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A description of the management of itinerant grazing ducks in the Mekong River Delta of Vietnam

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ABSTRACT

A cross-sectional survey of management practices of itinerant grazing ducks (known as field running ducks) was conducted during March 2008 in four districts of Can Tho and Bac Lieu provinces in the Mekong River Delta, Vietnam. The objective was to characterize the demographic structure of the itinerant grazing duck population and the management practices which might be related to the continuing outbreaks of H5N1 avian influenza in this region. Broiler duck flocks were owned by 55% of survey respondents, and layer flocks by 53%. Greater than 80% of ducks within 93% of villages and 99% of duck flocks were reported to have been vaccinated against H5N1 avian influenza, whereas only 19% of villages and 60% of chicken flocks had greater than 80% of chickens vaccinated. Fifty-nine percent of duck owners moved their ducks outside their home communes, whilst 37% and 28% of owners moved their ducks outside their home district and province, respectively. Larger flocks were more likely to be run outside their home district compared with smaller flocks. After adjusting for the effect of flock production type and district, the odds of an out-of-district field running duck flock movement was increased by a factor of 7.24 (95% CI 2.89–19.24) for households with flocks of more than 800 ducks, compared with flocks of less than 250. Most households sold ducks to traders (72%) or to neighbours (33%), whereas less than 20% sold their birds through markets. The findings of this study suggest that surveillance strategies for field running duck flocks should focus on layer flocks as well as larger flocks as they are more likely to be moved outside of their home district, facilitating long-distance disease spread.

1. Introduction

Waterfowl, including ducks, have been implicated in the maintenance and spread of avian influenza infections in domestic and wild bird populations. Tiensin et al. (2005) demonstrated that free-grazing ducks played an important role in maintenance and transmission of infections during the second wave of the highly pathogenic avian influenza (HPAI) epidemic in Thailand during 2004, concluding that controls measures were difficult to apply due to the way free-ranging ducks are managed. Free-ranging duck flocks were also suspected as a source of an HPAI H5N1 outbreaks in chickens which lead to human infection in Thailand in October 2005 (Songserm et al., 2006). Findings from an experimental study conducted by Keawcharoen et al. (2008) demonstrated that some wild duck species can act as a long-distance vector of H5N1 virus. Wild ducks can contribute to the perpetuation of avian influenza viruses and facilitate spread of disease to domestic ducks and

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other avian species. Results from a cross-sectional virological study conducted in Vietnam during 2001 showed that avian influenza A viruses of the H4N6, H5N2, and H9N3 subtypes were present in healthy ducks presented for sale in live bird markets in Hanoi (Nguyen et al., 2005). Results from an experiment conducted by Sturm-Ramirez et al. (2005) showed that HPAI H5N1 viruses causing minimal signs of disease in ducks can spread silently and efficiently among domestic and wild ducks in Asia. Since December 2006, HPAI outbreaks in Vietnam have mainly involved ducks (DAH, 2007; Minh et al., 2009) and it is suspected that the management of duck flocks may influence HPAI H5N1 transmission dynamics among poultry in Vietnam.

There are approximately 60 million domestic ducks distributed throughout Vietnam (Men, 2007). An estimate of the size of the duck population in the Mekong River Delta (MRD) is approximately 18 million. Ducks represent about 60% of domestic poultry in the delta, and the duck population in the delta makes up 30% of the total duck population in Vietnam. Although itinerant grazing duck flocks (known in Vietnam as field running ducks, FRD) represent only about 10% of the total number of duck flocks, they form 75% of the total duck population in Vietnam (VSF, 2006; Men, 2007). The remainder are raised in small flocks under various confinement systems. In this paper we use the term field running ducks (vịt chạy đồng) to refer to ducks that scavenge for feed in rice fields. The integrated rice-duck farming system is common in the MRD, which is the main area of rice production in Vietnam. FRD flocks form a key part of an efficient traditional integrated farming system, where ducks scavenge in rice fields following harvest to glean grains that fall to the ground during harvesting. A feature of FRD management, which has implications for the epidemiology of avian influenza, is that flocks can move within or between districts and/or provinces throughout the yearly production cycle to exploit readily available feed resources. Young ducks (<3 months of age) scavenge for insects and snails during rice growing periods as part of an integrated pest management system (Teo, 2001). Adult ducks (>3 months of age) are moved to rice fields after harvest to scavenge for leftover rice grains. Ducks can be walked or moved by boats and trucks to scavenging locations (Henning et al., 2009). Due to the presence of feed, post harvest rice fields may act as a meeting point for wild birds and domestic poultry (Gilbert et al., 2007), facilitating the spread of HPAI H5N1 viruses. In Vietnam, duck farming systems have recently been described in the Red River Delta (VSF, 2006) and the MRD (Men, 2007). However, demographic and movement patterns of FRD flocks have not been well defined from a disease management perspective. Henning et al. (2009) described management practices of moving duck flocks that travelled distances of more than 10 km in the MRD, concluding that the moving duck production system may pose a risk for avian influenza transmission.

We conducted a cross-sectional interview survey in two provinces of the MRD to describe details of FRD flocks and their management in relation to avian influenza transmission. Acknowledging the importance of FRDs in transmission of HPAI H5N1 in the country, our aim was to provide information about management systems and practices that might be used for future studies identifying risk factors for the disease transmission associated with FRD farming practices in the delta. A secondary objective was to use the survey data to identify characteristics of flocks (e.g. size, production type) that render them more likely to be run outside of their district of origin, and therefore potentially increase the risk of spreading infectious diseases such as avian influenza to new locations.

2. Materials and methods

A cross-sectional survey was conducted in March 2008 in two districts of Can Tho province (Vinh Thanh and Co Do) and two districts of Bac Lieu province (Phuoc Long and Vinh Loi) in the MRD of Vietnam (Fig. 1). The four districts were purposively selected as ongoing surveillance data showed that these districts had a history of HPAI outbreaks and they derived their main income from integrated duck-rice production (Tran D. Quy, personal communication).

Thirty villages were selected at random from the two selected districts in each province. Villages were selected from a list of villages that were known to keep FRDs. This information was obtained from the provincial offices of the Department of Animal Health and validated during a training workshop held in Can Tho province on 20 March 2008. The thirty villages included in the survey accounted for 17% and 37% of villages that kept FRDs in the selected districts of Can Tho and Bac Lieu provinces, respectively. In each village, an interviewer obtained a list of households that kept FRDs and randomly selected five households from that list using a table of random numbers. The headman ($n = 60$) from each village as well as five households from each village ($n = 300$) were selected for interview.

Two questionnaires were developed (copies are available from the corresponding author on request). One questionnaire targeted the village headman, the other targeted individual households. The village headman and household questionnaire included 36 and 50 questions, respectively. Both questionnaires included sections on general information, poultry production, aspects of FRD management, biosecurity (for example the frequency and amount of contact a flock was permitted to have with other poultry and/or traders) and attitudes to avian influenza. The questionnaires were tested in two pilot villages in March 2008 and subsequently refined. Sixteen trained district and provincial veterinarians conducted the interviews. All contacted respondents agreed to participate in the survey.

Duck flock sizes were stratified into quartiles. Survey respondents were requested to express the timing of events at the lunar month level (the lunar calendar being the most commonly used measure of date in Vietnam). These were then converted to solar months at the time of data entry, with a solar month being approximately 30 days prior to the corresponding lunar month. Throughout this paper time is expressed in the solar calendar format. Movements of ducks were classified into two categories: those running only within their home district and those running outside. A district in the MRD occupies a median