

ISSUES FACED IN THE 2002 VA AI OUTBREAK

by Dr. Bill Pierson

Outbreak Synopsis

In the early part of March 2002 a flock of turkey breeder hens located near Harrisonburg, VA developed signs of respiratory disease and experienced a precipitous drop in egg production. The flock was screened for Avian Influenza (AI) as part of the diagnostic work-up. Sera were tested by Agar Gel Immunodiffusion (AGID) at the Virginia Department of Agriculture and Consumer Services (VDACS) Lab and found to be positive. The flock was placed under quarantine pending virus isolation (VI) results from the National Veterinary Service Lab (NVSL) in Ames, IA. The Virginia Poultry Federation (VPF) immediately advised integrators of the situation and regional biosecurity was heightened. Shortly thereafter, the flock was confirmed H₇N₂ positive. With authorization from VDACS and the Virginia Department of Environmental Quality (VDEQ), the flock was euthanized and buried on-site. The time between the onset of clinical signs and destruction of the flock was 8 days.

It was immediately realized that prior to the development of clinical signs, a portion of the hens from the affected flock had been moved to another farm to be force molted. The second farm was also quarantined and additional samples were submitted for AGID and VI. The flock was confirmed positive a week later. By this point, the general public was now aware of the situation and the VDEQ began receiving complaints regarding the on-site burial of birds. As a result, VDEQ was reluctant to issue a permit for the second flock. Approximately two weeks worth of negotiations followed before disposal at landfills was approved. In the interim, integrators began testing of symptomatic flocks, those within 3-5 miles of known positives, and those scheduled for market. Because of this voluntary effort, the imposition of a regional quarantine by the State Veterinarian was averted. However, between the time AI was first diagnosed and the new disposal plan was implemented (+24d), 35 additional positive flocks, i.e., 12 turkey breeder, 18 turkey growout, 2 broiler breeder, and 1 broiler growout flock were found in the Shenandoah Valley (SV). A predilection for older birds (turkeys \geq 10 wks and broiler breeders) seemed apparent.

In mid-April (+6 wks), with no evidence of subsidence, VDACS requested assistance from the U.S. Department of Agriculture (USDA). In an attempt to identify positive flocks as early as possible, a regional dead-bird surveillance program that included all 1000+ commercial poultry farms in the SV and a convenience sampling of small backyard flocks was undertaken. At its peak, the USDA manpower involved in this effort reached upwards of 200 persons. This was in addition to the continued involvement of industry personnel who were engaged in what had now become mandatory monitoring of symptomatic and pre-slaughter flocks as well as depopulation and disposal.

The epidemic lasted approximately 4 months (fig 1). By its apparent end (July 2, 2002) the outbreak had claimed the following:

No. of turkey growout operations affected:	125
No. of turkey breeder operations affected:	28
No. of broiler breeder operations affected:	29
No. of broiler growout operations affected:	13
No. of table egg operations affected:	2
No. of back-yard flocks affected:	0
Total no. of farm affected:	197
Total no. of birds destroyed:	4,743,560
Estimated losses to the industry:	~ \$130 million

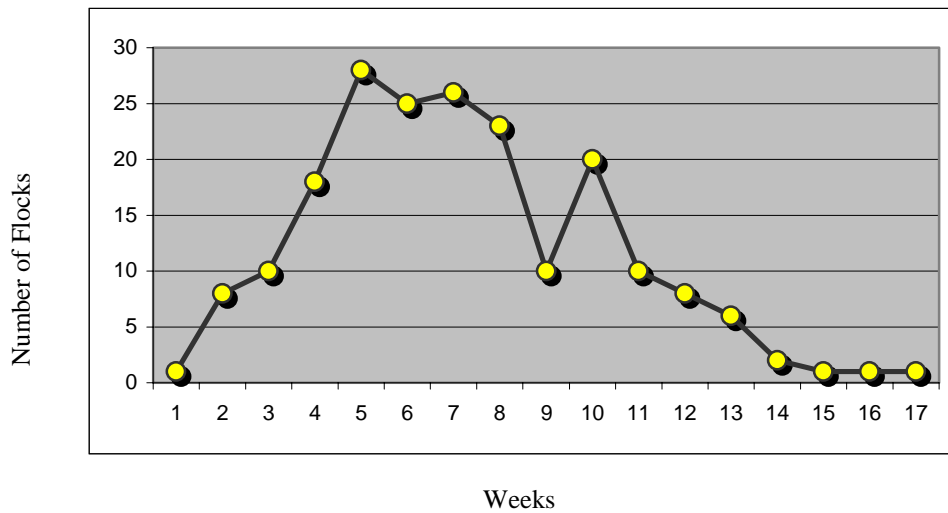


Figure 1. Number of flocks affected over time

Managing Information

For politico-economic reasons, careful management of information in the case of diseases like AI is critical. In the VA outbreak, so that appropriate biosecurity measures could be implemented, integrators were notified immediately when it was determined that the first flock was AGID positive. Within days, reports of the outbreak began appearing in the public media. The Associated Press subsequently distributed the story worldwide, which prompted a knee-jerk embargo on all US poultry by the Japanese Ministry of Agriculture, Forestry, and Fisheries (MAFF). This required 2 days to resolve, with the final dispensation being a restriction on

