A COMPREHENSIVE PLAN OF NATIONAL SURVEILLANCE FOR MODERN LIVESTOCK INDUSTRIES

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USDA's Veterinary Services (VS) is a forward thinking agency that has fostered a spirit of renewed customer focus and has forged ahead in developing new ways of serving industry and the public. A specific manifestation of this is the formation of the Swine Futures Project (SFP) team to evaluate the health services needed by a modern livestock group, in particular, the U.S. pork industry [Miller, 1999]. Despite success in disease eradication by many countries, there is concern that many Official Veterinary Services (OVS) are obsolete regarding demands of animal industry [Acha, 1987]. An alternative view is that these past successes will allow animal health officials to refocus on new challenges and opportunities in preventive medicine. The SFP was a two year government-industry partnership effort to redesign VS activities related to the pork industry. This paper presents the SFP recommendations to VS for the development of a comprehensive national surveillance plan.

The design of a national surveillance system should not begin with the identification of a data source (e.g. sentinel veterinarians) without the prerequisite defining of the objectives. The proper sequence for steps in planning a surveillance system are listed in table 1 [Teutsch, 1994].

1.	Establish objectives
2.	Develop case definitions
3.	Determine data source and collection methods
4.	Develop data collection instruments
5.	Field test methods
6.	Develop and test analytic approach
7.	Develop dissemination mechanism
8.	Assures use of analysis and interpretation

Table 1. Sequence for planning a surveillance system.

Before VS can work with providers of surveillance data, it must be clearly defined why the data is needed and for what purposes it will be used. The objectives should be defined well enough that specific indicators for monitoring can be developed. Once specific indicators have been developed, data sources can be identified. The comprehensive plan consists of ten surveillance systems grouped by objective, not by data source. They fall into four broad categories: surveillance for foreign animal diseases, trade, disease control, and emerging diseases.

I. Rapidly detect a foreign animal disease on domestic soil.
First and foremost, the well-defined principles of surveillance should be used to expand and improve surveillance efforts to prevent intrusion of foreign animal diseases (FAD). A critical element of preparedness, and the pivot on which an effective response can be launched, is the initial recognition, reporting and investigation of a suspicious occurrence. Surveillance for detection of an outbreak

must not only be timely, but sensitive and flexible. The surveillance system should be sensitive enough to detect multi-focal outbreaks.

II. Detect outbreaks of foreign animal diseases on foreign soil.

Despite successfully eradicating major epidemic diseases, there has been a fundamental shift in import policies away from zero-risk to risk management in order to liberalize trade. Therefore it is prudent to have real-time information regarding disease status of international livestock populations, especially in neighboring countries and trading partners. Objective, accurate, timely knowledge and deliberate communications are needed to stay apprised of disease situations in other countries around the world. Surveillance data on FAD in other countries can be captured through international organizations and various VS divisions with positions in foreign countries. Preventive measures that can be taken based on this surveillance information include import policies, port inspections, research as well as additional surveillance and educational efforts.

III. Monitor risks associated with domestic introduction of a FAD.

A comprehensive surveillance plan covers not only health outcomes but also related hazards and exposures. The explosive growth in global travel and world trade present growing infectious hazards. U.S. herds are exposed to a constant influx of live animals, germplasm, semen, and sundry animal by-products from countries around the globe. The specific purpose of this surveillance program is to keep a vigilant watch over hazards and exposures associated with imports, fomites (travel and commerce), and vectors. Vector surveillance programs should encompass global ecological monitoring for certain vectors, particularly changes in geographical distribution, habitat, and other factors related to transmission and the movement of these vectors in imports.

IV. Document disease free status for trade purposes.

Data gathered in surveillance systems for trade purposes are an important source of high-quality scientific information for policy makers to thwart new threats and to garner new opportunities. The documentation of the absence of disease, either at the national or regional level, has two benefits. It provides justification for restrictive import policies and allows for the exportation of live animals and products. This objective is distinct from the need to detect the initial case of a FAD (I). An analytical challenge for this surveillance system is in determining the absence of disease in a national population in lieu of the perfect test. Another challenge is when to incorporate pathogens that have been recently eradicated from the national herd.

V. Describe disease prevalence for trade purposes.

The purpose of this surveillance system is to describe spatial and temporal patterns of diseases pertaining to international trade. The concept of regionalization has replaced a strict dichotomous classification of the national herd. This will require surveillance capabilities for several purposes including the monitoring of sentinel herds in a defined disease-free region or border; conducting surveillance for assessing efficacy of a vaccination barrier; or simply describing regional borders based on climate or other ecological characteristics. Unlike surveillance to document freedom from a pathogen, surveillance to categorize level of risk may be directed towards clinical manifestation of a disease (versus presence of a pathogen).

VI. Assess progress in eradication of selected pathogens.

It is clear that much has changed in the business of disease control and prevention. The goal may no longer be complete elimination of a pathogen but simply the control of its spread and/or impact. To the extent that national eradication programs are employed in the future, data from these activities should be collated and summarized to assess progress in the eradication program. A complete surveillance program for this purpose should be able to monitor program impact and detect problems.

VII. Assess progress in education campaigns for control of selected diseases.
Similarly educational programs directed toward changing the actions of producers and practitioners can best succeed when accompanied by a surveillance system to document the initial prevalence levels; to target educational efforts; to establish realistic, measurable objectives for intervention; and to document and measure changes, thereby determining the effectiveness of the educational material.

VIII. Assess progress in reduction of food-borne pathogens.
The purpose of this surveillance system is to describe epidemiological patterns for food-borne pathogens where swine are an important reservoir and to conduct surveillance to support national efforts for reducing transmission of food-borne agents. Guzewich cite several reasons for pre-harvest surveillance for food-borne disease (Guzewich, 1997).

IX. Describe trends in hazards, exposures, and health conditions.
Emerging diseases include the reemergence of endemic conditions, i.e. epidemics. Thus, surveillance information on key animal health indicators is needed to describe frequency of risk factors and trends in prevalence, especially to quickly and accurately identify epidemics. There is widespread recognition that a state of the art livestock industry can no longer rely on the frequent speculations of laboratory diagnosticians to determine disease trends.

X. Recognition of new infectious diseases and novel pathogens.
VS can not begin to tackle the more arduous task of addressing emergence of novel pathogens until a solid foundation of disease surveillance is laid. It is readily apparent to many that the industry needs more than a 'vet rumor mill' to identify emerging health concerns. A novel disease may entail the emergence of a previously unidentified pathogen or simply the atypical epidemiological expression of a known pathogen. Surveillance for new infections should focus on monitoring high risk populations designed to detect unexplained health events, instead of case definitions for known pathogens.

References
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