

# Zoonotic Disease Research in the Federal Government: Summary of a Roundtable Discussion

AUGUST 23-24, 2021





# Charles Valentine Riley Memorial Foundation

401 9th Street NW Suite 630 Washington, DC 20004

#### SEPTEMBER 2021

#### Contributors.

Woteki, Catherine E., Kappes, Steven, Lautner, Elizabeth A., Korch, George, Parker, Gerald, and Grooms, Daniel

#### About the Charles Valentine Riley Memorial Foundation.

The Charles Valentine Riley Memorial Foundation (RMF) is committed to promoting a broader and more complete understanding of agriculture and to building on Charles Valentine Riley's legacy as a "whole picture" person with a vision for enhancing agriculture through scientific knowledge. RMF, founded in 1985, recognizes that agriculture is the most basic human endeavor, and that a vibrant, robust food, agricultural, forestry and environmental-resource system is essential for human progress and world peace. RMF's goal is to have all world residents involved in creating a sustainable food and agriculture enterprise in a responsible rural landscape.

#### RMF's Commitment to Increased Federal Investment in Research and Education.

RMF supports growing each of the key components of the agricultural research and education funding portfolio that supports the national system delivering results for the public good. These include: competitive grants, which take advantage of innovation at public and private universities and other organizations with scientific and technical expertise; capacity funds, for state (universities) and federal agencies such as USDA's Agricultural Research Service, Economic Research Service, and Forest Service, to continue to provide a stable scientific workforce and research sites that conduct research requiring long-term commitment and potential high-risk/high-payoff solutions, while maintaining the capacity to rapidly address emerging and sometimes crisis situations; and public–private partnerships, such as the Foundation for Food and Agricultural Research, a nonprofit corporation that matches public funds with



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private funds to conduct research on problems of national and international significance. As part of its effort to obtain additional support for research and education, RMF promotes a broader and more complete understanding of agriculture by sponsoring the annual Riley Memorial Lecture through the American Association for the Advancement of Science. Other program activities support strengthening federal research, education, extension, and outreach efforts—essential work that touches every American and contributes to the public good.

#### About this Report.

RMF is sponsoring this report to place into perspective the broad impact that agriculture, when broadly defined, has on society as a whole and to review what has been done to develop a unifying message, to report the progress that has been made to develop unity among the many interests, and provide some perspective on what might come next.

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# Introduction

The Charles Valentine Riley Memorial Foundation invited federal agencies that conduct and/or sponsor research related to zoonotic diseases to join a roundtable discussion about priorities, funding levels, and opportunities for transformational changes.

The impetus for the invitation was twofold. The continuing COVID-19 pandemic has focused public attention on the importance of understanding and preventing the emergence and spread of new diseases of animal origin. In addition, in preparing for the upcoming 2021 AAAS <u>Riley annual lecture</u> (the theme of which is zoonotic disease), the planning committee was unable to find a recent description of the role of federal science agencies that have responsibilities for this area of research.

Representatives of 11 federal agencies that conduct and/or sponsor zoonotic disease research met virtually on August 23 and 24, 2021. The Riley Foundation planning committee members and a list of participants and their agencies can be found in <u>Appendix A</u>. Unfortunately, two key agencies were unable to participate: the Laboratory of Virology within the National Institute of Allergy and Infectious Diseases of the National Institutes of Health, and the Army Public Health Center within the Department of Defense.

There is heightened attention to zoonotic diseases both nationally and globally. Since taking office, President Biden has taken administrative actions to focus federal efforts on preparing for future zoonotic disease threats, and several of the roundtable participants referenced them during the discussion.

- Executive Order 13987 directed agencies to organize their COVID-19 response, prepare for future threats, review current capacities, and recommend actions on national biopreparedness.
- <u>National Security Memorandum 1 (NSM1)</u> is intended to strengthen pandemic response and global security, and calls on departments to review existing strategies and develop recommendations for how to update them.
- Executive Order 13994 focuses on ensuring a data-driven response to COVID-19 and future biological threats, and specifically tasks the Director of the Office of Science and Technology Policy (OSTP) to coordinate with the National Science and Technology Council to develop a plan to advance innovation in this area.

In addition, a new National Center for Data Analytics was announced by OSTP to focus on the data science necessary to combat future pandemics. Much of this effort focuses on human medical defenses, but there are opportunities to further our knowledge of zoonotic threats and apply strategies more broadly to fighting emerging diseases, as the leaders of the G7 countries pledged to do in the <u>100 Days Mission</u> announced in June 2021.

The roundtable participants shared short presentations about their agencies' roles and responsibilities for zoonotic disease research, the level of funding, and publicly available reports that describe their agency's program. They also discussed three questions:

- What opportunities exist to collaborate across agencies to address zoonotic disease in setting research goals, in collaborative cross-agency/disciplinary research, and in funding?
- Do you see gaps in our national federal structure for prioritizing and coordinating zoonotic disease research?
- What is needed to transform our abilities to detect and predict an emerging zoonotic disease?

The following sections summarize the major findings from the reports from the 11 participating agencies and broadly capture the discussion of the three questions. In addition, summaries of each agency's report are attached in <u>Appendix B</u>.



# Findings

- The U.S. government supports research and development related to zoonotic diseases for a variety of reasons, ranging from furthering basic knowledge, to protecting the food supply, to preparing for and responding to outbreaks of human and animal diseases from natural or deliberate introduction of pathogenic zoonotic organisms.
- 2. At least 13 federal agencies located in nine departments and the Executive Office of the President sponsor, conduct, or coordinate zoonotic disease research and development.
- 3. Agencies' priorities for zoonotic disease research and development are designed to provide the evidence base for programs and policies within the departments in which they are located. The authorization for agencies' R&D programs flows from the statutes that define and circumscribe their departments' missions.
- 4. It is challenging to define what is included in zoonotic disease research and development. One challenge is where to draw the boundary around the extent to which surveillance, monitoring, and modeling efforts are included within R&D. Another challenge is whether testing and evaluation of vaccines, sanitation/decontamination protocols, and other practical knowledge generation fall within R&D. A third challenge is to differentiate biodefense from One Health from protection of the food supply and determine how zoonotic disease R&D is treated within these responsibilities of the federal government.
- 5. The Centers for Disease Control and Prevention (CDC), along with the U.S. Department of Agriculture (USDA) and Department of the Interior (DOI), convened a workshop in December 2017 to prioritize zoonotic diseases, and these priorities continue to shape individual agencies' programs. The eight priorities identified were zoonotic influenza viruses, salmonellosis, West Nile virus, plague, emerging coronaviruses (e.g., MERS and SARS), rabies, brucellosis, and Lyme disease. The workshop should be viewed as an important contribution to federal government One Health strategies for zoonotic disease surveillance, response, preparedness, workforce development, and prevention and control activities.

