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Short Communication

Epidemiological situation of turkey coryza (*bordetellosis*) in Poland

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Abstract

The present study investigated the prevalence of *Bordetella avium* (BA) infections in turkey flocks of different production type in Poland, based on serological examination of blood samples collected between 2012 and 2014. The results of our study indicate that BA infections are very common in turkey flocks, they are possible during the whole production cycle and that probability of the past infection increases with age. This situation is causing high level of specific anti-BA maternally derived antibody transfer to hatching poults.

Key words: turkeys, *Bordetella avium*, prevalence

Introduction

Bordetella avium (BA) is a causative agent of *bordetellosis* (also known as turkey coryza) – highly infectious disease of upper respiratory tract of turkeys (other birds species are less susceptible), causing great loss to poultry production worldwide, which is characterized by high morbidity (up to 100%) and relatively low mortality (Jackwood et al. 1995, Rumińska and Koncicki 1999, Jackwood and Saif 2008). Different strains of BA are known to produce toxins (i.a. endotoxin, tracheal cytotoxin, heat-stable dermonecrotic toxin and osteotoxin) as well as hemagglutinine which are involved in pathogenesis of the disease (Rumińska and Koncicki 1999).

Since no studies into epidemiological situation of BA infections of turkeys in Poland have been conducted so far, the aim of our study was to evaluate this situation in Polish flocks.

Material and Methods

The studies were carried out with blood samples from breeder and broiler turkeys of different age, collected between 2012 and 2014. The birds originated from 87 flocks. Serum samples were stored at -20°C until analysis.

Serological examination of serum samples was performed with the use of commercial ELISA kit specific for detection of turkeys anti-BA antibodies (ProFlok BA-T kit, Synbiotics Corporation, Canada) according to manufacturer instructions. ELISA was carried out with the use of the Eppendorf epMotion 5075 LH automated pipetting station (Eppendorf, Germany), BioTek ELx405 automatic plate washer and BioTek ELx800 plate reader (BioTek, USA). Regardless of birds' production type the results are presented for different age groups which represent the level of maternally derived antibodies (MDA)

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Table 1. Results of serological examination of 3+ week old turkeys.

Year	Birds age (weeks)	Number of flocks	Number of serum samples	% of positive samples	Mean anti-BA IgY titer (per flock)
2012	3-7	3	56	0	0
	8-22	14	316	44	3096
	23+	5	113	100	7955
2013	3-7	5	113	16.8	76
	8-22	19	449	77.5	3605
	23+	15	317	99.6	4425
	3-7	nd.	nd.	nd.	nd.
	8-22	7	156	57.05	897
	23+	9	181	100	16125
Total:		77	1701		

Abbreviations: nd. – not done

Table 2. Results of serological examination of day-old turkeys.

Number of flocks	Number of serum samples	% of positive samples	Mean anti-BA IgY titer (per flock)
10	214	34.3% (mean)	1783
	min.	0% (2 flocks)	0 (2 flocks)
	max.	100% (1 flock)	8817 (1 flock)

(day-old poults) early rearing (3-7 weeks), late rearing or fattening of meat type turkeys (7-22) and egg production stage (23+).

Results and Discussion

The results of serological examination are summarized in Table 1 (for 3+ week old birds) and table 2 (for one day old poults). From the data presented in Table 1 it maybe concluded that regardless of the year, both the percentage of positive serum samples for anti-BA IgY antibodies and mean titers increased with birds age, which indicates that BA infections are very common in Polish turkey flocks, they are possible during the whole production cycle and that probability of past infection increases with age. It is worth to emphasize that blood samples were collected from birds that displayed health disorders and from clinically healthy turkeys (regardless of birds' age).

Considering the results of serological examination of samples collected from breeder flocks (23+ weeks) it was predictable that those antibodies would be transmitted to progeny which in general reflects the results presented in Table 2. Hinz et al. (1981), as well as Rimler and Kunkle (1997), demonstrated previously that birds with passive humoral immunity are protected against clinical signs after experimental infection with BA. Taking into account the results of our

study we may conclude that Polish turkey poults are well protected by MDA against clinical form of BA in the first weeks after hatch. On the other hand, Rimler and Kunkle (1997) reported that passively transferred antibodies do not protect from the possibility of colonization of the trachea by BA. Additionally, Śmiatek et al. (2014) demonstrated that 3 week old healthy turkeys are likely to be infected sub-clinically with BA (with negative results for BA genetic material determined in choanal swabs with PCR technique), and that this bacteria (as secondary pathogen) is likely to exacerbate the course of viral infections. Additionally, it has been reported that immunosuppressive viral infections of birds enhance the pathogenicity of BA (Liang et al. 2013).

Bordetella avium was demonstrated not to be transmitted vertically, but the survival of BA for at least 6 months in undisturbed damp litter has been reported (Jackwood and Saif 2008), which contributes to epidemiological situation of BA infection in turkey flocks. The above data indicate the role of biosecurity measures in the control of turkey coryza.

A live vaccine containing a chemically induced mutant of BA has been registered in several countries. The results of our study rises the question whether is it appropriate to implement this vaccine in vaccination strategies of turkeys' flocks in Poland. Considering the fact that vaccine producers instruct to vaccinate one day old turkeys (with revaccination at

14 days of life) the legitimate registration of this vaccine should be based on the research into the influence of anti-BA MDA on post vaccination immunity development and protection against BA infection. On the other hand, considering the fact that the results for separate flocks of day old turkeys were highly variable (table 2) the development of inactivated vaccine against BA for use in breeder flocks, in order to increase and uniform the level of MDA transmitted to progeny seems like a promising idea that could contribute as one of key elements in BA infections control strategy.

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