Once the data has been analyzed, full reports will be forthcoming.

Supaporn Wacharapluesadee: "One Health" Surveillance for Nipah virus in Thailand

This presentation provided an overview of an epidemiological surveillance study of Nipah virus in Thailand. While Nipah virus antibodies and viral RNA have been found in bats in Thailand since 2002, there have been no reported cases of Nipah virus infection in pigs or humans. A series of studies were conducted in high-risk areas in Chonburi Province that assessed human, pig and bat populations. While there was no detection of Nipah virus in humans and pigs form these high-risk areas, seropositive bats were found at two pig farms and a bat roost. These results were used to raise awareness to pig farmers and the local community about the risk of emerging infectious diseases such as Nipah virus in particular.

Caryl Lockhart: Social network analysis in poultry trade systems in Asia

This presentation provided a description of the use of social network analysis as a value chain tool. Social network analysis is increasingly being used to target surveillance for animal diseases, predict disease spread and it is being used as a parameter in risk factor analyses. Brief cases studies from Indonesia

(describing the live bird market system in Bali), Cambodia (describing the movements of live poultry in the south), Viet Nam (describing movement in south Viet Nam), Thailand (showing trading patterns in Ratchaburi province) and China (spent hen and live bird markets are described) were presented.

Session 3: What can be done with value chains to reduce risks?

Objectives: To share the experience in applying animal value chain approaches to risk management.

Eric Brum: Risk management of live poultry trade in Indonesia

The presentation began with a role-play that demonstrated the different behaviors and characteristics of different stakeholders in the value chain. A goal, and challenge, is finding ways to reduce infection and transmission risks with no enforcement. This, more often than not, requires listening closely to these stakeholders and acting upon their recommendations. In order to find "win-win" situations where animal health officials and value chain players both realize good outcomes, we need to build a compelling evidence base. While working with intermediaries can been difficult, the end results are often worth it.

So how do we do this? First we must realize that we face a large challenge at the outset. In the case of Indonesia where the infection sink was distant from the source, we need to find a way to motivate and work with people at the source who may not see a need to change practices. In some cases, these stakeholders still do not understand H5N1 and why it persists, and they need to know why. We worked with the farmers by listening and through dialogue. By sharing information and data, we were able to help the farmers on their profit ratios. While at first this type of help seemed strange to the farmers, they soon realized we were there to help them. When this connection was made, the relationship improved and we were able to work with these stakeholders and provide more effective inputs. The takeaway message is to work closely with the farmers at the source and listen to them.

Sakdid Anulomsombat: Application of biosecurity along the poultry value chain to ensure safe trade

The Betagro Group operates an integrated poultry business involving chicken feed manufacturing, parent stock farms and hatcheries, broiler farms, raw chicken meat processing and frozen products, and cooked products for export and domestic distribution.

Betagro operates a vertical production chain and manages all aspects of each stage of production. Hatcheries, farms, feed companies processing plants, distribution, and markets are all integrated into a single value chain. In 2004, disease fears were brought to the forefront during the HPAI outbreaks. Betagro has been addressing this issue by exercising greater control over the stages of production. However, as a Thai producer and major international

exporter, the company's supply chains and safety standards come under scrutiny.

In the area of food quality and food safety, Betagro Group has initiated Betagro Quality Management (BQM) to standardize its quality assurance throughout its entire chicken product supply chain – from raw material acquisition to meat processing. The globally recognized standards such as Red Tractor Assurance (RTA), British Retail Consortium (BRC), International Food Standard (IFS) are also applied to ensure that chicken products from the Betagro Group meet the needs of international trade partners and make the quality for life of consumers. The continuing success of Betagro's business can be linked to their BQM that are supported by the company's long-term corporate agenda, top management commitment, and staff mindset to meet the higher quality and food safety standards.

Susan Zimicki: Modifying date palm sap collection techniques and communication to reduce risks of Nipah

Much has been said on the epidemiology of Nipah virus in Bangladesh. Research has documented how bats contaminate raw date palm juice with Nipah virus when they pause to drink out of the sap collection bottles placed in trees by sappers. The work now centers on interventions to prevent this transmission of the virus by bats. A variety of devices, or skirts (made of jute, bamboo or polyester), were developed and tested to assess their ability to block bats from reaching the bottles used to collect palm sap in the trees. Working with sap collectors, and recording bat visits in trees, it was determined that the bamboo skirts were the most effective prevention devices. In this small trial intervention the results were promising with sap harvesters using the bamboo skirt, and even some small reduction in sap consumption recorded. This year will see a larger trial conducted. Below is a sample of the messaging used in the campaign.