- 6. It is hard to quantify with certainty the level of funding for zoonotic diseases R&D in the federal government. Agencies have varying levels of difficulty parsing out funding dedicated to zoonotic disease R&D within their appropriated funding. For example, the Agricultural Research Service (ARS) estimates funding for zoonotic research (including food safety) at \$92,599,000. This total includes a portion of the \$21,600,000 in funding expected for National Bio and Agro-Defense Facility (NBAF) research and another \$6 million for NBAF partnerships. As another example, the Animal and Plant Health Inspection Service (APHIS) has cross-cutting responsibilities for animal disease detection, preparedness, and response that may involve zoonotic diseases, and within these program areas it can be difficult to identify specific activities that could be considered research.
- The NBAF Science Program and the <u>American Rescue Plan Act</u> are two opportunities for infusion of new funding into zoonotic disease R&D. The NBAF will provide maximum biocontainment space to study high-consequence zoonotic diseases affecting livestock, pilot scale development of vaccines and countermeasures, conduct diagnostic testing, and offer opportunities for partnerships and technology transfer. NBAF received in FY21 \$20.2 million for the APHIS Science Program that includes \$3 million for partnerships. The American Rescue Plan Act includes \$300 million to "conduct monitoring and surveillance of susceptible animals for incidence of SARS-COV-2," which can strengthen our U.S. early warning system for zoonotic diseases.
- 8 Coordination of zoonotic disease R&D occurs at multiple levels within the federal government, with the White House OSTP having overall responsibility for setting priorities and coordinating programs. The President's National Biodefense Strategy was last updated in 2018 and provides the framework for coordinated response operations to contain, control, and rapidly mitigate zoonotic diseases like COVID-19. The Foreign Animal Disease Threat Interagency Working Group is a long-standing group of federal agencies focused on the development of research priorities for high-consequence animal diseases, including those that are zoonotic.

# **Opportunities to collaborate and coordinate**

The roundtable participants stated that the COVID-19 pandemic created a sense of urgency that has spurred collaboration and rapid discoveries, and felt that the same sense of urgency is needed to foster better integration of their other zoonotic disease research. They identified several collaborations occurring on a disease-by-disease basis and referenced the workshop that CDC convened in 2017 to prioritize zoonotic diseases as an important unifying effort. One impediment that arises from the disease-by-disease coordination approach is that researchable questions that could define priorities may not be widely shared and therefore are not being built into the research agendas of the funding agencies.

Several specific actions were identified that could strengthen cross-agency and cross-disciplinary research and enhance opportunities for funding. Chief among them was the need for a One Health real-time bio-incident research framework that integrates human, animal, and environmental systems and would support the needs of agencies tasked with response. The National Biodefense Strategy could be used to orchestrate the development of such a research framework that would also enable risk awareness, ensure biodefense capabilities for prevention, allow for building and training multi-agency teams, and sponsor practice sessions. The goal of the research framework should be to provide coordinated, concise scientific information to facilitate rapid response to future events and recovery after events.

Participants also identified the needs to share data among lab networks, coordinate on sampling and data utility, and coordinate research to integrate S&T into any zoonotic disease response. The outcomes for the research agencies would be a prioritized research agenda, opportunities to identify gaps and prioritize work through regular coordination meetings, and collaborative project design and review.

A second action that could strengthen interagency coordination would be to exercise together and invest in building interdisciplinary teams. These teams promote broader collaboration, identify new emerging pathogens, and identify the means to improve data collection and analysis for future pandemics. One current example is the <u>Mitigating Zoonotic Threats Scialog</u> planned by USDA, a three-year science dialogue to bring together 50 early career scientists from multiple disciplines to detect zoonotic threats. The first meeting will be September 30–October 3, 2021, in Tucson. The goal is to create research networks that will last the next 30 years.

One barrier to enhanced collaboration is the lack of information about current levels of funding and the structure of appropriations. Several of the agencies participating in the roundtable discussion could not identify dedicated funds for zoonotic research and pointed to the difficulty of splitting this field of research within their budget lines.

CDC sees real value to having a One Health office as a coordination point within a large agency or department that can also connect with external partners. When something relevant to zoonotic disease is also related to antimicrobial resistance, for example, the One Health office can help identify relevant programs and experts and facilitate coordination.

Other potential actions include sharing examples of successful prevention built on collaborative work to get traction and resources for further work, and supporting each other's funding requests to make sure each agency has funding capability to continue their program. This would leverage each agency's strengths and save money in the long run. Another potential action would be to work through the Office of Management and Budget (OMB) to conduct a budget cross-cut that could be used to build understanding in Congressional appropriations committees of the importance of this research and where it is conducted among the nine different federal departments within their jurisdictions.

Another line of discussion focused on what we could learn from other countries. In Canada and the EU, the research and response agencies are under the same organizational structure. How they coordinate internally and what best practices they follow may be instructive. Currently, our mission responsibilities are spread across many U.S. agencies and even some outside the federal government. It might be more effective to create a central clearinghouse of all programs that could function as a one-stop shop, to share information with outsiders and also for agency use internally.

There was also discussion about investing more in basic research to evaluate zoonotic pathogens that could pose a threat in the future and to use machine learning to tie together epidata. Funding and resources are often diverted to addressing current crises rather than ramping up basic knowledge, and it is important to make the case for R&D investments.

# Gaps in our national federal structure for prioritizing and coordinating zoonotic disease research

Prediction is a key gap. If we were better at predicting the next zoonotic organism with pandemic potential—what it will be, and where and how it will emerge—we would be better positioned to stem zoonotic events before they become big problems in the human population. One massive knowledge gap is understanding the broad reservoir of pathogens that exist in wildlife and which ones are likely to jump to humans. Another knowledge gap is how many of the epitopes (antigen molecules to which an antibody attaches) in these potential pathogens match up to human viral receptors. This knowledge could inform models for predictive analyses. The U.S. Agency for International Development's (USAID's) <u>PREDICT Project</u> and other similar programs could make important contributions.

Another gap is understanding the potential for disease transmission from companion animals and the current lack of dedicated research and surveillance programs for these animals. The popularity of companion animals is growing around the world, especially since the pandemic. Millions of pets in the United States have billions of interactions with people per day, and even healthy-appearing animals can carry and transmit infectious pathogens (like Salmonella) to people. People sometimes release their pets into the wild, enabling potential spillover of pathogens to wildlife. Responsibility for companion animal diseases is spread across the Department of Health and Human Services (DHHS), USDA agencies, and state public health departments that are dealing with these issues on the frontlines. A CDC program called Healthy Pets, Healthy People is a one-stop shop website (used worldwide) that offers advice for pet owners and veterinarians, but no one agency has clear authority for research and surveillance in the companion animal population. APHIS has an initiative monitoring antimicrobial resistance in dogs and cats, that complements work the Food and Drug Administration (FDA) is doing through its labs. Several participants identified workforce development as a gap that needs to be filled. The pipeline of scientists with needed skills in zoonotic diseases is small, and the agencies are hiring in key programs. In 2017, the Agricultural Research Service (ARS) and APHIS received funding for workforce development and started programs to support students and postdocs in epidemiology and viral microbiology and diagnostics in their university settings. Expanding the talent pool through this and similar programs is an important step to developing the needed workforce, but the agencies face stiff salary competition from universities and industry. To fill the talent gap, the agencies may need new ways to offer competitive salaries to attract and retain zoonotic disease specialists.

