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308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorijps@gmail.com

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HPAI H5N1 in Europe 2007: Poultry and Wild Birds

Sigfrido Burgos[1,3] and Sergio A. Burgos[2]
[1]Food and Agriculture Organization of the United Nations, AGAL-PPLPI, Rome, Italy
[2]Department of Animal and Poultry Science, University of Guelph, Ontario, Canada

Abstract: There were 308 HPAI cases in wild birds, most of them in Germany and 13 HPAI outbreaks in poultry, with clear spatial and temporal infectious patterns. Grebes, swans, ducks, chickens and turkeys got most frequently infected. The United Kingdom, Czech Republic and Germany hosted many viral incursions.

Key words: HPAI H5N1, Europe, poultry, wild birds, avian influenza, bird flu

Introduction

Avian Influenza (AI), more commonly known as bird flu, is an acute, highly contagious viral disease that infects a wide range of domestic birds, wildfowl and shorebirds, but also many other species, including humans, pigs, horses, mink, felids and other mammals. AI can be divided into highly pathogenic (HPAI) and lowly pathogenic (LPAI) depending on its ability to cause disease symptoms and fatality. High mortality rates of 90 to 100% are seen in HPAI-infected poultry, whereas only profound morbidity and weight loss is seen in LPAI-infected birds. This virus replicate predominantly in the intestinal tract of hosts, is shed in faeces and is subsequently transmitted and maintained by faecal-oral routes (Burgos and Burgos, 2007).

Viral transmission has not only been confirmed in domestic fowl but also in birds of prey. For example, falcons shed high levels of infectious virus through the oropharynx and cloaca (Lierz *et al*., 2007), with many of these residing in central Europe. The close link between sizeable domestic waterfowl populations (i.e. ducks and geese) and poultry is one of the major underlying risk factors in HPAI outbreaks worldwide. Gilbert *et al*. (2006) has pointed out to the relationship between free-grazing ducks and HPAI in Thailand. Large numbers of duck raising systems are found in high density rice-growing areas such as China, Bangladesh, Indonesia and Vietnam. Large water bodies attract waterfowl. This may be the reason why all countries bordering the Black Sea -a wintering paradise for Siberian migratory birds - have reported HPAI outbreaks. Additionally, all these countries have significant waterfowl populations. Due to the transmission dynamics of this virus, confined poultry flocks are extremely susceptible to infections and die within days. Countries hosting HPAI report massive poultry losses in short time frames (Burgos, 2008).

The Asian lineage of HPAI was first isolated in geese in southern China in 1996 and has now successfully spread westward to Europe and Africa. This disease, like any other contagious epizootic animal disease, poses significant threats to animal and human health. In Europe, different poultry raising systems (particularly those at increased risk of viral introduction) are frequently tested serologically. If a positive finding arises, it is followed by thorough clinical, epidemiological and virological investigations. These efforts are complemented with passive surveillance of birds found dead and active wild bird surveillance of hunted and living bird species migrating from HPAI H5N1 endemic areas. A risk-based approach is employed.

To mitigate disease risk, European policy makers have approved stamping-out (culling of infected birds and those at risk of infection), manure application prohibitions, radial surveillance zones, thorough cleaning and disinfection of infected sites and movement restrictions of poultry and poultry products. In case culling occurs, there is a compensation scheme for farmers' losses. This article will focus on HPAI cases in poultry and wild birds in Europe for 2007 and its regional implications.

Evidence[1]: Temporal infectious patterns are shown in Fig. 1a, b. HPAI cases in wild birds occurred from June to August; in poultry from Nov to Feb and from May to July.

Species infected with HPAI are shown in Fig. 2 a, b. In wild birds, grebes, swans and ducks predominate. In poultry, both chickens and turkeys are almost equally infected.

Countries hosting HPAI are shown in Fig. 3 a, b. Most wild bird cases were found in Germany and some in France. In poultry, most outbreaks occurred in the United Kingdom, Czech Republic, Germany and single ones in Poland, Romania and Turkey.