Susan Zimicki / Jonna Mazet: Risk mitigation of wildlife trade in fresh markets – case study in Laos
This presentation presented results of research conducted at wildlife markets in Lao PDR over the past three years. 4162 samples were tested from 996 animals, (487 bats, 458 rodents, 47 small mammal, and 4 birds). Nine viruses were detected in 23 animals. Three known coronaviruses in 12 bats, commonly found in Pteropus bats, and additionally six new bat astroviruses within the mamastrovirus genus in 12 bats. More than 1000 animals remain to be tested.

Work also continues on the Healthy Market Initiative that had its original focus on poultry and H5N1 infection and transmission prevention. There is a recommendation to expand the original guidelines to include broader threats from wildlife. The longer-term goal will be to have the adopted guidelines incorporated into the Trade and Industry Market Decree.

Session 4: What else do we have to do?

What else do we need to know to be able to focus surveillance and risk-mitigation interventions on the most-important locations, interfaces and populations?

Objectives: Three groups will develop lists of what is required to understand the emergence, spread and persistence of diseases. Based on this list, groups will answer these questions:

1. What approach should be applied to obtain such information?
2. How can we make the best use of the information derived from the value chain analysis to manage risk?
3. Who will be the partners?

Group 1: Emergence
Group 1 discussed issues on emergence. To learn more about the mechanism of emergence, we need to answer questions on the where, when, and how of the virus. Particular areas of inquiry should be on 1) virus mutations and re-assortment, and 2) spillover to new species. The locations for research should be focused in four places in the value chain:

- Intensive production system
- Traditional production system
- Traditional farming system
- Collection points (markets)

Partners in this effort depend on the country. It is important to define the value chain for different (local) settings.

Group 2: Spread

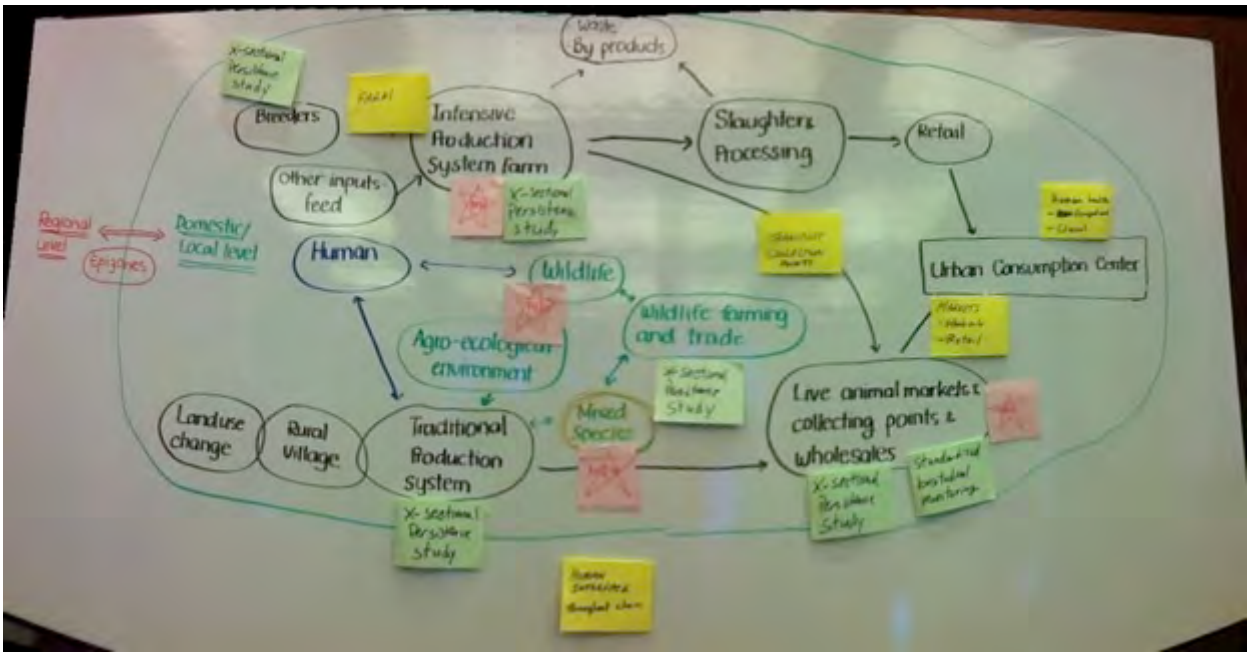
Spread is an important factor, because you should look at the spread before you implement surveillance. Using a value chain approach is beneficial because it not only describes the chain, but also covers important social factors. We want to implement surveillance at sites where there is combined mixing, collection and transport. This would include places where there are trucks, cages and places where the virus accumulates. For H7N9, the source of the disease in yellow chickens in most cases is likely to be quite a distance away from the markets where many of the human cases are contracted. For this reason highly targeted approaches based on market chain analysis is needed to find the source of the virus on farms. There was almost no detection on farms because the sampling strategy was not sufficiently targeted. This is also an opportunity to view human health issues through the supply chain lens. It will also be important to identify those points in the chain where clusters of human infection occur to minimize human exposure. Finally the targeting of interventions will be in high-risk pathways. Interventions will include improving biosecurity, health management, transport issues, and reducing human exposures.

