

DISPOSAL CHALLENGES DURING AN AVIAN INFLUENZA OUTBREAK

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Introduction:

The Fraser Valley of British Columbia, Canada, has been subject to three outbreaks of avian influenza in 2004, 2005, and 2009. The 2004 outbreak was by far the most severe involving a highly pathogenic strain of avian influenza (subtype H7N3). Ultimately, 42 commercial poultry farms were identified as an infected premise, accounting for approximately 1.2 million birds. In total, more than 17 million birds were culled or sent to market, representing 90% of the commercial production (Bowes, 2007). Lessons learned from the 2004 event were applied to subsequent events in 2005 and 2009, events which were much smaller in scale, affecting only two to three farms in each case and involving low pathogenic strains of avian influenza.

This paper focuses on the 2004 event and the disposal challenges associated with disposing of a large number of poultry mortalities in a very short period of time.

Disposal Challenges:

The nature of the 2004 outbreak created significant challenges for industry and the various government agencies involved in the response. Some of the specific challenges are identified below:

- Jurisdictional roles: While the Canadian Food Inspection Agency (CFIA) had the delegated role of leading the destruction response, the BC Ministry of Agriculture and Lands (MAL) had staff with local knowledge and expertise.
- The disease outbreak began slowly. There was a 20 day lag between the detection of avian influenza on the first and second premises. Because government agencies were only dealing with one farm, initial staff involvement was small and was dedicated to resolving the disposal challenges of the index farm, not planning for disposal challenges on eventually infected farms.
- Producer cooperation in identifying a disposal solution. For the index farm, the initial request to government was to assist getting the dead birds off the farm as quickly as possible so he could resume business. This was in contrast to disease control expertise, which suggested the best way to minimize disease transfer was to process the mortalities on the site where they died.
- Lack of disposal protocols. The Government of British Columbia did not have any signed off protocols for mortality disposal in case of an avian influenza outbreak.
- Overabundance of options. As the disease outbreak expanded, the Ministry of Agriculture and Lands was overwhelmed with calls from individuals and companies offering potential disposal solutions. The evaluation of proposals was

somewhat politicized as some companies went directly to politicians with their ideas.

- Disposal needed to be done in a manner that was environmentally sound.
- Disposal needed to be done in a manner that minimized risks of further spreading of the disease.
- Many individuals participating in the disease response were not well-trained in the essentials of Emergency Management and particularly the Incident Command System. In particular, there was a lack of familiarity with the Foreign Animal Disease Emergency Support (FADES) Plan

Key Disposal Options Considered:

For farms infected with avian influenza, the only options given serious consideration were those proven to be effective in either destroying the virus or fully containing the virus. The key options considered were:

- Composting (on-farm or at central site)
- Incineration (on-farm or at other destination)
- Burial (at landfill)
- Heat Treatment (>64°C for 2.5 minutes, on-farm or other destination)

In considering options, various criteria were applied to select the most suitable option:

- Is the technology available on a commercial scale and is it technically feasible?
- Is the option cost effective?
- Is there adequate management competency to implement option?
- If the material is transported, is containment secure enough to avoid risk of disease spreading.
- If transported, will the receiving community “accept” material?
- Do all key stakeholders agree with this option?
- Does it comply with all applicable regulations?

Selection of Options:

With the index farmer pushing hard to have the mortalities moved off the premises, initial attention was given primarily to exploring landfills and incineration options. An option involving transportation was air-curtain burning of the mortalities at a mine reclamation site near Princeton (approximately 200 km east of the affected area). The system involves burning a mix of carcasses and dry firewood in a pit ventilated with high output fans. Ultimately, over 200,000 carcasses from infected premises were destroyed using this method. A further 37,000 birds were incinerated at the Burnaby Incinerator, located within Metro Vancouver. Use of this facility met some local opposition. There were also some technical challenges related to the infrastructure of the incinerator and further complications related to risks of transporting infected material through an urban area. As a result, this option was not pursued further.

Various landfill options were considered. Cache Creek is located approximately 200 km north of the affected area and is home to a large landfill that accepts municipal waste from Metro Vancouver. This facility was considered a suitable landfill location but local

opposition was strong and the option was not pursued. The Chilliwack landfill (located on the eastern end of the affected area) was also deemed a suitable location and did not receive significant local opposition. Protocols were developed for transporting and landfilling infected material, and approximately 172,000 carcasses were disposed of at this site. However, by April 15, 2004, the Chilliwack landfill had reached its capacity in the cell designated for poultry carcasses and other options were pursued.