Discussion

From above we can conclude that weather conditions (temperature and humidity) throughout 2007 played a role in the maintenance and persistence of HPAI in nature. Very similar conclusions regarding temporal infectious patterns have been reported in Thailand

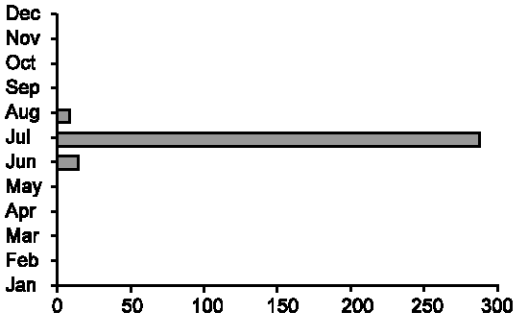

Fig. 1a: HPAI cases in wild birds by month, 2007

Fig. 1b: HPAI outbreaks in poultry by month, 2007

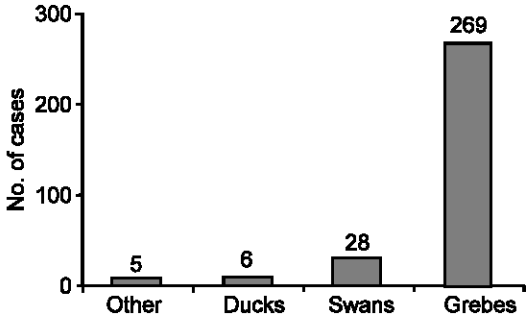

Fig. 2a: HPAI cases in wild birds by species, 2007

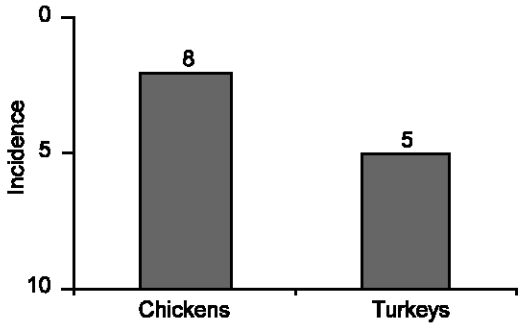

Fig. 2b: HPAI outbreaks in poultry by species, 2007

(Tiensin *et al.*, 2005), Vietnam (Pfeiffer *et al.*, 2007) and China (Liu *et al.*, 2007). In general, HPAI outbreaks occur shortly after temperature drops ensues.

Grebes grabbed the spotlight in 2007 as compared to swans in 2006. Both, chicken and ducks were almost equally infected in poultry raising systems, further providing evidence that these two species are highly susceptible to HPAI (Capua *et al.*, 2000). The United Kingdom reported the most HPAI outbreaks in poultry and this may be due to elevated numbers of confined animal feeding operations in Southeast UK and imports of chicken, turkey and goose meat from other European countries (i.e. Hungary). On the other hand, Germany had most of wild bird HPAI cases and two confirmed outbreaks in poultry for 2007. In 2006, Germany and Austria led the way.

It is now widely accepted that wild birds, ducks and geese are natural reservoirs of HPAI (Hinshaw *et al.*, 1980; Tumpey *et al.*, 2002; Webster *et al.*, 2002), with most remaining asymptomatic. This has been corroborated in Germany, where apparently healthy domestic duck populations may be propagating HPAI-H5N1 among neighbouring poultry populations. The presence of virus in German duck farms proceeded unobserved because ducks had shown no clinical signs of disease. Due to these peculiarities, European countries established a 3-km control area and a 10-km monitoring area to detect HPAI in wild birds. Bio-security and disease awareness is repeatedly stressed. Also, it is suggested that all poultry be kept indoors. Zoos receive preventive vaccinations and if HPAI is suspected, it is reported immediately to competent authorities. Outbreaks of disease are formally reported to the European Commission via the Animal Disease Notification System (Pittman *et al.*, 2007).

Although geese did not play a significant role in 2007, it has done so in the past. Capua and Mutinelli (2001) confirm that geese contract AI; however some display clear signs of infection, but most do not. Moreover, the delayed diagnosis of HPAI - H5N1 in Hungarian geese indicates that it went unnoticed and may have resulted in onward viral transmission to the UK via frozen goose meat shipments. This is perhaps why surveillance of dead wild birds provides an excellent warning system that the virus is in circulation in a specific region. Anecdotal reports suggest that disease incidence is related to prolonged chilly winter movements of wild birds from Eastern Europe; if this is the case, then survey-based identification of resident and migrating birds might prove useful in determining spatial movements of viral carriers.

