



Surveillance of Influenza Viruses in Waterfowl Used As Decoys in Andalusia, Spain

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Abstract

A longitudinal study was carried out to determine the seroprevalence of avian influenza viruses (AIVs) in waterfowl used as decoys in Andalusia, southern Spain. A total of 2319 aquatic birds from 193 flocks were analyzed before and after the hunting season 2011–2012. In the first sampling, 403 out of 2319 (18.0%, CI_{95%}: 15.8–19.0) decoys showed antibodies against AIVs by ELISA. The AI seroprevalence was significantly higher in geese (21.0%) than in ducks (11.7%) ($P < 0.001$). Besides, the spatial distribution of AIVs was not homogeneous as significant differences among regions were observed. The prevalence of antibodies against AIVs subtypes H5 and H7 were 1.1% and 0.3%, respectively, using hemagglutination inhibition test (HI). The overall and H5 seroprevalences slightly increased after the hunting period (to 19.2% and 1.4%, respectively), while the H7 seroprevalence remained at the same level (0.3%). The proportion of flocks infected by AIVs was 65.3%, while 11.2% and 4.9% of flocks were positive for H5 and H7, respectively. Viral shedding was not detected in any of the 47 samples positive by both ELISA and HI, tested by RRT-PCR. The individual incidence after the hunting season was 3.4%. The fact that 57 animals seroconverted, 15 of which were confirmed by HI (12 H5 and 3 H7), was indication of contact with AIVs during the hunting period. The results indicate that waterfowl used as decoys are frequently exposed to AIVs and may be potentially useful as sentinels for AIVs monitoring. The seroprevalence detected and the seropositivity against AIVs H5 and H7, suggest that decoys can act as reservoirs of AIVs, which may be of animal and public health concern.

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Introduction

Avian influenza viruses (AIVs) are among the most important emerging zoonotic pathogens worldwide, affecting a wide variety of avian and mammalian species, including humans [1]. Most strains of AIVs are low pathogenic (LPAIVs), causing minimal disease in infected animals. However, the H5 and H7 subtypes have implications for public and animal health owing to their potential to mutate to highly pathogenic viruses (HPAIVs), inducing severe disease and high mortality [2]. Public health relevance of AIVs is highlighted by the fact that the H5N1 subtype has caused, up to January 2014, 650 human cases, of which 386 died [3]. It emerged in Southern China in the 1990s, but it was not until the winter of 2005/2006 that spread westward, mainly via migratory birds, reaching Central Asia, Europe and Africa [4]. In March 2013, a novel reassortant AIV (H7N9) was identified in China [5], and has caused, up to January 2014, 251 human cases with 56 deaths [3]. Whether this variant may reach the wild bird population in Europe is difficult to predict, so in this context it is essential to maintain the European Union wild bird surveillance [6]. Wild aquatic birds, especially Charadriiformes and Anseriformes, are considered natural reservoirs of AIVs, and do not

usually develop clinical signs [2,7]. Waterfowl can play an important role in the transmission of LPAI and HPAI strains to poultry farms through long distances during migrations [8]. Besides, AIVs may also persist in the environment for long periods under appropriate conditions, favoring its transmission and maintenance between wild and domestic birds [9].

Due to the strategic location on the migratory flyway of wild birds between Eurasia and Africa, the high number of wetlands and the diversity of wild bird species, Spain is considered a risk area for HPAIVs introduction [10]. Since 2004, a National Avian Influenza Surveillance program has been implemented to determine the incidence of H5 and H7 subtypes of AIVs in wild and domestic birds in Spain. To date, four outbreaks of AIVs have been reported in this country. In 2006, H5N1 strain of HPAIV was detected in a Great Crested Grebe (*Podiceps cristatus*) found dead in the Basque Country (Northern of Spain) [11]. Two outbreaks were detected in poultry in 2009, one of an H5N3 strain of LPAIV in a duck meat production farm in the Community of Navarra (Northern Spain) [12], and the second one associated to an H7N7 strain of HPAIV in a laying hen farm in Guadalajara (Central Spain), next to a wetland with high density of wild birds