Another issue that complicates zoonotic disease research and outbreak response is obtaining access to farms. Roundtable participants noted that it is important not to alienate producer communities early in an incident investigation, because the producers may not agree to additional interventions at the farm level and there may not be tested interventions to offer producers. They emphasized how important it is for federal agencies to work in partnership with commodity groups to support decontamination, research on viral persistence in the farm environment, and continued surveillance and monitoring. Finding better ways to investigate antimicrobial resistance, for example, may be a model for addressing producers' real fears of litigation, penalties, and a social media firestorm that damages their reputation and business.



# Transformational changes needed to detect and predict an emerging

The roundtable participants identified a number of transformational changes needed to detect pathogens that can spread to humans at the earliest stages of their emergence and to launch robust prevention, response, and recovery efforts. They identified the following needed transformational changes:

## Invest in early threat identification

- Use genome sequencing technologies in clinical settings as a routine part of clinical care, especially for patients with unexplained fevers or respiratory illness
- Expand environmental monitoring of wastewater, etc. to detect pathogens circulating in communities, to complement clinical testing and care
- Find new ways to aggregate information and connect real-time information with genomic knowledge
- Use equipment and techniques that provide early warning regarding climate change, to capture emerging zoonotic diseases

## Create the capacity to monitor the spread and evolution of pathogens after a threat is identified

- Integrate diagnostics and genome sequencing with environmental monitoring data, to inform how we respond, help us think through approaches to track pathogens and their evolution, and track change in pathogen genetic code to inform vaccine development and other countermeasures, in animal as well as human populations
- Improve real-time analytics and forecasting systems to inform communities and decision makers where to direct public health resources to deploy countermeasures and how to communicate with the public
- Provide comprehensive digital resources and screening tools to frontline operators (to help them identify biothreats)
- Provide comprehensive digital resources and screening tools to frontline operators (to help them identify biothreats)
- Integrate and provide analysis of veterinary medical records (as in human medicine) and laboratory records to enable real-time situational awareness and observation of sentinel populations like zoos, animal shelters, livestock, and companion animals
- Complete threat, hazard, and risk assessments for genetic modification and gene editing research (we must prepare for a zoonotic disease with the transmissibility of COVID and mortality of Ebola)

### Focus on prevention and demonstrate its value

- Build up production capacity for vaccines, to make them faster and in large amounts
- Learn how to keep outbreaks of zoonotic diseases smaller and not so frequent, to avoid putting strain on the system
- Develop a deeper understanding of the coronavirus and influenza virus families to inform the development of broad-spectrum vaccines
- Identify examples that show that the research investment has protected or prevented a larger outbreak from happening, and tell the story.
- For example, surveillance using PulseNet helps identify outbreaks in small clusters early, and prevents an estimated 270,000 cases of foodborne illness a year.
- Shellfish are tested before harvest for various algal and other pathogens; as a result, there are few shellfish-related consumption problems.
- In swine, there are many production-limiting diseases, so constant surveillance in very integrated production systems is necessary to prevent diseases like PRRS (porcine reproductive and respiratory syndrome). This surveillance has a major positive economic impact.
- In Malaysia, the Nipah virus outbreak was caused by sick bats to pigs via fallen, contaminated fruit and then to humans. Understanding the role of wildlife in viral spread enabled a policy change, and now fruit trees are not planted near pig farms.
- Another example is the surveillance and culling of "downer" (neurologic) cattle and bans on feeding meat and bone meal to livestock. These policies prevented further spread of bovine spongiform encephalopathy (BSE) prions in the food supply, which can cause variant
  Creutzfeldt-Jakob Disease (vCJD) when the meat is ingested by humans. By contrast, surveillance and challenge studies show little evidence for potential cross-species transmission of chronic wasting disease (CWD) prions of deer and elk.

# Balance early detection vs. understanding and mitigating risks

Looking upstream in livestock and wildlife sectors, before human infection occurs, can lead to more rapid response and better preparedness. For example, the PREDICT Project found Marburg virus in bats, which causes hemorrhagic fever in people, in Sierra Leone in 2018. Finding it in bats helped clinicians recognize the disease more quickly in people; it became part of standard

# Conclusions

One participant offered the following summary of the current needs for zoonotic disease research in the federal government. We need:

- A consistent investment over time (we don't have this yet)
- Larger scale efforts in countries and globally (we don't have this yet)
- Coordination and collaboration across sectors and within/among countries (improving, but more needed)
- Proactive surveillance to monitor risk, to include unknown threats (started, but more needed)
- Timely data collection and sharing across sectors and within/among countries (started, but more needed)
- Linking risk-understanding data with end users of data to develop biomedical and non-biomedical interventions (started, but more needed)
- Advocacy with senior officials on the need for support (started, but more needed), not just for COVID-19, but for other diseases as well

The Riley Foundation thanks the participants in the roundtable discussion for their thoughtful and insightful presentations, and hopes that this summary will be of use not only to them, but also to the broader scientific community and to our country's leaders in government.

# **Appendix A:**

# List of participants and agencies and the planning committee

### PARTICIPANTS

- Dr. Andrew Hebbeler, Assistant Director for Health and Life Science in the White House 1
- Office of Science and Technology Policy (OSTP)
- Dr. Jeff Silverstein, Deputy Administrator of Animal Production and Protection, 2.
- Agricultural Research Service, U.S. Department of Agriculture (ARS/USDA)
- Dr. Kathe Bjork, National Program Leader Animal Health, National Institute of Food and 3. Agriculture, U.S. Department of Agriculture (NIFA/USDA)
- Dr. Beth Lautner, Associate Deputy Administrator, Veterinary Services, Diagnostics and 4. Biologics, Animal and Plant Health Inspection Service, U.S. Department of Agriculture (APHIS/USDA)
- Dr. Tim Kurt, Scientific Program Director for Advanced Animal Systems Challenge Area, 5.
- Foundation for Food and Agriculture Research (FFAR)
- Dr. M. Camille Hopkins, Wildlife Disease Coordinator, Biological Threats and Invasive **6**. Species Research Program, Office of Ecosystems, U.S. Geological Survey, Department of the Interior (USGS/DOI)
- Dr. Casey Barton Behravesh, Captain, U.S. Public Health Service; Director, One Health 7. Office, Centers for Disease Control and Prevention (CDC)
- 8. Dr. Andrew Clements, Global Health Security Program, U.S. Agency for International Development (USAID)
- Dr. Micheal Burke (Veterinary Medical Officer, Countering Weapons of Mass Destruction) 9. and Dr. Tod Companion (Program Manager Coordinator, Science and Technology Directorate), U.S. Department of Homeland Security (DHS)

