

Influence of vaccination scheme and administration route of an Avian Encephalomyelitis vaccine on humoral immune response in turkey breeders

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Most turkey flocks experience exposure to Avian Encephalomyelitis virus (AEV). Vaccination of breeder flocks is carried out to assure that all progeny receive maternal antibodies. There are several vaccines registered for chickens but none for turkeys. The mode of application of these vaccines in turkeys is following vaccination schemes based on the well characterized humoral immune response in chickens. The aim of this study was to set up an appropriate vaccination scheme for turkeys. Turkey breeders were either vaccinated at 22 weeks of age with a booster vaccination at 25 weeks of age or at the age of 16 and 23, and 9 and 23 weeks respectively with a commercial AE vaccine. The antibody response was measured by an enzyme-linked immunosorbent assay (ELISA). First vaccination at 22 or 16 weeks of age resulted in a late onset of antibodies with low titers for a short period, whereas vaccination at 9 and 23 weeks induced antibodies approximately 10 weeks earlier, with higher and uniformly distributed titers. One group was chosen for further experiments on the different administration routes. Vaccine application after withdrawal of drinking water for two hours resulted in higher antibody titers than application directly into bell drinkers.

Keywords: Avian Encephalomyelitis; turkeys; humoral immune response; ELISA

Introduction

The Avian Encephalomyelitis virus is known to be distributed worldwide and most turkey flocks experience exposure to AEV. Control is dependent on vaccination of stocks. Vaccination of breeder flocks is carried out to assure that all progeny receive maternal antibodies which protect them until they develop age associated resistance.

There are several vaccines registered for the use in chickens but none for turkeys. The aim of this study was to determine points of vaccination of turkey breeders that result in high antibody titers prior to the onset of lay.

Materials and methods

For the experiments flocks of B.U.T. Big 6 breeder hens were divided into groups of 4000 birds each and vaccinated with the recommended dose of $10^{3.0}$ EID AE virus, strain 1143 Calnek of a commercial AE vaccine. Serum samples were taken 3 weeks after the second vaccination and in one

flock weekly respectively. The antibody response was measured by an ELISA (IDEXX). The different points of vaccine administration and routes applied are given in the figures.

Results

When first vaccinated at the age of 22 weeks and boosted at 25 weeks of life hardly any antibodies could be verified three weeks after the second vaccination. An earlier first vaccination at 16 weeks of life resulted in slightly higher antibody titers. Not until a clearly earlier first vaccination in the 9th week of life was applied significant higher uniformly distributed antibody titers at a sufficient level were obtained (figure 1).

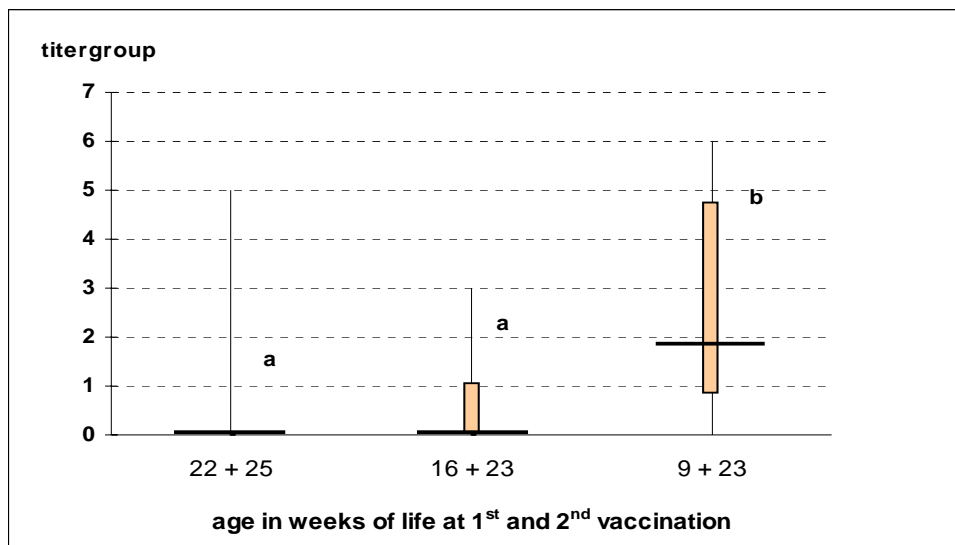


Figure 1: Influence of time of vaccination on antibody titers

A flock vaccinated in the 9th and 23rd week of life was chosen for further experiments on different administration routes. One half was vaccinated after withdrawal of water for two hours. In order to allow the unhampered access to drinking water at any time another group received aliquots of the vaccine without previous withdrawal of water directly into the bell drinkers. Application of the vaccine after withdrawal of water resulted in an one week earlier onset of detectable antibodies with a clearly stronger rise of titers and a significant higher level during the following period of 17 weeks (figure 2).