Group 3: Persistence/Maintenance

Looking at H5N1, we want to know what are the reservoirs for the virus. There is a seasonal pattern, so where is it during the "low" season? We know the reservoir is live poultry. With that in mind, what is important to the virus in order to survive? What is the nature of the poultry population in that area? Doing a population survey might be necessary. However, once going to the area we know conducting investigations are expensive, and we need to keep costs reasonable. One approach is to conduct a cross-section survey in the low season. If you are able to find a virus in the low season, then you will have found the location where the virus lays low in the off-season. In summary, the cost effective surveillance

should highly target to the highest risk species in the highest risk locations. When we know the reservoir then it is easy to put together an intervention. The problem is that after 10 years we still do not know the reservoir.

A comment was raised on how to control H5N1 viral shedding and spillover from ducks into poultry? There is a need to consider ducks as a reservoir host. What contributes to this persistence? And while ducks are at the top of the possible reservoir list, we also need to look at other possible reservoirs. It could be circulating in other species. There is still the question of what to do with the virus once we find it in its reservoir. Finally, a participant made the recommendation to put out "bait", see what gets infected, and then "reverse-engineer" the infection trail and follow it.



Summary and meeting close

Dennis Carroll closed the meeting with a summary. This focus on value chains is a way to help us look forward. What we have learned in the past with AI we are now using in our EPT work. The discussion around value chains is an Asia specific one. There is an absence of this type of work in Africa. Likewise, viral persistence and spread are distinctive to Asia. However, the growth of populations, and economies, in Africa, will soon be followed by an increase in demand for protein consumption. With that we will begin to see similar value chains developing on the continent. What we learn and deal with now in Asia will soon become relevant for Africa policy and regulatory dialogue.

As we move into EPT II, and more influenza work, what will we be able to take with us from this experience? We will continue to examine the role of livestock, its value chains and its interface with wildlife and waterfowl. Will our work show a proof of principle that can be applied to coronavirus or other virus families? This meeting is just the opening of a dialogue around this theme.

Annex 1: Meeting Agenda

USAID Partners Meeting on
Value Chains and Zoonotic Pathogens

December 16-17, 2013
Bangkok, Thailand

Date/Time	Details	Moderator	Objectives/ Expected outputs
Day 1: 16 December			
08.30 – 09.00	Registration		
09.00 – 09.30	Opening Session: - Welcome remarks by Subhash Morzaria - Opening remarks by Dennis Carroll		
09.30 - 09.45	Introduction	Andrew Clements	
09.45 – 10.15	Group Photo and Coffee Break		
Session 1: Scene Setting			
10.15 – 11.00	Plenary presentation: Overview on concepts of animal value chain analysis related approach and applications to disease prevention and control (Jan Hinrichs)	Andrew Clements	Objectives: To harmonize understanding of the concepts, applications, advantages and disadvantages of different approaches related to animal value chain analysis "Parking lot" ideas/issues brought up during the discussion will be listed.
Session 2: What have we learned?			
Session 2.1: Experience from animal value chain studies			
11.00 – 12.30	Panel Discussion: Characterizing the animal value chain studies for the following species: - Poultry (Eric Brums) - Swine (Jan Hinrichs) - Wildlife (Ed Newcomer)	Dan Schar	Objectives: To share the experience in applying the approach of the value chain analysis to different livestock particularly the methodology, information yielded, gaps and constraints in applying such approaches and recommendations to improve Points to be brought to the discussion from the examples may include domestic and cross-border value chain studies, live bird markets analysis, tracking animals and

			animal products (e.g. types of animals; condition of animals; start and end of value chains; directionality of product movement; seasonality; overlap of livestock and wild animals; drivers of demand, movement, and growth; etc.) "Parking lot" ideas/issues brought up during the discussion will be listed.
12.30 - 13.30	Lunch		
Session 2.2: Applications to risk assessment - Monitoring the pathogens			
13.30 – 15.00	Panel discussion: Monitoring for the presence of viruses - Animal Influenza surveillance and epizonal approach (Ken Inui) - Four-way linking project for avian influenza surveillance (Filip Claes) - Viral family surveillance in farmed wildlife (Jonna Mazet)	Subhash Morzaria	Objectives: To share the experience in monitoring different pathogens along the value chain particularly the methodology, information yielded, gaps and constraints in applying such approaches and recommendations to improve Points to be brought to the discussion from the examples from the country and cross-border levels which may include - Tracking "known" pathogenic viruses and their relatives in animals or wildlife or in human populations exposed to animals along the value chain/exposure pathway - Identifying "progenitor" viruses in animals - LBM surveillance, - Environmental surveillance - Epizonal approach for avian influenza H5N1 "Parking lot" ideas/issues