- **10.** Dr. Stephen Goldsmith, Weapons of Mass Destruction Directorate, Chemical-Biological Countermeasures Unit, Federal Bureau of Investigation **(FBI)**
- Dr. Tonya Nichols, Senior Science Advisor, Center for Environmental Solutions and Emergency Response, Office of Research and Development, Environmental Protection Agency (EPA)

#### PLANNING COMMITTEE

- **1** Dr. Steven Kappes, Associate Administrator, Agricultural Research Service, U.S. Department of Agriculture **(ARS/USDA)**
- 2. Dr. Beth Lautner, Associate Deputy Administrator, Veterinary Services, Diagnostics and Biologics, Animal and Plant Health Inspection Service, U.S. Department of Agriculture (APHIS/USDA)
- **3.** Dr. Gerald Parker, Associate Dean, College of Veterinary Medicine & Biomedical Sciences, **Texas A&M University**
- **4** Dr. Dan Grooms, Dean of College of Veterinary Medicine,
- Iowa State University
- 5. Dr. George Korch, Director, National Biodefense Analysis and Countermeasures Center at Battelle National Biodefense Institute, LLC
- 6. Dr. Cathie Woteki, President, C.V. Riley Memorial Foundation; Professor of Food Science and Human Nutrition, Iowa State University; and Visiting Distinguished Institute Professor, University of Virginia's Biocomplexity Institute

# **Appendix B:**

# Highlights of agency presentations

### Dr. Andrew Hebbeler,

Assistant Director for Health and Life Science in the White House Office of Science and Technology Policy (OSTP)

#### OSTP role:

- Give President timely advice
- Ensure that policies and programs across Executive Branch are informed by science
- Ensure that federal investments in science and technology are making biggest impact
- OSTP does not fund research and development—instead, through a range of ways and unique mechanisms, sets priorities, coordinates, and informs funding decisions by other departments and agencies

#### Zoonotic disease and COVID

- COVID pandemic has underscored the work that many of us have been doing for decades
- 4 million deaths globally, 600,000 Americans, estimated cost to U.S. \$16 trillion
- We know that a natural zoonotic transmission represents one of two likely scenarios that could have caused this pandemic, so this is an important discussion
- Next pandemic could be around the corner and could be worse
- Incumbent on U.S. to make transformative investments that allow us to detect emerging pandemic, specifically zoonotic threats, and monitor spread so we can be prepared

#### Funding

- Joint OSTP/OMB budget memo that comes out annually in September. Last time One Health appeared in this memo was Obama administration
- Combating zoonotic threats and promoting One Health approaches was a priority for Obama administration
- One product that has substantial zoonotic relevance is President's Council of Advisors on Science and Technology (PCAST) report; <u>2014 report focused on antibiotic-resistant</u> <u>bacteria</u>, hoping the Biden Administration PCAST will be released soon

# Administrative actions with relevance for zoonotic disease (all issued January 2021)

- <u>Executive Order 13987</u>: organizes Executive Branch to cope with COVID and provide global security; directed agencies to organize their COVID response, prepare for future threats, generate review with recommended actions on national biopreparedness
- <u>National Security Memorandum 1 (NSM1)</u>: intended to strengthen pandemic response and global security, asks departments to review existing strategies and develop recommendations for how to update them
- <u>Executive Order 13994</u>: ensuring a data-driven response to COVID and future biological threats, specific tasking to director of OSTP to coordinate with National Science and Technology Council to develop a plan to advance innovation in this area
  - Dylan George, Marc Lipsitch, Caitlin Rivers will be leaders of new National Center for Data Analytics being set up by OSTP on pandemics

### Dr. Jeffrey Silverstein,

Animal Production and Protection Deputy Administrator, Agricultural Research Service/U.S. Department of Agriculture (ARS/USDA)

#### ARS role:

- USDA's chief scientific in-house research agency, tasked with finding solutions to agricultural problems that affect Americans
- 670 research projects, 15 national programs, 6,000 scientists, 90+ research locations
- \$1.5 billion budget
- 4 areas of focus; zoonotic disease falls within animal production and protection focus

#### Plans for coordinating zoonotic disease research

- President's National Biodefense Strategy: goals are to enable risk awareness, prevent bioincidents, reduce impacts of bioincidents, rapidly respond to bioincidents, and facilitate recovery
- <u>December 2017 workshop</u> [participants were Health and Human Services (HHS), CDC, DOI, USDA, EPA, National Oceanic and Atmospheric Administration (NOAA), state partners]
  - One Health Zoonotic Disease Prioritization (OHZDP)
  - Generated list of eight zoonotic diseases that are relevant for U.S.: #5 is coronaviruses
- Interagency Working Group on Foreign Animal Disease Threats: long-standing group focused on potential of animal diseases to become zoonotic
- USDA Science Blueprint to guide USDA science priorities, mentions zoonoses under sustainable agriculture goal
- International groups: ARS works closely with them to strengthen international connections (e.g. BSL4ZNet, STAR-IDAZ)

#### **ARS research**

- Animal Health National Program (Cyril Gay and Roxann Motroni)
  - <u>Action plan for 2022–2027</u>
  - Budget \$101.4 million, 122 scientists
  - Prediction and prevention of emerging diseases is strong priority of this program over next 5 years
  - Partnerships with APHIS and CDC
  - Active research projects on avian flu, swine flu, virulent Newcastle disease, 10 others

National Bio and Agro Defense Facility (NBAF)

- Veterinary, Medical, and Urban Entomology National Program (Robert Miller)
  - <u>Action plan for 2019–2024</u>
  - Budget \$26.4 million
  - Research on screwworm, mosquitoes, midges, house flies, sand flies, ticks; Integrated Pest Management of vectors; surveillance, trapping, and repelling of pests
- ARS SARS-CoV-2 response
  - Determined that poultry, swine, and cattle were not potential vectors/reservoirs for SARS-CoV-2
  - Showed that white-tailed deer are susceptible to infection and could transmit SARS-CoV-2 infection for up to five days

#### Budget

- Funding for zoonotic research (including food safety): \$92,599,000
- NBAF research FY21: \$21,600,000
- Partnerships funding at NBAF: \$6 million

#### NBAF

- Opening 2024 in Manhattan, Kansas, adjacent to Kansas State Vet School
- World-class science facility that will address threats to agriculture sector, increase knowledge and biosecurity infrastructure, develop vaccines

