The use of the fowlpox virus as the vector for vector vaccines

At the recent CEVA Vector Vaccines Symposium in San Diego, USA, various facets of this intriguing subject were considered. We have already looked at the use of HVT vector vaccines (Volume 18 No. 8, pages 11-13). In this article we will consider the use of the fowlpox virus as the vector.

Dr Deoki N. Tripathy from the University of Illinois, USA, considered the theory behind the idea of using the fowl pox virus as a vector. When birds are exposed to the fowlpox virus they develop both humoral and cell mediated immunity against the virus.

To create a recombinant fowlpox virus or vector vaccine Dr Tripathy confirmed that the following were needed:

- A non-essential gene in the fowlpox virus.
- A promoter(s) to regulate foreign gene.
- A selection marker.
- A cell culture capable of supporting the growth of the fowlpox virus.

In the late 1980s a vector vaccine based on the fowlpox vaccine for avian influenza was created that contained the gene for the avian influenza H5 haemagglutinin. When chicks that had been vaccinated with this product were subsequently challenged with highly pathogenic avian influenza H5N2 there was 100% protection.

Range of uses

Since then several fowlpox vectored vaccines have been created for diseases such as avian influenza, Newcastle disease, Mycoplasma gallisepticum, infectious laryngotracheitis and infectious bursal disease.

In each case it was found that vaccination of birds with susceptible fowlpox virus recombinants resulted in the development of specific antibodies and protection to subsequent challenge by the respective pathogen. The recombinant fowlpox vaccine against avian influenza has been used with moderate results in Mexico.

Dr Tripathy considered that an ideal vaccine would contain only protective antigen(s), have no chance of reversion to virulence, have the benefits of both live and killed vaccines and be capable of mass administration.

Ideally, this should be a polyvalent vaccine capable of expressing antigens from several pathogens. This was the case with fowlpox based vector vaccines.

There were several good reasons for using the fowlpox virus as a vector:

- The fowl poxvirus has a long track record as a vaccine against fowl pox.
- The virus has a large genome.
- There are non-essential genes present.
- There are homologous and heterologous promoters.
- The virus is relatively easily propagated in cell culture.
- The virus has a restricted host range.
- Humoral and cell mediated immunity is induced.
- It has proved to be a successful expression vector.

Now we have new generation fowlpox vector recombinant polyvalent vaccines that can be administered by wing web or in ovo vaccination.

In concluding, Dr Tripathy highlighted that we now have fowlpox vector vaccines at an affordable cost and that these should provide customised vaccines for different localities, risks of reversion can be eliminated and they can be used alongside more traditional vaccines for other diseases.

Dr Carlos Barrañon from Mexico then shared his field experiences with the use of the vectored vaccine Vectormune FP-LT in his country.

He highlighted a particularly poultry dense region where birds were typically vaccinated for Marek's disease, Newcastle disease, infectious bronchitis, Gumboro disease and H5N2 avian influenza. In December 2007 this region experienced its first outbreak of infectious laryngotracheitis in five week old broilers.

The history of this disease in the area and its containment and ultimately its control are detailed in Table 1. ■

Table 1. Field experience with Vectormune FP-LT in Mexico.

Date	ILT status	Decisions	Results
Before 2007	Never seen	No vaccination	No ILT problem
December 2007	First ILT cases confirmed by laboratory	Observation. Early processing of ILT affected flocks	Low mortality No big losses
January – March 2008 (strong winds)	Increasing ILT severity. Younger flocks affected >20% mortality	Vaccination with TCO by eye drop at 21 days of age	ILT cases continue
April 2008	ILT field cases continue	Use of ILT killed in spray at 21 days of age	Some improvement
June 2008	ILT field case continue	Initial field trials with Vectormune FP-LT	Vaccinated flocks did not get ILT
August 2008	No ILT in Vectormune FP-LT vaccinated flocks	Vectormune FP-LT used in 100% of broilers	ILT disappeared No more ILT cases
October 2008	No more ILT field cases	Continue to use Vectormune FP-LT	No ILT