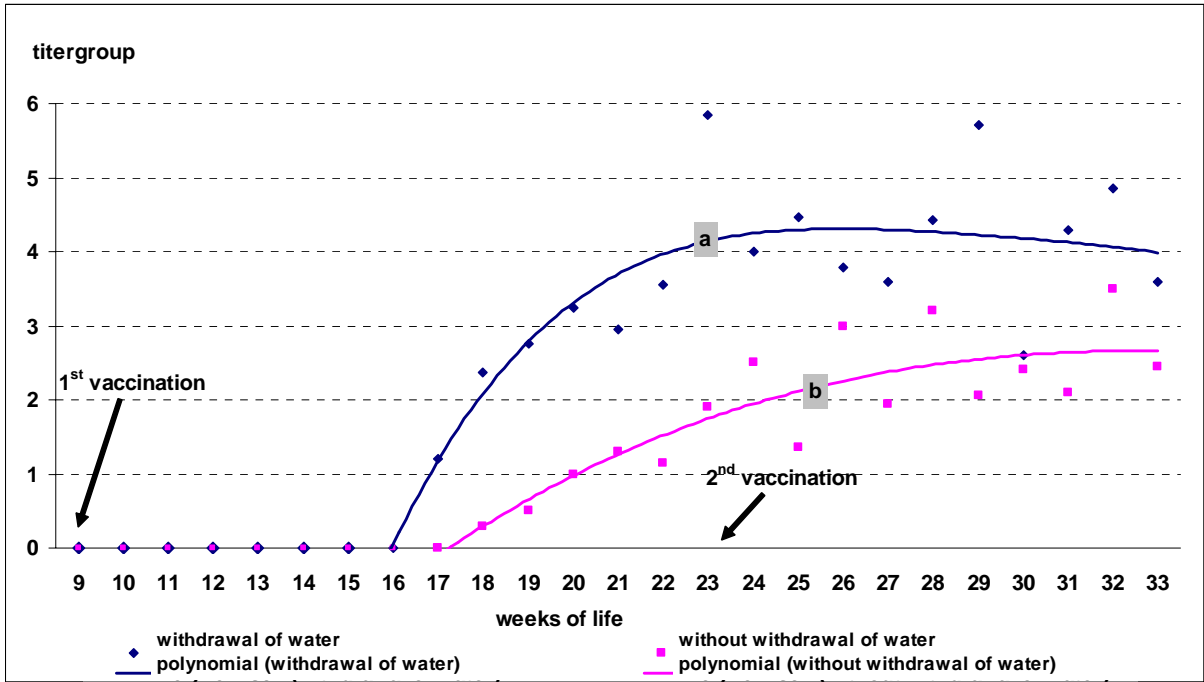


Figure 2: Course of AE titers after vaccination with and without previous withdrawal of water

These findings were reproducible in four trials. Altogether four consecutive flocks were vaccinated with these modes of application. All four flocks showed consistently higher antibody titers in the groups vaccinated after withdrawal of water. In summary these titers differed significantly (figure 3).

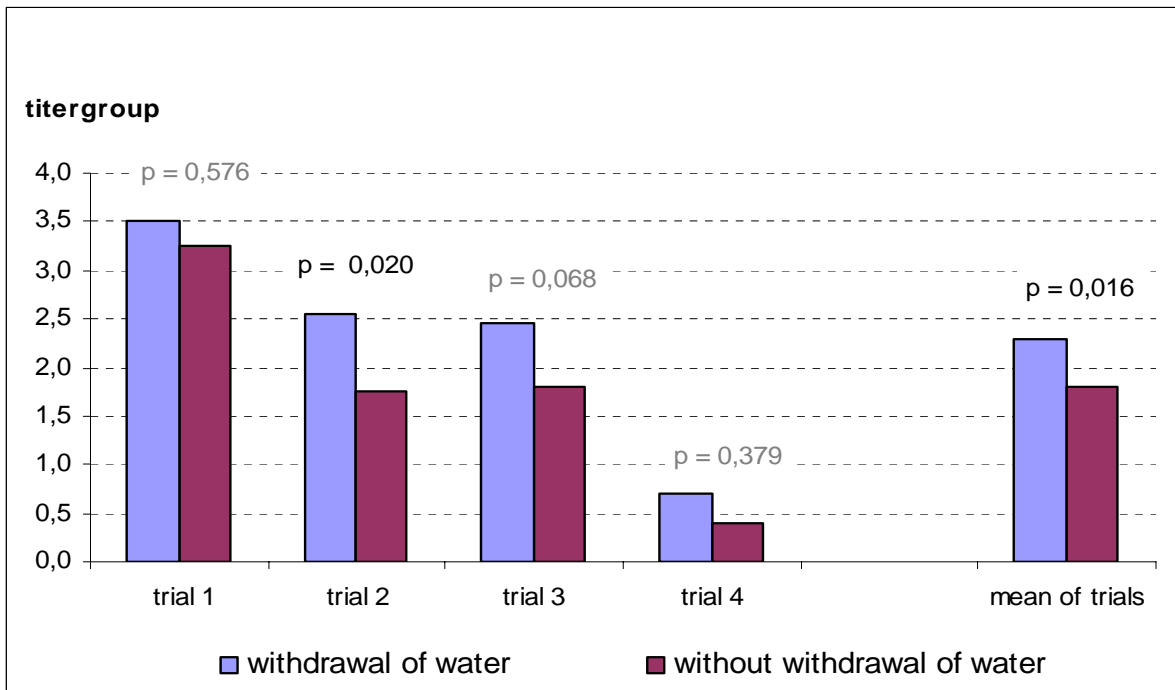


Figure 3: AE antibody titers (mean) after vaccination with and without withdrawal of water before application of vaccine

Conclusions

The presence of humoral antibodies against AEV in breeders is correlated to protection of the progeny due to an AE field infection. The capability of the vaccine virus to spread rapidly within a flock has been seen in former studies and even the administration of low doses has resulted in the appearance of antibodies 2 to 3 weeks after vaccination in chickens. Recommendations regarding vaccination schemes followed these findings. When applied to turkey breeders it became obvious that it takes at least 7 weeks after one vaccination with a full dose until ELISA antibodies are detectable. The obtained results show that vaccination up to 4 weeks before onset of lay can not be applied in turkeys which start laying at an age of approximately 32 weeks. An early vaccination provides high antibody titers at onset of lay. The assumption of some users to achieve high antibody titers by direct application of the vaccine into the drinkers without previous withdrawal of water can not be supported by our findings.