- Three focus areas: agro-terrorism, transboundary animal diseases, emerging zoonoses
- BSL-4 livestock capability may foster collaborations with Department of Homeland Security (DHS), Department of Defense (DOD), HHS for zoonotic research
- Biological Development Module to accelerate vaccine development
- Facility will cost \$1.25 billion, funded by \$938 million in federal appropriations, \$307 million from the State of Kansas, and \$5 million from the City of Manhattan (Kansas)

## Dr. Kathe Bjork,

National Program Leader, Animal Health at the National Institute of Food and Agriculture, U.S. Department of Agriculture (NIFA/USDA)

#### NIFA role:

- Invest in and advance agriculture research, education, and extension through grants
- Support schools to train agricultural workforce
- Provide knowledge to agricultural workforce and extend theory to practice

#### **NIFA grants**

- Competitive grants with broad eligibility
  - Agriculture and Food Research Initiative (AFRI) distributed \$400 million FY21 within six Farm Bill priority areas and to provide conference support
  - 30+ non-AFRI programs
- Non-competitive grants
  - Food Animal Residue Avoidance Databank (FARAD)
  - Regional Aquaculture Centers
  - Sustainable Agriculture Regional Centers
- Capacity Grant Programs with limited eligibility for land-grant institutions, state Agricultural Experiment Stations, and veterinary colleges

• Currently funding 100 Capacity (Formula) projects and 44 Competitive (non-Formula) projects in zoonotic disease or zoonotic disease – related research and education

#### NIFA programs relevant to zoonotic disease

- Rapid Response to Novel Coronavirus (SARS-CoV-2) Impacts Across Food and Agricultural Systems (A1711)
  - Develop rapid strategies; mitigate urgent threats to food supply; interdisciplinary teams; provide solutions, training, and support
- Ecology and Evolution of Infectious Diseases (EEID)
  - Interagency program partnering with National Science Foundation, National Institutes of Health (NIH), United Kingdom Biotechnology and Biological Sciences Research Council, U.S.–Israel Binational Science Foundation, National Natural Science Foundation of China
  - \$5 million/year in funding
- Tactical Sciences for Agricultural Biosecurity (A1181)
  - Detection and diagnostics of transboundary and emerging pests, invasive diseases
- Diseases of Agricultural Animals (A1221)
  - Foundational aspects of animal health and disease (disease mechanisms, prevention, control, diagnostics, and therapeutics) to ensure a safe and adequate food supply
- IDEAS (Interdisciplinary Engagement in Animal Systems) (A1261)
  - Bridges traditional divides to bring together diverse backgrounds and find novel solutions, precision management
- Dual Purpose for Dual Benefit (A1241—sunsetted in 2019)
  - Interagency program with NIH to use agricultural species for basic research and create pathogen-resistant animals, looking at genes and mechanisms that regulate resistance or susceptibility to pathogens

### Dr. Beth Lautner,

Associate Deputy Administrator, Veterinary Services, Diagnostics and Biologics, Animal and Plant Health Inspection Service, U.S. Department of Agriculture (APHIS/USDA)

#### **APHIS role:**

- Protect American agriculture and natural resources (manage animal disease, protect livestock from foreign animal diseases, oversee vet labs and biologics, conduct wildlife research)
- National Animal Health laboratory network jointly administered with NIFA
- Work for coexistence with wildlife, operate National Wildlife Research Center
- Six operational units: work on zoonotic disease falls within veterinary services and wildlife services

#### **Veterinary Services strategic directions**

- Created One Health Coordination Center in 2012
- Proactive in emerging and One Health events and issues, building on existing skills in detecting disease, provide veterinary expertise
- Operationalizing One Health through five aspects
  - Deliver Field epidemiology services (surveillance, investigation and response)
  - Support field epidemiological investigations, assist with intra- and inter-agency communications
  - Guide strategic development and policies and provide national-level coordination for commodity disease investigations affecting multiple districts
  - Design and evaluate surveillance systems, provide investigation support, conduct surveys, specialized epidemiological studies, economic analyses and modeling through the Center for Epidemiology and Animal Health
  - Provide critical laboratory support, identify emerging trends and share data, isolates, and expertise through the National Veterinary Services Laboratories

#### Zoonotic influenza viruses: very important to everyone

- #1 priority from One Health Zoonotic Disease Prioritization Workshop in December 2017
- Monitoring avian influenza in flocks and wild birds, especially during 2015 outbreak of highly pathogenic avian flu, sharing of isolates with CDC and ARS
- Swine influenza surveillance program, conducted with National Animal Health Laboratory Network (NAHLN) labs, sharing of isolates with CDC and ARS

#### **APHIS SARS-CoV-2 response**

- Developed case definition, validated tests for animals, confirmed animal cases
- Coordination of testing for companion animals and zoo animals, collaborating with CDC to detect in animals around U.S.
- Provided guidance to states, especially regarding detection in mink farms, sampling wildlife around mink farms, detection of white-tailed deer exposure to SARS-CoV-2

#### APHIS funding for zoonotic disease

- Can be difficult to identify zoonotic activities that would be considered research as cross-cutting responsibilities for disease detection, preparedness and response
- Zoonotic line item: \$19.6 million FY21
- Funding also in Avian, Cattle, Equine, Cervid and Small Ruminant, Swine Health, Veterinary Diagnostics, Wildlife Damage Management, and Wildlife Services Methods Development to support zoonotic activities, \$20.2 million in FY21 for APHIS NBAF Science Program (includes \$3 million for partnerships) includes zoonotic work but also strictly livestock diseases
- \$300 million in American Rescue Plan to conduct monitoring and surveillance of susceptible animals for SARS-CoV-2 and early warning system
- \$20 million in FY21 "to improve and maintain animal disease prevention and response capacity"

#### Needs

- Integration of early warning tools
- Support to diagnostic labs to further investigate when a diagnosis is not made (often the submitter will not pay for extra testing)
- Integration of Laboratory Information Management Systems across animal health and public health labs to capture early signals
- Laboratory Messaging and Reporting (standardize data, increase electronic data transfer)
- Rapid diagnostics and disease detection in livestock and wildlife (pooled diagnostic capabilities, pen-side technologies)
- New and novel techniques for pathogen detection and surveillance (molecular detection, canine detectors)
- International sample sharing (negotiated sharing agreements, interagency work)
- Agility and flexibility to respond to emerging research priorities

### Dr. Timothy Kurt,

Scientific Program Director for Advanced Animal Systems Challenge Area, Foundation for Food and Agriculture Research (FFAR)

#### FFAR role:

- \$385 million federal investment + \$385 million non-federal funds
- Created by 2014 Farm Bill to complement work of USDA, nonprofit with partial federal support
- Work with nonprofit funders, non-governmental organizations, and federal agencies to complement USDA research
- One Health approach: ongoing work on climate change mitigation and adaptation
- No specific program on zoonotic disease research but it is a component of other ongoing initiatives

- Environmental changes, changes in animal production practices, and increased viral vector/reservoir distribution will increase potential for zoonotic disease emergence.
- These diseases can have severe consequences for human health, can alter distribution networks, may cause consumer food prices to surge.
- Thus: we need a broad approach to combat them, including work to reduce malnutrition.

