USDA National Surveillance Program for Influenza A Virus in Swine

Technical Review, Evaluation, and Recommendations

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November 19, 2015

Executive summary

The National Surveillance Program for influenza A virus in the U.S swine population is risk-based and monitors the genetic evolution of endemic influenza A virus in swine to better understand endemic and emerging influenza virus ecology. The program is precedent setting because it is a USDA-APHIS-VS first for an endemic disease and involves a non-regulatory approach to a potentially regulated disease and has swine industry support and engagement.

In my opinion, the overall program has been successful because of:

- New knowledge created through the phylogenetic studies of co-circulating influenza viruses in swine, as part of cooperative work with the Agricultural Research Services
- Trust and goodwill which has developed between animal and public health partners
- Political value of the program and partnerships created

To inform discussion within USDA-APHIS, I recommend changes to components of the surveillance program, with the longer-term goal of maximizing efficiency and cost-effectiveness with regards to sampling design, data collection, data management and analysis, interpretation of results, and dissemination of information to stakeholders. My 26 recommendations are summarized on pages 21-23 of this report and are categorized as to whether they apply to the existing program or to a revised program that addresses proposed funding cuts.

My highest-ranked priorities for action are to**:**

- **Identify failure/inefficiency points** throughout the existing program and strategies that might be feasible to implement in order to improve program efficiency.
- **Undertake a cost-effective analysis of the testing algorithm** and this task should include deciding on the most appropriate number of samples for full-genome sequencing to achieve program objectives
- **Develop an impacts statement** for internal and external stakeholders that summarizes and promotes the animal and public health benefits of the current program; this should include data on how influenza isolates have been used by biologics companies
- **Develop a strategy for increasing accessions from the traceable stream,** including use of incentives and perhaps shifting responsibility and costs to the swine industry; this may include **having the swine industry provide representative regional samples to ensure adequate geographical coverage of the U.S. herd**
- Agree as to **what epidemiological analyses are realistic with the currently-available**

data or after modification of the program, given the reluctance of the swine industry to allow state-level analyses

- **Provide more explicit description of goals, objectives, and outcomes/deliverables** for a revised program including a reassessment of the importance of geographical coverage and representativeness as part of the programmatic goals
- **Define key attributes and associated metrics** for a revised program
- **Develop case-definitions that include genomic data** at the sample, pig, and herd levels for purposes of epidemiological analysis
- **Develop a comprehensive data management system** to allow more streamlined integration of data from multiple sources, including laboratory and field data

Recommendations

	Number	For EXISTING Program	For REVISED Program
Priorities and objectives	1		• Deliverables for each objective • Listing current priorities in reports • Traceability of changes
	2		• Swine Health Information Center (SHIC) as a possible stakeholder
Short- and long-term outcomes	3		• Update or change outcomes and define practical deliverables
	4		• Identify knowledge gaps in IAV-S ecology & epidemiology that can be realistically addressed
	5	• Spatiotemporal analysis of variant IAV-S at state or regional levels	
	6	• Answer questions related to geographical objectives • Assess impact of data pooling across states into regions • Sample-size questions	
	7		• Discussions with swine industry regarding data management & analysis for IAV-S epidemiology
Target and source populations	8	• Spatial coverage (preferably state-level) • Retrospective evaluation (at ARS) of variant IAV-S	
	9	• Describe criteria for selection of viruses for full genome sequencing	
Case definition	10		• Include genomic data • Review case definitions for clarity, accuracy, and acceptability

Data management and analysis	11		• Develop a comprehensive data management system for integrating field and laboratory data
	12		• Standardize data submissions from farms and electronic transmission of data by all parties
	13	• Evaluate completeness and timeliness of NAHLN's data submissions from 2014 on and investigate worst 20% for impacts	
	14	• Update swine industry representatives about limited epidemiological data unless more traceable herds and possible follow-up can be included in program	• Discuss alternative models; with the swine industry leading epidemiologic studies and USDA providing a supporting role
Result interpretation	15	• Include pattern-interpretation disclaimer for sequence data in annual reports	
Testing protocol/cost effectiveness	16	• Cost-analysis of full sampling and testing algorithm	
	17	• Calculate number of isolates to be sequenced to meet the desired objectives of the surveillance program including phylogenetic analyses	
Sources of system inefficiency & failures	18	• Identify and rank failures and inefficiencies for each step in entire surveillance system	
	19	• Set metrics for times within each step, as appropriate • Define unacceptable failure percentage for each step	
	20	• Consider cost-effective and feasible mitigations for identified failure/inefficiency points	

	21	• Impacts statement summarizing benefits to stakeholders and focusing on public health and animal health goals	• Future discussions with stakeholders and modifications of the existing system (to ensure more focus on deliverables and outcomes) informed by the impacts statement
Success and impact metrics	22	• Survey biologics companies to determine use of IAV-S from NVSL for vaccine development	
Dissemination to stakeholders	23	• Describe communication process to the swine industry for a unique strain • Describe roles of responsible parties in the communication process	
Cost-sharing	24	• Initiate discussions with swine industry representatives about sharing testing costs	
Surveillance attributes	25	• Identify and rank the most important attributes to be assessed in the surveillance program	• Identify potential metrics for a modified program based on these assessed attributes
Modification process	26		• Develop a Gantt chart showing the sequential and simultaneous steps in the modification process and the timeline for each • Develop a written plan for regular internal evaluation of surveillance system attributes