exports from VA (PA, CT, and ME were still under a previous embargo). The source of the premature information leak was never identified, but had the information reached MAFF in a manner that permitted immediate clarification at the appropriate administrative level, the 2-day embargo may have been averted. The recent decisions by NY and NJ to cutback AI surveillance efforts appear to be based on a similar concern. Thus, what to report, when to report it, and who should do the reporting are issues that the industry, state, and federal governments must promptly address to mitigate such problems in the future.

A second challenge related to the management of information concerned the use and distribution of Geographic Information System (GIS) data. GIS was an invaluable tool in the coordination of AI monitoring, control and eradication efforts in VA. However, the issue of who could actually possess the information was of some concern because of State and Federal Freedom of Information Act (FOIA) legislation. The State FOIA as promulgated in the Virginia Code essentially guaranteed public access to any information in the possession of VDACS. Exemption and protection of the information was afforded only on the basis that it was the result of proprietary research conducted at a University (Virginia Tech) and funded by private industry. The USDA was given access to the data when a Memorandum of Understanding (MOU) between the agency and the VPF was drafted outlining restrictions for use. Many poultry states have yet to develop GIS databases because of FOIA concerns, yet the power of GIS in managing diseases like AI is undeniable. Development of GIS databases with careful consideration of State and Federal FOIA's is an imperative for the industry on a national level. USDA's willingness to provide some protection of this information at the federal level is a welcome invitation to get the job done!

The sheer volume of information generated as a result of testing and surveillance presented a third challenge. The logistics of tracking submissions and results as they went to and from various laboratories became an arduous task. This was especially true in the early days of the outbreak. Over time, the process eventually became refined. Hence, the experience in Virginia should yield valuable guidelines for data management in future outbreaks.

Testing and Surveillance

Prior to the 2002 outbreak, Virginia was considered by many to have one of the more progressive AI surveillance programs in the US. Sera from every turkey flock processed in VA as well as those submitted for NPIP were tested by AGID. The problem with this approach became readily apparent when slaughter blood from a NC flock processed in Harrisonburg was found to be positive. It is believed that, crossover of human traffic between the slaughter plant and the first positive flock may have been the origin of the outbreak. By nature, slaughter blood is an "after the fact" method of surveillance that provides little real security especially if biosecurity is the least bit relaxed. An MOU between the industry and VDACS is currently under development, which specifies the use of "real-time" tests like Directigen and Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR) combined with antibody methods (like AGID) for screening of all commercial poultry prior to entry into Virginia. In the end however, the risk-benefit for such a programs will as always, depend on dollars (corporate and state).

During the outbreak, it was necessary to provide some reasonable assurance that poultry moving to slaughter were not shedding the virus (complete assurance would have been economically and logistically impossible). This was accomplished primarily through the use of the Directigen test. Tracheal swabs were tested at the VDACS lab or in-house by some integrators. Convenient and easy to run, the drawback to this assay is its sensitivity i.e., it requires fairly high levels (10^6 ID) to produce a positive reaction. Therefore, although Directigen was the best test available for this purpose, it may have provided a false sense of security. Some problems with false positives were also noted when tracheal swabs were obtained from moderately decomposed birds during the dead-bird surveillance program. RT-PCR, which was employed later in the outbreak, proved to be the most rapid and sensitive method for detection of actively shedding flocks. A formal analysis of the efficiency of various testing methods used by VDACS and USDA is underway.

Finally, confirmation of positive flocks using the "gold standard" i.e., VI, became an issue early in the outbreak due to sample backlog and turnaround time at NVSL. This was partially remedied by an influx of manpower and the use of RT-PCR. Ultimately however, the decision to depopulate was typically made based on 2 out of 4 tests being positive (Directigen, AGID, RT-PCR, VI).

