

Opportunity Title: Predictive modeling of livestock diseases with significant economic, social, or security impacts

Opportunity Reference Code: ICPD-2019-03

Organization Office of the Director of National Intelligence (ODNI)

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How to Apply **Create and release your Profile on Zintellect** – Postdoctoral applicants must create an account and complete a profile in the on-line application system. **Please note: your resume/CV may not exceed 2 pages.**

Complete your application – Enter the rest of the information required for the IC Postdoc Program Research Opportunity. The application itself contains detailed instructions for each one of these components: availability, citizenship, transcripts, dissertation abstract, publication and presentation plan, and information about your Research Advisor co-applicant.

Additional information about the IC Postdoctoral Research Fellowship Program is available on the program website located at:
<https://orise.ora.gov/icpostdoc/index.html>.

If you have questions, send an email to ICPostdoc@ora.gov. Please include the reference code for this opportunity in your email.

Application Deadline 3/1/2019 6:00:00 PM Eastern Time Zone

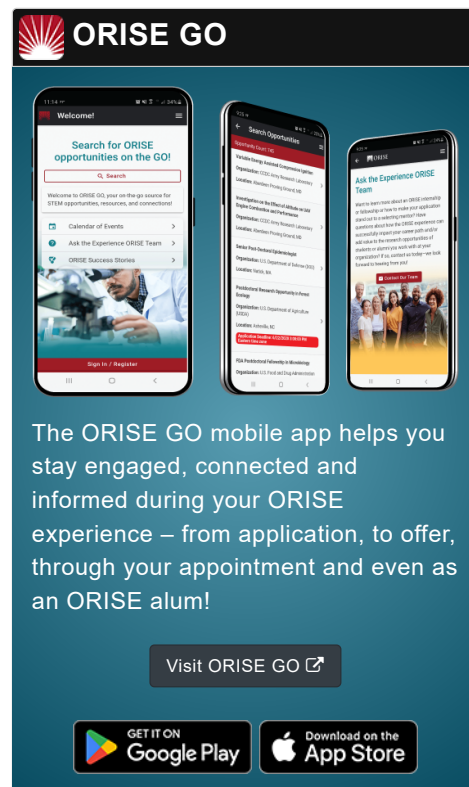
Description **Research Topic Description, including Problem Statement:**

Infectious diseases of agricultural animals can have devastating impacts on economies (income, food security, and trade), the environment (wildlife die-offs), and societies (community stability and social unrest), and could threaten a country's security interests or degrade its international and trade relationships. Animal diseases also have major implications for personnel and equipment movements (such as movement of military forces and vehicles), which increasingly are recognized as potential long-range dissemination pathways. The worldwide growth and connectivity of livestock production may heighten the risk of transnational contagion, with new opportunities for pathogen transmission at the wildlife interface and within and between agricultural facilities. Current approaches to modeling the emergence and spread of livestock diseases tend to focus on selected modes of transmission and settings, but typically do not consider transmission pathways that may be rare but important for long-range pathogen dissemination. Also current efforts may not adequately account for the role of environmental variation and change in disease emergence and spread. More detailed data and comprehensive models are needed to understand and predict livestock disease dynamics, particularly low-probability, high-consequence dissemination of virulent pathogens to new settings.

Example Approaches:

Note: Human subjects research is not permitted in this research topic.

- Work with existing models and underlying data (possibly available from National Bio- and Agro-Defense Facility (NBAF) in Manhattan, KS or find other sources) to interrogate the validity of existing links and assumptions to identify

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- outliers and potentially reflect new pathogens, vectors, or settings.
- Hotspot mapping for future disease emergence.
- Methods for overcoming deficiencies in population or movement data in transmission models.
- Transmission models that integrate environmental persistence, animal reservoir, trade, and/or movement of contaminated people, vehicles, or equipment in long-range disease dissemination.
- Models that can rapidly be adapted to specific situations for real-time assessment and forecasting during outbreaks.
- Integration of genomic sequencing and deep sequencing data to improve forecasting accuracy of transmission models.
- Models that draw reliable conclusions from data analyses, are applicable to data/resource poor settings, that capture spatial transmission routes between farms, or that link diseases in livestock populations to other species.

Relevance to the Intelligence Community:

The National Biodefense Strategy (2018) identifies natural or deliberate biological threats among the most serious threats facing the United States and the international community. The Strategy highlights the connections across humans, animals, plants, and the environment, where a disease that affects one component influences others as well, and notes the potential for animal threats to cause economic disruption and physical harm to health and well-being. The Strategy's Implementation Plan calls for intelligence to inform decision-making regarding biological threats through several specific actions, including incorporating forecasting and modeling into intelligence products and processes; providing strategic warning for diseases with the potential to affect U.S. national security or interests abroad; and improving modeling and forecasting of the likelihood and impact of bioincidents (such as outbreaks). The proposed Research Topic responds directly to these requirements.

Recent outbreaks highlight scientific gaps in our ability to anticipate emerging animal diseases, and illustrate the potential of these diseases to reach new areas unexpectedly. For example, African Swine Fever (ASF) virus causes a highly-contagious and lethal disease among pigs, wild boars, and related species. Though ASF does not affect humans, outbreaks may spread rapidly within and across national borders and cause significant economic damage. ASF was reported in China for the first time in 2018, and outbreaks spread across multiple provinces. ASF was reported in new locations in Europe at about the same time. The recent ASF outbreaks resulted in culling of tens of thousands of animals; international trade restrictions; and public accusations by a senior foreign government official that another foreign government was to blame. The drivers and links among these outbreaks are uncertain. Improved models of ASF dynamics could clarify the role of environment, trade, wildlife, and movement of people and equipment in the emergence of spread of viruses such as ASF, and inform efforts to predict and control the disease. These insights may be useful more broadly in understanding and predicting transmission patterns for other animal diseases of security, or economic importance.

Key Words: Infectious diseases, outbreaks, epidemics, modeling, forecasting,

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animal diseases, livestock

Qualifications

Postdoc Eligibility

- U.S. citizens only
- Ph.D. in a relevant field must be completed before beginning the appointment and within five years of the application deadline
- Proposal must be associated with an accredited U.S. university, college, or U.S. government laboratory
- Eligible candidates may only receive one award from the IC Postdoctoral Research Fellowship Program.

Research Advisor Eligibility

- Must be an employee of an accredited U.S. university, college or U.S. government laboratory
- Are not required to be U.S. citizens

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree.
- **Discipline(s):**
 - **Chemistry and Materials Sciences** (12 )
 - **Communications and Graphics Design** (6 )
 - **Computer, Information, and Data Sciences** (16 )
 - **Earth and Geosciences** (21 )
 - **Engineering** (27 )
 - **Environmental and Marine Sciences** (14 )
 - **Life Health and Medical Sciences** (45 )
 - **Mathematics and Statistics** (10 )
 - **Other Non-Science & Engineering** (5 )
 - **Physics** (16 )
 - **Science & Engineering-related** (1 )
 - **Social and Behavioral Sciences** (28 )