

Assessment of practitioner-based reporting system for identification of foreign animal disease introduction.

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Summary

Between July 2000 and March 2001, NAHMS conducted a national swine survey in the top 17 States. To ascertain the coverage of the practitioner-based reporting system, the questionnaire included items on the frequency of visits made in the last 12 months by various types of veterinarians. Over one fifth (21.9%) of swine production sites indicated there were no veterinary visits of any kind on that site in the previous 12 months. The percent of sites with no veterinary visits ranged from 31.1% on small sites (total inventory <500) to 10.0% on large sites (10,000 total inventory). The passive practitioner-based surveillance system for reporting suspicious cases of foreign animal diseases therefore should be bolstered in those segments of the industry not adequately covered by veterinarians. More active surveillance by government field veterinarians, extension agents, or other local agricultural workers could fill this role.

Introduction

A critical component of animal health emergency preparedness is effective surveillance for the timely recognition of an outbreak. Surveillance is defined as the ongoing systematic collection, analysis and interpretation of health related events occurring in a population; followed by timely dissemination of results to those involved in the planning, implementation, and/or evaluation of prevention and control measures. This systematic process of collection, analysis, and dissemination requires periodic evaluation to ensure that the surveillance system is useful and effective.

In the United States, USDA's Veterinary Services (VS) relies on multiple surveillance systems for detection of foreign animal diseases. One of the main systems is passive reporting by private practitioners of suspicious cases with clinical signs similar to a foreign animal disease. To date, this surveillance system has not been evaluated. This project evaluates the coverage and sensitivity of the practitioner-based passive reporting system.

Methods

Between July 2000 and March 2001, NAHMS conducted a national swine survey in the top 17 States. To ascertain the coverage of the practitioner-based reporting system, the questionnaire included items on the frequency of visits made in the last 12 months by various types of veterinarians. Veterinary types included private practitioners, consulting vets, company vets, and government field veterinary officers. The top 17 States were categorized according to their contribution to US hog production. Contribution is defined as a composite of percent hogs and percent producers. The proportion of sites with no veterinary visits were estimated for each tier to assess holes in coverage by this practitioner-based surveillance system.

A second important criteria evaluated is the sensitivity of the surveillance system. A basic strategy to mitigate the notoriously poor reporting in passive systems is to create a well defined and specific case definition. The lack of a clearly specified, well-publicized case definition in this case hampers the sensitivity. A case definition for reporting suspicious CSF cases would include some combination of clinical signs, modified by factors which elevate concern or suspicion.

Reports of suspicious cases are reported to Federal animal health officials who assign a trained FAD diagnostician to investigate. FAD investigations are recorded into an electronic paper trail using Lotus Notes. Swine investigations for fiscal years 2000 and 2001 were summarized. Then, using the NAHMS Swine 2000 study, using various criteria for case definitions, the total number of cases were estimated for the population of swine production sites with 100+ total inventory in the top 17 states.

Results

Over one fifth (21.9%) of swine production sites indicated there were no veterinary visits of any kind on that site in the previous 12 months. The percent of sites with no veterinary visits ranged from 31.1% on small sites (total inventory <500) to 10.0% on large sites (10,000 total inventory). The percent of sites with no veterinary visits in 12 months also varied according to their contribution. Iowa is a tier one state with a composite contribution of 28.3% to the US pork industry. North Carolina and Minnesota are in the second tier. The percent of sites with no veterinary visits of any kind are shown in Table 1, by State tiers.

	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5
States	IA	NC, MN	IL, IN, MO, NE	KS, OH, OK, SD	AR, CO, MI, PA, TX, WI
Composite contribution	26.2	21.3	25.5	11.3	8.2
Percent sites with no vet contact	6.9	18.0	32.3	33.0	47.6
Estimated coverage	24.4	17.5	17.3	7.6	4.3

Table 1: States participating in NAHMS Swine 2000 study, by composite contribution to US hog industry and the percent of sites for each tier of States that did not have any veterinary visits in the previous 12 months.