Euthanasia and Dead Bird Disposal

As one might expect, euthanasia and disposal of 4.7 million birds was a major undertaking that stretched human and equipment resources to their limits. The industry is well aware of the controversy that surrounds issues like euthanasia. It therefore goes without saying that organizations like PETA were very attentive to what was happening in Virginia. Multiple variations of whole house CO₂ euthanasia were employed. These worked fairly well for chickens but were difficult to implement with large turkeys. In some instances, turkey integrators had to resort to CO₂ and clubbing to get the job done. This was a source of contention for the USDA and animal rights groups, especially when tired and discouraged employees were left to do the latter. On one occasion, an unauthorized visit by an "animal rights" person resulted in anonymous threats of "going public". Although these were apparently not acted on, the sensitiveness of the issue should prompt the industry to investigate more acceptable methods for euthanasia of large turkeys in particular.

The inability to bury birds on-site combined with the delay in resolving the landfill disposal issue may likely have contributed to the early, rapid spread of the disease. A conflict in missions between VDACS and VDEQ (both abiding by their public mandates) and was apparently the root of this problem. Therefore, one of the more important take-home lessons from the Virginia experience is that it is imperative to get disposal protocols and contingencies in writing with sign-off of appropriate state agencies and industry representatives long before a catastrophic need arises.

Other disposal methods such as composting and air-curtain incineration proved to be impractical and too costly when done on such a large scale. In-house composting was deemed unfeasible due to the amount of time (months) that it would tie-up facilities and therefore delay

repopulation. In the end, landfilling became the only tenable option, but finding enough locales willing to take large numbers of birds was not easy. Alternatives such as the use of Ag-Bags for composting or enzymatic bioremediation need to be investigated more fully.

Biosecurity

Rockingham Co., the heart of the SV, has the highest density of poultry production in the US. All tolled, the SV is home to approximately 1100 contract operations, affiliated with 2 turkey/turkey breeder complexes, 3 broiler/broiler breeder complexes, and 1 broiler breeder only complex which belong to 5 separate integrators. With AI, this mixture proved explosive.

Numerous industry personnel will vouch that biosecurity in the SV is better than most production areas in the US. This is particularly true of the turkey integrators, who have more recently had to deal with moderately contagious diseases like coronaviral enteritis. Yet in this outbreak, it appeared that a highly contagious agent could easily overwhelm good biosecurity practices, especially when the density of production is high, there are multiple ages present on farms e.g. turkeys, and different species of poultry are raised in the same area.

Although the general principles were the same, exact biosecurity programs varied from integrator to integrator. Most took immediate action in terms of keeping farm visits to a minimum, appropriate apparel, C&D of feed delivery and live haul equipment, etc. Among growers however, compliance was more of an issue. Some failed to see the connections between poultry and other agricultural operations e.g., beef and dairy. Consequently, spread via farm vehicles, equipment, and personnel probably occurred. Some growers were also observed violating the moratorium on dead bird rendering, which proved to be one of the more high-risk practices. Ultimately, attitudes of despair and resignation seemed to effect even the most vigilant of growers and company personnel.

Biosecurity education and more regional uniformity in biosecurity practices will be some of the important issues to address in the future. The MOU currently under development by the VPF and VDACS will hopefully address these issues.

Indemnification

After the last major AI outbreak in 1983-84, many of the mid-Atlantic integrators opted for the establishment of an industry sponsored indemnity program. This was not the case in Virginia. Nor was there compensation available from the State due to a looming multi-billion dollar budget shortfall. Without the assurance of indemnification, some, especially the turkey integrators, questioned the reasonableness of a "test and destroy" eradication program for low path AI. The alternative of controlled slaughter following quarantine and a negative Directigen test was vigorously discussed, but the potential for the isolate to become highly pathogenic and a lack of hard data regarding the risks of controlled slaughter were issues that could ultimately not be ignored. Four and three quarter million birds and 130 million dollars later, the USDA finally approved indemnities totaling \$51 million. Any hope for a low path AI program in the US hinges on resolving the issues of federal indemnity vs. controlled slaughter and of course, stricter regulation of Live Bird Markets.

Vaccination

A final issue worth mentioning is that of vaccination. In other areas of the US (UT, MN) where non-H₇/H₅ isolates are a problem, vaccination has been approved as a means of control. Although the USDA approved use of an H₇ vaccine in Virginia, the industry at the national level felt that the negative effects on the chicken export market would outweigh the immediate substantive losses born by local integrators (especially turkey).

The use of AI vaccines is a controversial subject. Detractors of vaccination cite invalidation of sero-surveillance programs, limited success with vaccine-based eradication in Mexico and Italy, and concerns over potential masking of high path viruses. Proponents highlight the effectiveness of vaccines with regard to the prevention of clinical disease, the worldwide distribution of the virus, and as such, the ludicrous nature of export restrictions being tied to vaccine usage. Vaccination would likely have saved turkey and broiler breeder operations in Virginia, but when all the ramifications are considered, it's apparent that the answer is just not as simple as that.

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