The CFIA worked diligently in partnership with MAL to finalize protocols for on-farm composting. These protocols involved two stages of composting. The first phase was conducted in the barn and was deemed complete when the compost piles met the time and temperature requirements established by the CFIA to eliminate the virus from the compost. Composting was done by creating windrows in the barn that included a mix of dead birds, poultry litter, and bedding. Once stage one was completed, the compost was generally moved outside and placed in a new windrow for further composting and curing. Over 500,000 birds from infected premises were disposed of by composting.

As the outbreak progressed, it reached a point where there were fears it was out of control. At a meeting held on April 11, 2004, CFIA officials requested that other agencies and industry prepare for 100 new positive farms within the next 10 days (Husdon and Elwell, 2004). This was a very stressful time for all involved. It quickly became clear that transportation of mortalities to alternative disposal sites was not the most viable option and that mortalities should be processed whenever possible on the farm where they died.

While poultry barns have many similarities from farm to farm, each farm has its own unique features. For some, composting was not an option. Therefore, individual solutions were decided on a case by case basis.

Rapid Cull of Non-Infected Premises:

As the disease spread and the severity increased, the Provincial Emergency Program was engaged and the adoption of an Incident Command System was implemented. With the goal of eradicating the disease as quickly as possible, a decision was made during the week of April 15, 2004 to rapidly cull the birds on all farms within a 3 km radius of farms declared as infected. A parallel decision was made to establish a central composting site for composting of birds from non-infected farms. It should be noted that as much as possible, meat birds from farms confirmed as non-infected were sent for regular slaughter if they were at or near slaughter weight.

In very short order, decisions were made about the location of the centralized composting site, the technology that would be involved, and the business partners that would be contracted to do the work. The system selected was aerated bag composting. The site selected was an agricultural field on an operating dairy farm. Material used for creating the compost mix included poultry mortalities, poultry litter, wood chips, and liquid dairy manure (primarily for moisture content).

While there were some local concerns about odour, the composting system worked quite effectively and odour risks were well managed. The aerated bags reached temperatures above 60°C within 48 hours and generally sustained temperatures above 50°C for 6 weeks (Paul, 2005).

A limitation of the technology selected was that the aeration system resulted in the core material within the bag drying out while material near the perimeter remained very moist. To produce quality compost, it was recommended to remove the material from the bags after four to six weeks and remix in a windrow. Monitoring of temperatures and fecal coliforms was part of the process after removal from the bags.

The key benefit of the centralized composting site was that it facilitated the rapid poultry cull of non-infected farms. Further spread of the disease stopped shortly after this action was taken.

Disposal Lessons Learned and Implemented for Future Emergencies

After the 2004 incident was completed, a significant effort was made to document lessons learned in hopes of applying recommendations for possible future events (Husdon and Elwell, 2004).

The key lessons learned in 2004 that apply directly or indirectly to disposal challenges are as follows:

1. **Prevention is critical.** Since 2004, the poultry industry has implemented mandatory biosecurity protocols to reduce the risk of disease entering a farm. No protocol is perfect but the protocols are a clear improvement over previous practices.
2. **Train staff in emergency management:** The CFIA is the lead agency in responding to a Foreign Animal Disease and regularly holds training exercises for their staff. MAL has also provided various training opportunities for staff. In addition, the 2005 and 2009 events provided real, albeit smaller, opportunities to apply emergency management practices. Rapid adoption of the Incident Command System has proven beneficial.
3. **Have a mortality disposal plan and specific disposal protocols in place.** The disposal responses in 2005 and 2009 were much more rapid, largely because of the draft protocols developed in 2004.
4. **Choose on-farm disposal solutions.** In an avian influenza outbreak, transportation of infected material should be avoided if possible. On-farm composting of mortalities has become the preferred option (CFIA, 2007).
5. **Work closely in partnership with industry.** An avian influenza event can be extremely stressful for all involved. Engaging and involving industry early in a response is critical. An affected farmer may listen more readily to recommendations from an industry peer than a government agent.
6. **Consider Centralized Composting in Extreme Outbreaks.** Utilization of a centralized composting site appears to have been an effective aid in the strategy to rapidly eradicate the disease by culling non-infected flocks.

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