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Mini Review

# *Chlamydia psittaci* Infection in Turkeys: A Review

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## Abstract

Avian chlamydiosis is a usually systemic disease of birds that caused by *Chlamydia psittaci*. Infections with *C. psittaci* were detected in most animal species and human. In poultry, turkeys and ducks are most susceptible, but several studies showed also a high prevalence of infection in chickens too.

Infections in turkeys are associated with severe respiratory disease conditions, however, latent infection are common. Infected birds regardless of clinical history can shed *Chlamydia* in high concentration and constitute potential reservoirs of infection for further birds and human.

Clinical signs in turkeys indicate a systemic disease involving the respiratory and digestive tract. These include general depression and reduced feed consumption, which will lead to cachexia in severe chronic cases. Morbidity after infection with virulent strains can go up to 80 %, with less virulent strains only up to 20 %. Mortality can be up to 30 % and 5 %, respectively. Egg production in turkey hens can drop up to 20 %. Several outbreaks have been reported in turkey farms in the USA, France, Germany, The Netherlands and Belgium. In addition, many reports on *Chlamydia* infection (Ornithosis) by workers of turkey as well as chicken processing plants were published. The interaction between *C. psittaci* and other pathogens especially avian metapneumovirus (AmPV) and *Ornithobacterium rhinotracheale* (ORT) in respiratory diseases complex in turkey could be demonstrated.

Humans could infected via inhalation of aerosols, when handling infected birds. Veterinarians are also at risk when visiting poultry houses with infected birds or when doing post-mortem on them. Other professions at risk are poultry farmers, workers in processing plants and laboratory staff.

***Keywords:*** *Chlamydophila psittaci; Avian Metapneumovirus (AmPV); Ornithobacterium rhinotracheale (ORT)*

## Introduction

*Chlamydophila psittaci* (*C. psittaci*) is recognised worldwide in most animal species and humans. Infected individuals regardless of clinical history can shed *Chlamydia* in high concentrations and constitute potential reservoirs of infection for humans and poultry. Humans become infected through inhalation of aerosolized bacteria when exposed to infected birds or handling contaminated feathers, faecal material or carcasses [1]. Even transient exposure to infected birds and/or a contaminated environment can result in human infection Knittler and Sachse [2]. The farm personnel and persons working in slaughterhouses are at risk. In poultry, turkeys and ducks are most susceptible, but recent studies show that there is also a high prevalence of infection in chickens.

## Aetiology

*Chlamydia* have a gram-negative cell wall. They are obligatory intracellular and during different stages of their life cycle they take one of three different morphological forms [3]. Using-serovar-specific monoclonal antibodies or restriction fragment length analysis of the outer membrane protein 1 (omp 1) gene; Avian *C. psittaci* strains are classified into 5 distinct serovars designated A to E and into 6 distinct genotypes designated A to F, respectively. Genotype A occurring in psittacine birds; B in pigeons; C in ducks and geese; D in turkeys; E in pigeons, ducks and others; E/B in ducks; F in parakeets [4]. In practice, it is more realistic to refer to host predilection rather than host specificity of the genotypes in order to account for quite a few exceptions [2].

Several outbreaks have been reported in turkey farms in several countries. The infection is not always associated with clinical signs, so that *C. psittaci* antigen as well as antibodies could be detected in apparently healthy turkeys [5-8].

The infection spread horizontally via inhalation of infectious agent infection and /or by the faecal-oral route is also possible. Mites and flies might serve as vectors, but probably are of little importance. In addition, vertical transmission should be considered since *C. psittaci* was isolated from hatching turkey eggs. In turkey breeder flocks in Israel showing high embryonic mortality, *C. psittaci* was isolated as a sole pathogen. The agent was isolated from fertile eggs and from 1-day-old poults indicating that the infection already existed in the embryo [9]. In the past, egg transmission of *C. psittaci* was considered to be rare in birds and experiments conducted in turkey flocks in the late 50's failed to support vertical transmission. In contrast, ducks, parakeets, sea gulls, snow geese and chickens are considered to be vertical shedders of *C. psittaci* [10].

The course of disease is mostly determined by the combination of host species and infecting *Chlamydia* strain. Incubation time also depends on the virulence of the strain; it can be as short as 5 - 10 days for virulent strains but up to eight weeks after infection with strains with lower virulence. Additionally, younger birds tend to be more susceptible than older ones.

Clinical signs in turkeys indicate a systemic disease involving the respiratory and digestive tract. They include general depression and reduced feed consumption, which will lead to cachexia in severe chronic cases. Respiratory signs are characterized by conjunctivitis, nasal and ocular discharge and laboured breathing. The nasal gland can be swollen and form a noticeable bump over the eye, which might be the only clinical sign. Yellow-green, gelatinous diarrhea shows involvement of the digestive tract. Morbidity after infection with virulent strains can go up to 80%, with less virulent strains only up to 20%. Mortality can be up to 30% and 5%, respectively. Egg production in turkey hens can drop up to 20%.

Latent infection are also common and infected birds regardless of clinical history can shed *Chlamydia* in high concentration and constitute potential reservoirs of infection for further birds and human.

Gross lesions are polyserositis, which is characterized by fibrinous exudate filling the air sacs and covering heart, liver and spleen. The lungs are dark red and congested. The swollen spleen is softer than usual and can be mottled and the enlarged liver is friable and greenish discoloured. In the acute stage, birds also have catarrhal enteritis [11].

A quick method to substantiate a presumptive diagnosis is staining impression smears of livers, spleens or the exudate. Recommended stains include Giemsa stain. For isolation or detection by PCR. In live birds, conjunctival, choanal and cloacal swabs are suitable from dead birds; all organs with lesions can be sampled for isolation and/or detection by PCR [12,13].

The interaction between *C. psittaci* and other pathogens especially avian metapneumovirus (AmPV) and *Ornithobacterium rhinotracheale* (ORT) in respiratory diseases complex in turkey were published. The studies clearly demonstrate the exacerbating role of AmPV and ORT during acute *C. psittaci* infection, which can play an important role in the respiratory disease complex of turkeys [14,15]. When avian chlamydiosis is suspected, rigorous safety precautions in accordance with local regulations have to be taken to avoid infection of

pathologists and laboratory staff. Beside general hygienic measures and governmental regulations, therapy using chlortetracycline (CTC) and/or enrofloxacin reduce shedding and mortality. However, Control of avian chlamydiosis has to rely on preventing the introduction of the causative agents into flocks. Among the common biosecurity measures, preventing contact with wild birds, especially pigeons that are reservoirs of *Chlamydia*, is most important. Flocks with outdoor-access are at special risk [16]. Commercial vaccines against *Chlamydia* are not available and attempts to develop a vaccine were remarkably unsuccessful. Recently a herpesvirus of turkeys (HVT) vectored recombinant vaccine was shown to provide partial protection for experimentally infected chickens [17].

## Conclusion

*Chlamydia psittaci* infections are circulating in most animal species. In poultry, turkeys and ducks are most susceptible, but several studies showed also a high prevalence of infection in chickens too. Infected birds can shed *Chlamydia* in high concentration and constitute potential reservoirs of infection for birds and human. Humans could infected via inhalation of aerosols, when handling infected birds. Veterinarians are also at risk when visiting poultry houses with infected birds or when doing post-mortem on them. Other professions at risk are poultry farmers, workers in processing plants and laboratory staff. In general, the control should be based sound biosecurity to prevent the introduction and spread of the infection.

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