#### FFAR zoonotic disease research priorities

- Antimicrobial stewardship/resistance
  - ICASA (International Consortium for Antimicrobial Stewardship in Agriculture) funded by \$7.5 million from FFAR, supports development of tools and management solutions that promote wise antibiotic use; mechanism for leveraging partnerships; many ICASA member organizations, including lots of beef and pig producers
  - Relevance for zoonotic disease: 2.7 million hogs processed per week in U.S., pandemic crippled meatpacking plants and millions of pigs were at risk of being euthanized but were managed otherwise at the last minute
  - Priorities: reduce need for antimicrobial use by addressing underlying drivers, and understand how antimicrobial use in commercial settings drives resistance
  - Example projects: development of rapid chute-side antimicrobial resistance detection tool, handheld antimicrobial resistance gene detection, precision macrolide use in the beef industry, model protocol for tracking antibiotic use in swine, predictive model development to promote science-based metaphylaxis in beef

#### Rapid research response to animal outbreaks

- ROAR (Rapid Outcomes from Agricultural Research), \$150k awards for 1-yr projects with matching required
- Focused on emerging infectious diseases/pests
- Projects include technology for avian flu, diagnostics for bovine/swine brucellosis, tick surveillance
- Veterinary scientist capacity building
  - FFAR Vet Fellows: 15 students/year supported, \$10k per student, no match required
  - Projects include research on coronaviruses, influenza, vaccine research, tick-borne diseases
  - Culminate in annual National Veterinary Scholars Symposium (600 participants)

### Dr. M. Camille Hopkins,

Wildlife Disease Coordinator, Biological Threats and Invasive Species Research Program, Office of Ecosystems, U.S. Geological Survey/Department of the Interior (USGS/DOI)

#### USGS role:

- Mission to provide unbiased science information to federal planners
- Leads investigations into unusual mortality of aquatic and terrestrial wildlife
- Flagship research center is National Wildlife Health Center (NWHC) in
   Madison, Wisconsin; others are Western Fisheries Research Center, Eastern
   Ecological Science Center, and National Wildlife Health Center Honolulu Field
   Station
- NWHC research shared in online database: Wildlife Health Informational Sharing Partnership event reporting system (WHISPers)

#### Connections between zoonotic disease and wildlife

- Wildlife diseases at the interface with public health and agricultural economy
- 60% of emerging human infectious diseases are zoonotic, 70% of those originate in wildlife (including COVID) (<u>Jones et al. 2008</u>)
- 79% of livestock diseases in U.S. are shared with wildlife (Miller et al. 2013)
- Five new human diseases appear each year, including three of animal origin

#### USGS work relevant to zoonotic disease

- Ecosystems Mission Area: science to support sustainable management and conservation of biological resources
- USGS supported interagency coordination on modeling and strategic approaches for COVID, tracked impact of shutdown on wildlife in national parks, etc.
- <u>2014 investigation</u> published in Journal of Wildlife Diseases was first report about avian flu

- Ongoing monitoring of migratory birds, avian flu ecology, and how shifting migration patterns affect disease risk
- USGS is doing research on seven of the eight emerging zoonoses that were identified as priorities in the December 2017 workshop

#### **One Health approach**

- Efforts by USGS aligned by Joint External Evaluation of International Health Regulations (IHR) Core Capacities
- Recommendations for priority actions:
  - Establish a One Health approach that can formally delineate sectors for steady state and emergency response
  - Formalize interagency networks to address One Health issues
  - Increase number of vets working on zoonotic diseases

#### Budget for zoonotic disease work

- No budget line items related to zoonotic disease
- But USGS does support coordination and cross-agency partnerships that address disease transmission among agricultural species and wildlife



### **Dr. Casey Barton Behravesh**

Captain, U.S. Public Health Service; Director, One Health Office, National Center for Emerging and Zoonotic Infectious Diseases, Centers for Disease Control and Prevention (CDC)

#### CDC role:

- Protect America from health, safety, and security threats, with programs on antimicrobial resistance, border health, coronaviruses, disease ecology, food safety, global health, influenza, lab animal methods, high-consequence pathogens like Ebola and anthrax, lab diagnostics, etc.
- Run National Center for Emerging Zoonotic and Infectious Diseases (NCEZID)
  - Protects against 800+ pathogens
  - PulseNet prevents 270,000 foodborne illnesses/year, saving \$500 million
  - Developed 40+ new diagnostic tests for rare/deadly pathogens in last two years
- Partner with federal, state, and local public health departments; state departments of agriculture and boards of animal health; state departments of natural resources; interagency partners on health, agriculture, wildlife, environment, security; clinical organizations; industry; non-governmental organizations; academia; ministries of health, environment, and agriculture
- Maintain comprehensive national data file for agencies to share data

#### **One Health approach**

- One Health office established 2009
- No single agency can address these health threats; One Health is "collaborative effort of multiple disciplines and sectors" to share information and response
- Big focus areas: zoonotic and emerging infectious diseases, pandemic preparedness, supporting response to outbreaks and emergencies at human-animal-environment interfaces, advancing One Health in the U.S. and globally, global health security, preventing zoonotic disease transmission between pets and people

- Rabies surveillance as an example of a great longstanding One Health initiative
  - 134 labs test 95,000 animals for rabies each year as part of the U.S. Passive Public Health Surveillance System, 4,500 samples are positive each year
  - Also, USDA biologists test 5,000 animals each year as part of USDA National Rabies
     Management Program, 200 samples are positive each year
  - Data inform USDA oral rabies vax program and CDC public health measures

#### One Health lessons learned with relevance for zoonotic diseases

- Identify all relevant partners and stakeholders early and delineate their roles
- Create a structure for communication
- Do One Health workforce trainings with multiple sectors
- Build trusted network before an emergency
  - Make agreements for surveillance and data exchange across labs at federal and state levels
  - Identify shared priorities across sectors
  - Plan for coordinated outbreak response, develop joint questionnaires
- Coordinate investigations
  - Deploy One Health teams with experts from different sectors to the field together
  - Include environmental sampling and assessments in One Health investigations
- Ask the right questions; address human-animal-environment interface
- Use One Health approach for prevention and control
- Develop joint guidance documents to protect human and animal health
- Identify research gaps

#### **Congressional support for One Health coordination**

- 2021 Omnibus Appropriations Bill for 1) national One Health framework and 2) One Health federal interagency coordination committee
- No funding associated with this but at least it's a directive

