THE ECONOMICS OF AVIAN INFLUENZA CONTROL

David Halvorson[A], Ilaria Capua[B], Carol Cardona[C], David Frame[D], Daniel Karunakaran[E], Stefano Marangon[B], Giovanni Ortali[F], Don Roepke[G] and Brian Woo-Ming[H]

[A]University of Minnesota, 1971 Commonwealth Ave, Saint Paul, Minnesota 55108
[B]Istituto Zooprofilattico Sperimentale delle Venezie, Via Romea 14/A, 35020, Legnaro, Padova, Italy
[C]Surge III Room 1383, University of California, Davis, California 95616
[D]245 East 300 North, Ephraim, Utah 84627
[E]Cargill Turkey Products, PO Box 158, Dayton, Virginia 22821
[F] A.I.A agricola italiana alimentare, San Martino Buon Albergo, Verona Italy
[G]Jennie-O Turkey Store, 2527 3 ¼ Fifth Street, Cumberland, Wisconsin 54829
[H]Longmont Foods, 16634 WCR #33, Platteville, Colorado 80651

Abstract

When large numbers of flocks get low pathogenic avian influenza (AI), different types of control programs have different costs associated with them. Costs of several large outbreaks are shown and compared. The difference in AI outbreak costs per flock from the least to the most expensive is over 100-fold. A new model for controlling AI, incorporating the best features of different control measures, is proposed. This model would draw from poultry industry and government expertise to quickly, cooperatively and cost-effectively stop AI outbreaks. The advantages of the proposed program are that it requires no unethical destruction of healthy birds, requires no costly disposal, is cost effective and puts more of the costs of control on the producers with infected birds.

Introduction

It is well accepted that "stamping out" of highly pathogenic avian influenza (HPAI) is a suitable method for control and eradication of this deadly disease. Protection of a national industry and protection of an export market are the major reasons for destruction and disposal of HPAI infected poultry. The costs associated with destruction and disposal of infected flocks can be great. Often there are other costs of even greater magnitude including lost markets, down time, etc. In 1999-2000 an outbreak of H7N1 HPAI in Italy resulted in $112 million in compensation for destroyed birds, but it was estimated that indirect costs exceeded $400 million for a total cost of over $512 million.

Low pathogenic avian influenza (LPAI) control methods have been more variable. Avian influenza (AI) has been introduced into the U.S. poultry industry over 100 times in the last 25 years and usually few flocks are involved in each outbreak. In Minnesota, where most U.S. introductions of AI have been recorded, a program of monitoring, biosecurity and controlled marketing has been employed. In other areas the index flocks have been destroyed. The costs of the two approaches are not large when small numbers of flocks are involved. In Minnesota the costs of the disease may be $2 per bird (or more) in a market turkey flock with additional cost for delaying placement of the next flock. In states where destruction is practiced the cost is going to be the bird value, or in the case of birds in egg production it will be bird value plus the impact of lost production. Thus, costs of destroying a flock will range from $1 or $2 per bird for broilers to more than $100 per bird for turkey breeders. In the past 15 months, destruction of flocks or eggs due to LPAI was implemented over 10 times in the U.S. (Maine, Michigan, Connecticut, Pennsylvania, New York, North Carolina, Virginia, California, Texas, Ohio).

However, sometimes large numbers of flocks are infected. There have been several notable outbreaks of LPAI that affected large numbers of poultry flocks: in 1978, 1988, 1991 and 1995 AI affected over 100 flocks of turkeys in Minnesota; in 1995 220 flocks of turkeys were affected in Utah; in 2000 – 2001 88 farms were affected in Italy; in 2000 – 2002 several flocks in California experienced AI; and in 2002 AI was found in Colorado and Virginia turkeys. The costs associated with those outbreaks are shown in Table 1. The difference in costs can be attributed to the species and type of birds infected, their age, flock size, as well as control methods employed, but most of the outbreaks involve turkeys.

Control

With expanding world-wide interest in LPAI, it seems likely that there is room for a new approach that would replace the old paradigm of destroy and dispose. A new paradigm could incorporate the desirable attributes of all successful programs: it should be effective; it should be rapid; it should be cost effective; and it should reward desired behavior.

Effectiveness. Actually all the LPAI control methods depend on biosecurity and have been shown to be effective in some situations and to be less than 100% effective in others. If applied correctly, all are demonstrably effective.

