

Completed Research

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Are the Infectious Laryngotracheitis Virus (ILT) Recombinant Viral Vector Vaccines Efficient Tools for the Control of the Diseases

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Recombinant viral vector fowl poxvirus (FPV) and herpesvirus of turkey (HVT) vaccines carrying ILTV genes are commercially available. For the past seven years different sectors of the broiler industry has used FPV-ILT and HVT-ILT recombinant vaccines for off-label *in ovo* vaccinations against ILT achieving variable results. In Georgia two thirds of the ILT cases recorded during 2008 occurred in flocks vaccinated with recombinant vaccines *in ovo*. The reason for outbreaks in recombinant vaccinated flocks is not clearly understood. In order for recombinant vaccines to serve as effective tools in the control of outbreaks, it is fundamental to determine the degree of protection offered by these vaccines and to develop tools to identify vaccinated chickens. The specific objectives of this study were: 1) to determine the degree of protection induced by the FPV-LT and HVT-LT recombinant vaccines when applied *in ovo* and subcutaneously; 2) to determine if shedders are produced in recombinant vaccinated chickens challenged with ILTV; and 3) to improve the detection of antibodies elicited during vaccination with viral vector vaccines and ILTV infection. Commercial broiler embryos were vaccinated *in ovo* with half a dose of the FPV-ILT and HVT-ILT recombinant vaccines at 17, 18, and 19 days of embryo age. *In ovo* vaccination at 18 or 19 days of embryo age did not affected hatchability, while hatchability of embryos vaccinated at 17 days of age was significantly affected. After challenge at 35 days of age, neither viral vector vaccine mitigated the disease or reduced the challenge virus replication in the upper respiratory tract. In this set of experiments a one-needle vaccinator, instead of commercially available *in ovo* injection systems, was utilized resulting in lower vaccination coverage and subsequently lower protection efficiency for both viral vector vaccines. Therefore, optimal efficiency of these vaccines strongly relies in proper *in ovo* vaccination. A third set of experiments was performed with the objective to evaluate the protection induced by ILTV viral vector vaccines when applied using a commercially available *in ovo* injector system vs. vaccination applied subcutaneously at hatch, followed by challenge at 35 and 57 days of post vaccination. Both viral vector vaccines provided moderate to low protection against clinical sings of the disease. The HVT-LT was more effective than the FPV-LT vaccine in mitigating the disease and reducing levels of challenge virus when applied *in ovo* and/or subcutaneously, while the FPV-LT was more effective mitigating clinical sings when applied subcutaneously but did not reduce challenge virus levels in the trachea when applied *in ovo* or subcutaneously. Although serum antibody levels against ILTV do not correlate with protection, detection of antibodies against the ILTV glycoproteins expressed by the viral vectors was a useful criterion to assess the immunogenicity of the vector vaccines. The presence of gI antibodies detected previous- and post-challenge in chickens vaccinated with HVT-LT indicated that the vaccine induced a robust immune response reflected in the significant reduction of clinical sings. On the other hand, a significant increase of gB antibodies was detected only post-challenge in FPV-LT vaccinated chickens suggesting immunological memory against the gB antigen. The lack of gB antibodies pre-challenge in FPV-LT vaccinated chickens suggests a weaker overall immune response which correlates with the presence of clinical sings and high levels of virus in the trachea after challenge. In this study it was demonstrated that both ILTV viral vector vaccines provide partial protection against the disease but do not stop replication of the challenge virus in the upper respiratory tract, which may explain field outbreaks in viral vector vaccinated flocks.

Most relevant findings derived from this research: 1) Eighteen to 19 days of embryo age optimal age for *in ovo* vaccination with HVT-LT and FPV-LT; 2) Optimal efficiency of viral vector vaccines strongly relies on proper *in ovo* delivery, which can be severely affected by the precision of the equipment utilized for delivery; 3) ILTV viral vector vaccines provided

partial protection against the disease but do not block replication of the challenge virus in the trachea; 4) Protection efficiency was rated from high to low, CEOed > TCOed = HVT-LTio = HVT-LTsc > FPV-LTsc > FPV-LTio (ed = eye drop; io = in ovo; sc = subcutaneous); 5) Detection of antibodies against ILTV glycoproteins expressed by viral vector vaccines was a useful tool to assess the immunogenicity of the vector vaccines.