			brought up during the discussion will be listed.
15.00 – 15.30	Coffee break		
Session 2.3: Applications to risk assessment - Monitoring risk behaviors, interface among sectors and drivers			
15.30 – 17.00	Panel discussion: Monitoring risk behaviors and drivers: - KAP (Susan Zimicki) - Bat surveillance (Dr. Supaporn Wacharapluesadee) - Social network analysis in poultry trade in Asia (Caryl Lockhart)	Kama Garrison	Objectives: To share the experience in monitoring different risk behaviors and drivers particularly the methodology, information yielded, gaps and constraints in applying such approaches and recommendations to improve Points to be brought to the discussion from the examples from countries which may include - Identifying practices, behaviors, conditions in markets that favor zoonotic viral spillover "Parking lot" ideas/issues brought up during the discussion will be listed.
17.00	End of Day 1 meeting		
Day 2: 17 December			
Session 3: What can be done within value chains to reduce risks?			
09.00 – 10.30	Panel discussion: - Risk management of live poultry trade in Indonesia (Eric Brum) - Application of biosecurity along the poultry value chain to ensure safe trade (Sakdid Anulomsombat) - Modifying date palm sap collection techniques and communication to reduce risks of NIpah (Susan Zimicki) - Risk mitigation of wildlife trade in fresh markets – case study in Laos (Susan Zimicki and Jonna Mazet)	Andrew Clements	Objectives: To share the experience in applying animal value chain approaches to risk management Points to be brought to the discussion from examples at the country and cross-border levels which ma include: - How was the information derived from value chain analysis and related approach applied to risk management? - What were the actions

			being taken in the following aspects: o Implementation o Policy development - How would these initiatives be sustained? "Parking lot" ideas/issues brought up during the discussion will be listed.
10.30 – 11.00	Coffee break		
11.00 – 11.30	Review list of "parking lot" ideas/issues	Andrew Clements	The ideas/issues will be taken into consideration in the following brainstorming sessions
Session 4: What else we have to do?			
11.30 – 12.30	Group brain-storming session: What else do we need to know to be able to focus surveillance and risk-mitigation interventions on the most-important locations, interfaces, and populations?	Andrew Clements	Objectives: To develop the list of information within the animal value chain aspects required to understand the emergence and spread of diseases and can be used to prevent and manage the problems 2-3 groups to discuss the same question List of the prioritized information required to know
12.30 – 13.30	Lunch		
13.30 – 14.30	Group brain-storming session: Take the top-five on the list of the prioritized information required to know and discuss on: - What approach to be applied to obtain such information? - How can we make the best use of the information derived from the value chain analysis to manage risks?	Andrew Clements	5 groups and each group to discuss each question

	- Who will be the partners?		
14.30 – 15.00	Group presentation	Andrew Clements	10 min/group
15.00 – 15.30	Coffee break		
15.30 - 16.00	Group presentation (Continued)	Andrew Clements	10 min/group
16.00 – 17.00	Plenary discussion and conclusion	Dennis Carroll	
17.00	Closing	Dennis Carroll Subhash Morzaria	

Annex 2: List of Participants

USAID Partners Meeting on Value Chains and Zoonotic Pathogens
16-17 December 2013
Bangkok, Thailand

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Annex 3: Parking Lot Ideas/Issues

1. What are the working hypotheses for virus emergence, spillover, amplification or persistence in the value chain? With such hypotheses, what are surveillance strategies that:
    - Identify new variants/new emergence
    - Detect virus persistence/maintenance

2. Where along the value chain could be the best point(s) to conduct surveillance to detect the "progenitor virus(es)"? Can we use systematic approach such as longitudinal and coordinated studies at multi-sites along the value chain to monitor the full genome of viruses (not focusing only particular one) so changes can be detected?

3. How can we continuously understand the dynamics of value chains, taking into account the capacities for countries to map and trace animal and product movement along the value chain and to conduct value chain analysis? What are the drivers for such dynamics, such as demographic, economic status, livestock revolution to accommodate food security, etc.?

4. Where are the high-risk interface areas in the value chain? Can we institutionalize the "4-way linking" concept to conduct surveillance at such high-risk interface areas?

5. How can we make the best use of information derived from risk assessment along the value chain analyses for management of such risks? Who are the appropriate stakeholders with the mandate for risk interventions?

Annex 4: Group Photo

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