#### Zoonoses in companion animals

- CDC website has helpful guidance regarding pets and other animals
- <u>Healthy Pets, Healthy People</u>: long-standing program preventing zoonotic disease transmission between people and pets, livestock, and wildlife

#### **CDC** response to COVID

- CDC has been guiding domestic and global strategy and priorities on One Health aspects, coordinating U.S. government interagency partners, investigating zoonotic transmission, collaborating with partners
- Deployed 11 teams to field to lead One Health field investigations (mink farms, animal shelters, homes)
- 2 HHSProtect surveillance pipelines to capture data from investigations, developing diagnostic assays, timely guidance, etc.
- Coordination through One Health federal interagency COVID-19 Coordination Group (OH-FICC): 22 partners, calls attended by state and federal partners, webinar for partners
  - Five OH-FICC subgroups and agency chairs: companion animals, animal diagnostics and testing, wildlife and zoo animals, production animals, environmental health
- Created interim guidance, frequently asked questions, toolkits, etc.
- Created SARS-CoV-2 interagency working group on genomics: studying transmission dynamics in animal populations and between humans and animals, etc.
- Developed public health and animal health recommendations (six feet of distance, wear mask even if don't feel sick, etc.)



### Dr. Andrew Clements,

Global Health Security Program, U.S. Agency for International Development (USAID)

#### USAID role:

• Work with partner countries and the global community on agriculture and food security, economic growth, environment, governance, education, humanitarian assistance

Emergent infectious diseases are increasing and 70% are zoonotic in origin One Health approach needed for global health security

#### **Global Health Security program**

- Works to build preparedness for future health threats
- HIV, reproductive health, maternal/child health, nutrition, health systems, tuberculosis, malaria, emerging threats (including coronaviruses), and neglected tropical diseases
- Program countries in sub-Saharan African, Middle East, south Asia (especially India)
- Four areas of focus
  - Capacity building: improving risk communication, strengthening national lab and surveillance systems, strengthening infection prevention and control
  - Workforce development: training next generation of health workers, supporting university networks in at-risk countries to train and grow One Health workforce
  - Viral surveillance and risk mitigation: research into new and emerging viruses, understanding risks of zoonotic diseases
  - R&D: vaccine development, best practices

#### **Research priorities for zoonotic diseases**

 Understanding risk of spillover, amplification, spread of zoonotic diseases and antimicrobial resistance

- Reducing risk of spillover, amplification, and spread
  - Risk mitigation measures (policy and behavior change, biosecurity on farms)
  - Biomedical interventions (vaccines, medicines, diagnostics)
- Training research staff in partner countries
- Among zoonotic disease research projects in portfolio:
  - Breakthrough Action: research on risk reduction
  - Discovery and Exploration of Emerging Pathogens Viral Zoonoses (DEEP VZN): discovery of viruses in coronavirus, filovirus, and paramyxovirus families
  - <u>Working with Food and Agriculture Organization of the United Nations (FAO)</u>: farm and market biosecurity for known zoonotic diseases
  - One Health Workforce Next Generation: One Health university networks in Africa, Asia
  - <u>PREDICT</u>: discovery of potential zoonotic viruses from wildlife
  - <u>Strategies to Prevent (STOP) Spillover</u>: Working to prevent spillover of known emerging zoonotic viruses
  - <u>Transformational Strategies for Farm Output Risk Mitigation (TRANSFORM)</u>: working with private sector on farm and market biosecurity
  - <u>IDENTIFY partnership</u>: FAO, WHO, and the World Organization for Animal Health, focused on improving laboratory capacity to diagnose pathogens

## Dr. Micheal Burke

Veterinary Medical Officer, Countering Weapons of Mass Destruction, U.S. Department of Homeland Security (DHS)

### **Dr. Tod Companion**

Program Manager Coordinator, Science and Technology Directorate, U.S. Department of Homeland Security (DHS)

#### DHS role:

- Oversee 22 federal agencies, including Science & Technology (S&T) Directorate and Countering Weapons of Mass Destruction (CWMD), which leads efforts to guard against chemical, biological, etc. weapons and health security threats
- S&T authorized to coordinate civilian efforts to "identify and develop countermeasures to chemical, biological, and other emerging terrorist threats" and to perform research, development, test, and evaluation (RDT&E)
- CWMD includes Medical Operations Directorate (CW-1), principal advisor to Secretary and DHS senior leadership on natural disasters, etc.

#### Food, Agriculture, and Veterinary Defense (FAV-D)

- Mission is to lead nation in prevention of, readiness for, response to, and mitigation and recovery from terrorist and other high-consequence events
- Goals are to make sure department leaders have data to inform policy decisions, coordinate activities involving programs, identify and protect critical nodes
- Coordinates with private sector, academia, interagency partners
- Identifies and protects critical nodes of food/agriculture sector
- Authority from Homeland Security Act 2002 (6USC101), Securing our Agriculture and Food Act of 2017 (PL 115-43), HSPD-9, -10, PPD-21 (National Response Framework), National Biodefense Strategy of 2016, and NBAF Act of 2020

Research and development goals: enhance U.S. food and agriculture critical infrastructure security and food and agriculture sector resiliency, defend against introduction of high-consequence diseases, strengthen defense and protection (against adulterants), improve data gathering and analysis, foster stakeholder capacity building

#### Two major programs in Office of Mission and Capability and Support (MCS)

- PANTHR/TIGER (Probabilistic Analysis of National Threats Hazards and Risks, threat/risk assessment)
  - PANTHR: grew from 2014 Ebola outbreak, became larger program on risk analysis, planning to do agriculture risk and management moving forward, moving to immediate characterization of threats, then early detection and mitigation of threats
- FAV-D Program Management (vaccine and diagnostic development)
   Both these programs executed through Office of National Laboratories (ONL) labs.
   60 program managers turn requirements into actionable activities, using business process flow.

#### S&T

- 17 mission-area programs and some recent projects include decontaminating PPE, regional explosives detection dog initiative, counter unmanned aerial systems
- Capabilities
  - FAV-D efforts, scalable with requirements/funding
  - PANTHR (risk modeling, threat characterization, information management and collection, support to COVID-19 response)
  - Support to DHS components and partners [test and evaluation (T&E) authority for the department, doing COVID characterization]
- S&T response to COVID: started questioning cycle in January 2020, cycling monthly (what needs doing, who's doing what), identified research gaps (how do we decontaminate vehicles and screening bins at airport, etc.), developed models and calculators that are publicly available (turned that around in weeks to educate people how to mitigate virus)

#### Outbreak lessons relevant for zoonotic disease

 Share, share, share. Emergencies are confusing and move fast. Thus, need to figure out who's in charge, who needs to review, what everyone thinks is the situation