The first observation from Table 1 is that as the importance of swine production drops in a State, the proportion of sites with no veterinary contact rises. In estimating the total proportion of the industry “covered” by veterinary access, the importance of these less swine populated states declines too. The NAHMS study did not represent the other 7.0 percent of the industry residing in the other states. The proportion of the entire industry with any type of veterinary visit is between 71.0 and 74.7 (depending on assumptions made for remaining states).

Approximately 30 porcine FAD investigations are conducted in a typical year. The majority were initiated by practitioners; however slaughter plant inspectors, producers, and research farms occasionally reported suspicious cases. For FY00-FY01 there were a total of 67 FAD investigations conducted. Sensitivity of the reporting system can be assessed by comparing this number to the actual number of suspicious cases estimated from the Swine 2000 study. The most common FAD suspected was FMD (34/67) or CSF (23/67) with vesicles (n=19 cases), lameness (8

cases), high mortality (8 cases) and reddened skin (5 cases) being the most frequent chief complaint triggering suspicion. Lameness was a common feature of reported cases with trauma being the single most common ruleout for FAD investigations. From the Swine 2000 study, there were an estimated 435 sites reporting weaned pigs with vesicles. The estimated number of cases of purplish discoloration of skin on abdomen (erythema) and other suspicious signs such as persistent fever, convulsions / incoordination, piling of pigs, alternating constipation and diarrhea, the ranged from 1140-5540. Table 2 shows the estimated number of cases that would occur based on presence of suspicious symptoms and existence of various high risk management practices.

	Erythema	Erythema + 1 other symptom	Vesicles
Worker visit to foreign country	710	370	75
Worker visit to foreign country farm	260	75	65
Visitor from foreign country	385	300	95
Worker from foreign country	60	50	25
Genetic material from foreign country	345	220	10

Table 2: Estimated number of cases occurring when case definition is suspicious symptom modified by various high risk management practices.

Discussion

Less than $\frac{3}{4}$ of the pork industry has adequate access a veterinarian. For a practitioner-based surveillance system, this lack of coverage is concerning for a need as critical as timely detection of a foreign animal disease. This number is somewhat conservative in that all veterinary types were included, not just use of private practitioners. Also those with only one or two visits a year were considered adequate. And finally, for the purposes of this paper, the US pork industry was defined as those sites with total inventory of 100+ when, in fact, any site with at least one hog is susceptible to a foreign animal disease.

The starting point for developing a specific case definition for passive reporting by practitioners are clinical symptoms suggestive of CSF or FMD. The presence of vesicles on snout or feet is the only one that would result in a manageable number of cases to investigate (435). However this symptom alone would bias detection of FMD and decrease sensitivity for detecting CSF. For CSF, erythema and the presence of at least one other symptom would still result in almost 4000 cases to investigate. A more specific case definition is needed. One not based solely on clinical symptoms.

Modifying the presence of suspicious symptoms with history of farm workers visiting a foreign country still results in a case definition too sensitive, though much closer to what could be handled. Restricting it to those workers that visited a farm in a foreign country greatly improves the case definition resulting in a total of 75 herds with suspicious CSF signs and 65 sites with suspicious FMD signs.

Likewise, modifying the presence of suspicious symptoms with history of recent foreign visitors results in a case definition that may be too sensitive. A history of workers on site that are from foreign countries provides a more manageable number

of cases; as does a history of receiving genetic material (live animals or semen) from a foreign country.

Conclusions

The passive practitioner-based surveillance system for reporting suspicious cases of foreign animal diseases should be bolstered in those segments of the industry not adequately covered by veterinarians. More active surveillance by government field veterinarians, extension agents, or other local agricultural workers could fill this role.

A specific case definition for reporting suspicious foreign animal disease is when (1) any vesicles are reported on the snout or feet and (2) when erythema and one other suspicious symptom are noted along with a history of any of the following: a worker has visited a farm in a foreign country, the site employs workers from a foreign country; or any genetic material has been received from a foreign country.