Research demonstrates susceptibility differences between domestic ducks and mute swans; the latter having greater susceptibility to lethal infection. Mute swans could therefore serve as natural disease sentinels because HPAI kills them fast and are big enough birds to be easily seen and found (FAO, 2007). De Marco *et al.* (2003) argues that some waterfowl

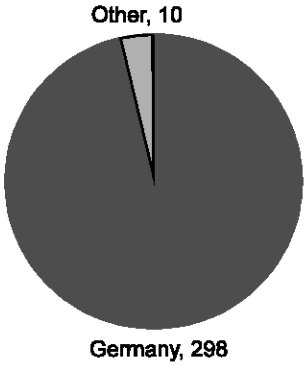

Fig. 3a: HPAI cases in wild bird by country, 2007

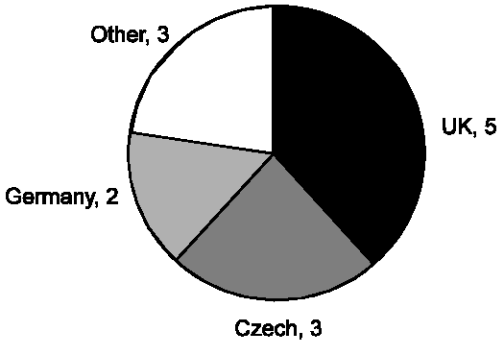

Fig. 3b: HPAI Outbreaks in Poultry by country,2007

species can shed virus for up to 5 days before displaying disease symptoms, suggesting that these birds can potentially spread virus within limited areas without being long-term reservoirs of this virus. Because HPAI - H5N1 viral loads seem to become amplified in poultry production systems (Gilchrist *et al.*, 2007) and then spill over into wildlife, this might result in increased wild bird mortalities and local disease dispersion. By palliating or mitigating viral incursions in poultry raising units throughout Europe, this, in theory, should result in fewer wild bird infections and an overall reduced viral load circulation in the Euro-zone.

Concluding Remarks: It is fair to stress that HPAI is primarily a poultry disease with wild birds undoubtedly playing a role in its epidemiology. Control and management measures should be focused on behavioural changes and marketing practices, taking into consideration the social dimensions livestock diseases have in many people's livelihoods. Having said this, assistance to develop risk diversification options (i.e. beekeeping, small herbivore raising and handicrafts) appears more promising to reduce HPAI-related economic impacts than compensation for poultry losses (Roland - Holst *et al.*, 2008).

The combination of relatively favourable weather, large water bodies, significant waterfowl populations, migratory birds and concentrated poultry raising operations expose Europe to repetitive epidemic waves and this warrants increased reporting incentives for farmer, enhanced surveillance, monitoring and early warnings. Evidence - based recognition of main risk factors has now raised awareness of the importance of active and passive surveillance in poultry and wild birds, thus allowing veterinary officials to modulate prevention and control measures according to their overall relative importance without engaging in panic-fueled reactions. Since domestic ducks, swans and geese play a critical role in the persistence of HPAI - H5N1 in many regions of the world; special emphasis should be placed on easier and faster sampling techniques, refinement of target species, dead bird sampling and proper identification of resident and migrating bird species. Because it is very challenging to determine further disease evolution, European states should continuously review their already established surveillance and control programmes based on incoming field reports and updated epidemiological findings.

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Disclaimer[3]**:** Mr Sigfrido Burgos is an international research consultant with FAO. Ideas expressed in this article represent solely his personal opinions and views and are not necessarily endorsed by the international organization that currently employs him.

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[1]The results presented herewith were collected and compiled from several sources:

1. Emergency Prevention System (EMPRES) at the Food and Agriculture Organization (FAO),
2. Animal Disease Notification System (ADNS) at the European Commission,
3. World Animal Health Information Database (WAHID) Interface at the World Organization for Animal Health (OIE).