- Institutional grant-driven research really important for long-term characterization of threats but not as nimble, caught up in paperwork and bureaucracy, can't prioritize sample analysis. Thus, need a more nimble partner for threat characterization and mobilization of response
- Diagnostics is poorly defined. Thus, need a clear definition of what you want
- You will spend as much time routing offers of help as doing research. Thus, have clear pipelines to other agencies, links for grants, commercial offers
- Do technology scouting for your frontline so you can give them advice and information during an outbreak

#### Funding

- DHS has no specific program on zoonotic disease research and no specific funding line items. Infrastructure budget money may fund some research.
- In past, annual budget \$19.5-30.8 million, with \$15 million for countermeasure R&D

#### Joint Strategic Plan for R&D

- Countermeasure development (vaccines, sensors and screening tools, diagnostics, risk management, capacity and capability building, data analytics and IT systems)
- Goal is to reduce catastrophic severity of events

## Dr. Stephen Goldsmith,

Weapons of Mass Destruction (WMD) Directorate, Chemical-Biological Countermeasures Unit, Federal Bureau of Investigation (FBI)

#### FBI role:

- Investigative and intelligence org
- 56 field offices and 350 resident agencies, 730 assistant coordinators in field offices, plus headquarters: WMD Directorate
- Lab division in Quantico does research to support case investigations, does not do or fund basic biological research
  - Science response and analysis unit
  - Research and support unit
  - Work to identify unknown threat agents, forensic assays to interrogate evidence, biotech tools to support case investigations
- Offer educational course for U.S. attorneys to increase their knowledge
- Establish Emergency Operations Center (EOC) protocols, support Defense Threat Reduction Agency/Department of State (DTRA/DOS) biosecurity engagement programs and bioterrorism investigation response courses, provide direct support to international case investigations

#### Threats to food security

- Agricultural system affects food security, national security, economic security
- Bioincidents can spread beyond point of introduction, hard to determine whether introduction was accidental or not
- Whether an incident is real or a hoax, it can still do long-term damage to the agricultural economy

- Threats include agroterrorism, state-sponsored espionage and biological warfare (by adversary governments), state-supported terrorism (by individual fighters and organizations supported by state), non-state supported espionage and terrorism (foreign and domestic terrorists), commercial competitors, and individual and insider threats
- Attacks on food/agriculture are asymmetric warfare because they attack unprotected infrastructure targets (like unsecured milk holding tanks at dairies), are unexpected threats, can use social media to distribute disinformation, often use simple low-tech weapons (like commercially available drones)

#### One Health lessons learned with relevance for zoonotic diseases

- Activities such as computer-hacking incident that caused slaughterhouse backlog for pigs and poultry; Project Counterglow which posted maps of 27,500 agriculture facilities online)
- Foreign nationals trying to smuggle in biological materials
- Rescue dog importations and organized dog smuggling (can introduce zoonoses)
- Foreign origin seed mailings

#### Joint investigations

- Goals are prevention (biosecurity, employee screening), threat awareness, identification of triggers/tripwires, surveillance/detection, development of joint response protocols
- Joint investigation challenges: attribution (whether introduction of biohazard was natural or deliberate), concurrent investigations, etc.
- WMD coordinator programs are great advantage for interagency coordination: their job is to build relationships and do tabletop and field exercises, offer joint investigation courses
- Overlapping roles for law enforcement, intelligence, and agriculture agencies: we're already doing incident information sharing, joint investigations of suspicious incidents, and forensics/attribution
- Animal-plant health joint criminal-epidemiological investigations course developed in 2015 by FBI, USDA, and Oklahoma State University
  - Serves as primary tool to implement Joint Investigation MOUs
  - Benefits of this tool: early recognition and rapid reporting, informed decision making to initiate joint investigation, better ability to perform rapid threat assessment which allows attribution, ability to identify and catch perpetrators

#### Needs

- Comprehensive biosecurity that provides physical, information, and personnel security
- Systematic attribution of suspicious disease incidents
- Ways to rule in/rule out all possible explanations
- Know expected (normal) background levels of variation so we can decide whether it's intentional or accidental
- Intel regarding unusual activities, suspicious trends. FBI gets huge amount of information on a daily basis, needs a way to determine credible threats and assess feasibility of threats (terrorist threatened to put ricin in New York water supply but such an attack is not feasible)

### Dr. Tonya Nichols,

Senior Science Advisor, Center for Environmental Solutions and Emergency Response, Office of Research and Development, Environmental Protection Agency (EPA)

#### EPA role:

- Mission is to protect human health and the environment (includes critical infrastructure of water)
- No specific focus on zoonotic disease, but potential overlap with branches on biological attacks and human disease outbreaks and natural disasters
- Consequence agency: in order for EPA to respond to a biological incident, it must be identified as a pollutant. No statutory authority for biosecurity response.

#### EPA's role with regard to zoonotic diseases

• Develop environmental countermeasures: preparing for and mitigating consequences

- Examples of countermeasures include treating and monitoring water, checking for pesticides in the environment, approving engineered mosquitoes to abate zoonotics, carcass disposal to prevent groundwater contamination after a natural disaster, cleanup (after 9/11 anthrax attacks)
- Total EPA budget \$8 billion, includes \$22 million for biodefense research, response, and regulatory programs
- Biodefense (environmental countermeasures) includes chemical, biological, radiological, and nuclear (CBRN) hazards research, water biodefense, response to emergencies, regulatory of pesticides and toxics; less than 1% goes to biodefense for antimicrobial resistance research in wastewater systems and receiving waters

#### Applying a One Health approach for R&D

- Goal is to collect data to protect humans, animals, and plants in shared environment against transmission of disease
- EPA's R&D focuses on disinfection, decontamination, persistence studies, detection, and wastewater surveillance
- Need more research on host susceptibility, transmissibility, persistence (multiple matrices), disinfection efficacy and safety, decontamination methods, and waste
- One Health approach: share data among lab networks, coordinate on sampling and data utility, coordinate and integrate environmental research into human, animal, and plant bioincident response research programs
- Ebola in New York City (2014–2015) as a case study: massive decontamination effort resulting in 352 drums of medical waste and \$1 million cost for disposal of biohazardous waste resulting from a single patient

# OSTP-National Science and Technology Council (NSTC)-Health Security Threats (HST) One Health Real-time Bioincident Research Framework Project

- Working on a One Health real-time bioincident research framework to integrate the human, animal, and environmental systems to support research agenda to quickly address emerging data needs relevant to disease agent and scenario.
- Phase 1: Develop framework: have sectors convene theme meetings, create groups for cross-sector discussions around themes, refine keys/flowcharts, develop integrated flowchart

- Phase 2: Conduct tabletops to exercise One Health flowchart applied to a zoonotic scenario and agriculture disease scenario
- Phase 3: Finalize One Health framework and provide recommendations for collaborators



## Charles Valentine Riley Memorial Foundation

401 9th Street NW Suite 630 Washington, DC 20004

www.rileymemorial.org