Speed. The Virginia 2002 LPAI outbreak, where destruction was employed, was controlled in 4 months. In the Utah 1995 LPAI outbreak, where vaccination & controlled marketing were employed, no new infected flocks were detected 6 weeks after vaccination was initiated. (Vaccine-induced antibody was present until the last vaccinated flock was marketed 10 weeks later.)

Cost effectiveness. According to the information in Table 1 the range in costs for LPAI and its control is from $4,000 per flock in the Italy 2001 outbreak where vaccination and controlled marketing were employed to $760,000 per flock in the Virginia 2002 outbreak where destruction was the primary control method.

Reward good behavior. One of the problems of some disease control programs is that the financial rewards go to those who fail to maintain healthy flocks. In stark contrast producers with healthy birds often find themselves caught in quarantine zones unable to move flocks, eggs or hatchlings. Because their birds are healthy they are ineligible for indemnity payments even though they suffer economic loss. This paradox sometimes causes extreme behavior by a producer who, in desperation, infects his birds to save his business. All LPAI control programs should be structured to reward producers for noninfected flocks.

A New Paradigm

Economics of LPAI control require us to examine the attributes of all control methods to determine how they could be combined to develop an effective and economical control program. Rather than having a loose ad hoc program managed by industry veterinarians or a tight program managed by APHIS veterinarians a hybrid cooperative organization should be formed. Once LPAI is detected aggressive, well-thought-out measures should be initiated by a group of industry and government veterinarians.

Biosecurity. First, all off farm movement of dead birds and manure should be halted area wide, and all off farm movement of live birds or eggs should be controlled as should movement of people and equipment.

Processing. A program of processing all virus negative (antibody positive or negative) meat birds of marketable age in the area should begin.

Scheduling. Placement schedules should be interrupted. No placement of chicks or poults should be allowed and downtime should be extended for LPAI infected premises.

Vaccination. The group should assess whether long-lived birds need to be vaccinated. Layer (and breeder) replacements should be vaccinated twice before being moved to the layer facility. Meat birds should be vaccinated if deemed to be at risk (if they are moving from brooder farm to infected grower farm for example). Vaccinated flocks are under quarantine. It is imperative, however that vaccine is available for emergency use. Thus vaccine banks should be established.

Area repopulation. After no new infected flocks are detected for four weeks the outbreak may be nearly over, controlled repopulation may begin. When all flocks are virus negative the outbreak is over but antibody positive flocks remain under quarantine.

Cost. The costs of this program would be borne by the affected individuals and companies with government providing diagnostic and logistical support. Companies and individuals with infected birds would experience more of the costs than their noninfected counterparts. These costs would include the costs of mortality,

medication, condemnation, lost production, rescheduling and vaccination. People with noninfected flocks might experience the costs of rescheduling and vaccination. The greatest cost is the forced rescheduling which would be greater for infected than noninfected farms. For a 10,000 bird turkey house to remain empty for an extra week it would cost about $1600. So if it was vacant for an extra 6 weeks, that would be only $9,600 per flock – a far cry from the $760,000 per flock associated with the outbreak in Virginia.

Conclusion

Different types of low pathogenic avian influenza control programs have different costs associated with them. By incorporating the best features of different control programs it should be possible to develop a new integrated avian influenza control program that has a high probability of success at a reasonable cost. The advantages of the proposed program are that it requires no unethical destruction of healthy birds, requires no costly disposal, is cost effective and puts more of the costs of control on the producers with infected birds.

Table 1. Costs associated with large LPAI outbreaks.

Outbreak	Year	Serotype	Flocks	Cost*	Control**
Minnesota	1978	H6N1	141	$ 13.9 M	CM
Minnesota	1988	H2,H9N2	258	$ 5.1 M	CM
Minnesota	1991	Multiple	110	$ 1.3 M	CM
Minnesota	1995	H9N2	178	$ 7.4 M	CM
Utah	1995	H7N3	220	$ 2.6 M	Vac & CM
Italy	2000	H7N1	88	$ 10.3 M	Des & CM
			586	$ 2.6 M	Vac & CM
California	2000	H6N2	NA	NA	Vac & CM
Virginia	2002	H7N2	197	$149.0 M	Des & CM
Colorado	2002	H8N4	NA	NA	Vac & CM

*2002 dollars
** Biosecurity is assumed in all outbreaks, CM=controlled marketing, Vac=vaccination, Des=destruction
NA=not available, costs have not been calculated yet.

Presented at the Western Poultry Disease Conference, March, 2003