Experimental and field results on the immunity induced by a rHVT-HA vector vaccine against H5N1 and other H5 type Highly Pathogenic Avian Influenza Viruses. 

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Abstract
Vaccination against H5N1 Highly Pathogenic Avian Influenza (HPAI) has the potential to provide an effective tool for controlling the disease once it has become endemic. The efficacy of vaccination against AI relies essentially, but not exclusively, on the capacity of the vaccine to induce immunity against the targeted virus (which is prone to undergo antigenic variations) as well as its capacity to overcome interference with maternal immunity transmitted by dams to their progeny. The immunological profile of such vaccines is largely unknown. In this study, we vaccinated chickens at the day-old stage with a live attenuated vector vaccine (rHVT-HA/HPAI). We then challenged the chickens with H5N1 virus strains (

Introduction
The 3 main issues associated with vaccination against Avian Influenza are:

Antigenicity: the challenge of the antigenicity of the vaccine strain relative to the antigenic diversity of the virus in the field.

Immunogenicity: the challenge of inducing a protective immune response in the vaccinated birds.

Immunological Memory: the challenge of making the prophylactic vaccine also a diagnostic tool.

These three issues are extremely important and related to each other. In this study, we have tried to solve these three problems in a very unique way to construct a vaccine which can be used for diagnosis, for vaccination of birds, and at the same time to be able to have a very high protection level against the virus. The vaccine we have developed is a live attenuated vaccine which can be used for both diagnosis and vaccination. It is a very promising vaccine which can be used in many different situations.

Immune response to vaccination and challenge (see figure 2)

After vaccination of SPF chickens, this rHVT-HA vaccine induces antibodies (AB) clearly detectable by HI test, as soon as 3 weeks post vaccination in the majority of the tested birds, with titers ranging from 6 to 650 (F. et al. 2013) [2]. The vaccine is also able to induce specific antibodies against antigens HPAIV and AIV S.type H5N2, if the HPAIV strain has been modified to a H5N2 one. The vaccine has been officially licensed by USDA in the USA in 2012, and from then in other countries since then, to complement information included in the original registration file, many scientific investigations, controlled trials and field studies have been conducted, confirming the knowledge of its characteristics and performance, so that prescription and use of this vaccine can rely on broader information. Besides, field experience from large commercial farms has also enriched our experience. The objective of this poster is to present a brief overview of the data from various experiments conducted so far, and some of the conclusions to be drawn regarding the practical usage and monitoring of performance.

Immune response to vaccination and challenge (see table 1)

2 criteria are considered as important regarding protection: clinical signs (mortality and morbidity) and shedding of the challenge virus after inoculation.

Table 1: completion of protection results collected through various experiments conducted with HVT-HA (veterumix AI) vaccine. Please refer to corresponding publication for more information.

Onset of Immunity (O01)

Maximum protection (defined as HI 20, any HI antibody titre) is observed at 28 days after immunization. However, it should be noted that the HI antibody titre is not a good indicator of the protective efficacy of an influenza vaccine.

Duration of Immunity (O02)

Duration of immunity against H5N1 HPAIV HVT AI vaccine in chickens is defined as the period of time during which the HI antibody titre is higher than 20. In this case, the HI titre is measured by the HI test. The HI antibody titre is measured in HI units, which are calculated by the formula HI titre = (log10 of the highest dilution giving a HI titre of 2 or more) + 1. The HI antibody titre is expressed in IU/mL.

Target species

Experiments have demonstrated the effectiveness of rHVT-HA, the expression of the HA antigen and induction of protection in chickens of the SPF, broiler and layer types, as well as in turkeys (L. Reau et al., 2018). Reaplication has also been evidenced in waterfowl of the Goose, Muscovy ducks and Mallard ducks types. Surprisingly, very reduced replication and no protection were observed in Pekin ducks (L. Reau). Replication was also observed in quails and pheasants but not in pigeons (C. Ceccarelli registration dossier).

References