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Key role of *Chlamydophila psittaci* on Belgian turkey farms in association with other respiratory pathogens

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Abstract

Two hundred turkey sera from eight Belgian and two French farms were tested for the presence of antibodies against avian pneumovirus (APV), *Ornithobacterium rhinotracheale* (ORT), *Mycoplasma gallisepticum*, *Mycoplasma meleagridis* and *Chlamydophila psittaci*. At slaughter, *C. psittaci*, APV and ORT antibodies were detected in 94, 34 and 6.5% of the turkeys, respectively. No antibodies against *M. gallisepticum* or *M. meleagridis* were present. Additionally, turkeys on three Belgian farms were examined from production onset until slaughter using both serology and antigen or gene detection. All farms experienced two *C. psittaci* infection waves, at 3–6 and 8–12 weeks of age. Each first infection wave was closely followed by an ORT infection starting at the age of 6–8 weeks, which was still detectable when the second *C. psittaci* infection waves started. Animals on farm A were not vaccinated against APV leading to an APV subtype B outbreak accompanying the first *C. psittaci* infection wave. Despite subtype A APV vaccination on farms B and C, the second *C. psittaci* infection waves were accompanied (farm B) or followed (farm C) by a subtype B APV infection. On all farms respiratory signs always appeared together with a proven *C. psittaci*, APV and/or ORT infection. This study suggests an association between *C. psittaci*, APV and ORT, and indicates the multi-factorial aetiology of respiratory infections in commercial turkeys. All three pathogens should be considered when developing prevention strategies for respiratory disease.

Keywords: *Chlamydophila psittaci*; Seroprevalence; Avian pneumovirus; *Ornithobacterium rhinotracheale*

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1. Introduction

All European turkey flocks experience one or more periods of respiratory disease resulting in major economical problems due to expensive antibiotic treatments, loss of weight and carcass condemnation at slaughter (Hall et al., 1975). Several etiological agents like avian pneumovirus (APV), *Escherichia coli*, *Ornithobacterium rhinotracheale* (ORT), *Mycoplasma* spp. and *Chlamydophila psittaci* have been described to be involved in respiratory distress (Vandamme et al., 1994; Vanrompay et al., 1997; Van de Zande et al., 1997; Dho-Moulin and Fairbrother, 1999).

Like in most turkey-producing countries, APV subtypes A and B infections highly prevalent in Belgium, causing mild to unapparent clinical infections (Van de Zande et al., 1998). However, this primary pathogen is economically important as it allows *E. coli*, Newcastle disease virus, *Bordetella avium*, *Mycoplasma gallisepticum* and ORT to colonize the respiratory tract, resulting in severe clinical signs and mortality (Naylor et al., 1992; Van Empel et al., 1996; Van de Zande et al., 2001; Turpin et al., 2002).

ORT, especially serotypes A and B, are highly prevalent in turkey-producing countries (Van Empel and Hafez, 1999). Several experimental infections have demonstrated the potential complicating role of ORT in respiratory disease (Van Empel et al., 1996; Droual and Chin, 1997) and recently ORT has been described as primary pathogen in both broilers and turkeys (van Veen et al., 2000; Van Empel, personal communication).

Turkey pathogens *M. gallisepticum* and *M. meleagridis* can cause respiratory disease (Levisohn and Kleven, 2000). Interactions between *M. gallisepticum* and Newcastle disease virus, infectious bronchitis virus, *Haemophilus paragallinarum* and adenovirus in experimentally infected chickens have been documented (reviewed in Kleven, 1998). Similar interactions between *M. meleagridis* and *E. coli* or *M. synoviae* are also reported (Saif et al., 1970).

Chlamydia psittaci, recently reclassified as *Chlamydophila psittaci*, is a primary respiratory pathogen, although often only regarded as a complicating agent (Everett et al., 1999). In the past, severe respiratory outbreaks have stressed the importance of *C. psittaci* as turkey pathogen (reviewed in Andersen and Vanrompay, 2003). In the USA, serovars A–E have been isolated from turkeys, whereas in Europe only serovars B and D have been discovered so far (Andersen, 1997; Vanrompay et al., 1997). Vanrompay et al. (1994) demonstrated differences in virulence for strains belonging to serovars A, B and D (1994). Strangely, *C. psittaci* is nowadays most often neglected as etiological agent in outbreaks of respiratory disease in turkeys. This is perhaps not surprising as diagnosis of infection with this obligate intracellular bacterium is difficult and handling of this zoonotic agent requires special biohazard laboratory conditions.

C. psittaci infections are highly prevalent on Belgian and German turkey farms (Vanrompay et al., 1997; Hafez et al., 1998a,b). Although *C. psittaci* seems to be present on European turkey farms, its role in the respiratory disease complex is unclear and needs to be clarified. The present study tries to contribute to this clarification by examining slaughterhouse sera for the presence of the 'major' respiratory pathogens APV, ORT, *M. gallisepticum*, *M. meleagridis* and *C. psittaci*. Additionally, a longitudinal study was performed on three Belgian turkey farms in order to elucidate the kinetics of these infections from production onset until slaughter.

2. Materials and methods

2.1. Farms and management schedule

In the fall of 2001, 200 turkeys from 10 different farms in Belgium (eight farms) or in northern France (two farms) were examined at slaughter for the presence of serum antibodies against APV, ORT, *M. gallisepticum*, *M. meleagridis* and *C. psittaci*. All turkeys were vaccinated against Newcastle disease (NCD) at the age of 1 day using a live-spray vaccine (Nobilis® ND LaSota; Intervet International, Boxmeer, The Netherlands) and at 3 weeks via drinking water. In 7 out of the 10 farms animals had also been vaccinated against APV using live vaccine based on a subtype A strain (Nobilis® RTV; Intervet International, Boxmeer, The Netherlands). APV vaccination was performed at 1 or 2 weeks of age and repeated once between 3 and 6 weeks of age via drinking water.