Improving economic productivity by controlling immunosuppression: II

In the last issue of International Poultry Production (volume 25 Number 3 (pages 23-25) we started our review of the Merial (now Boehringer Ingelheim) IBD Summit that was held in Atlanta, USA, earlier this year.

In that first part of our review we looked at the background science associated with Gumboro disease. We conclude our review by looking at some key aspects of the control of this immunosuppressive disease in the field.

Control by vaccination

In her presentation on control by vaccination, Silke Rautenschlein from Germany highlighted that several vaccination approaches have been developed over the years to control infectious bursal disease (IBD).

Inactivated IBDV-full antigen or subunit vaccines are very safe and may induce high levels of circulating antibodies. They are primarily used for booster vaccination of breeders.

For many years, classical attenuated IBD virus live vaccines (mild, intermediate and intermediate plus (hot) strains as well as vaccine strains against antigenic variants) have been used to vaccinate chickens all over world. However, there are some shortcomings associated with these live vaccine strains including residual immunosuppressive effects, interference with maternally derived IBD virus-antibodies (MDA) and subsequently poor immune responses.

In addition, attenuated vaccine strains pose the risk of reversion to virulence as well as reassortment or recombination with circulating field strains. Accordingly, alternative vaccine candidates have been developed.

IBD virus protein 2 (VP2) is an important structural protein, which carries immunodominant epitopes. Neutralising antibodies are directed against VP2 and are associated with protection. New generation IBD vaccines include VP2-based peptide-, DNA- as well as vector-vaccines.

Recombinant turkey herpes virus based vector vaccines expressing IBDV VP2 (rHVT-IBD) have been licensed in many countries. Comparing the rHVT-IBD-vaccine with other commercially available vaccine types, it was shown that this vector-based vaccine is safe and can, even in the presence of MDA, induce high levels of IBDV-specific antibodies and cell mediated immunity protecting vaccinated chickens against classical virulent, very virulent IBDV strains as well as antigenic variants. It was shown that rHVT-IBD may spread to different immune tissues including the spleen and the bursa of Fabricius, the main target organ of IBD virus.

Early protection

rHVT-IBD persists providing long term expression of IBDV-VP2 and protection, which gets greater as the time between vaccination and challenge increases. No measurable immunosuppressive effects can be detected after rHVT-IBD-vaccination, which is different to IBD-live and IBDV-immune complex vaccines.

Moreover, early rHVT-IBD vaccination may even lead to immune enhancement and potentiation of the humoral immune response after vaccination with other poultry vaccines.

Overall, a variety of vaccination strategies

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is available to protect broilers and layers, as well as breeders, against IBD in the field, some of which can already be applied early by in ovo or post hatch vaccination at day one of life.

Results from Colombia

The next presentation came from Dr Leonardo Cotamo, the director of the Colombian poultry company, Avidesa Mac Pollo SA, which produced 17% of the 757 million housed chickens in Colombia in 2016.

Molecular epidemiology assessments performed in samples sent from Latin America between 2001 and 2011 have proved that the recombination of variant and classic strains in the amino acid sequence of the VP2 protein had occurred. Colombian testing of affected birds found variant and very virulent strains of IBD virus.

Vaccination programmes were not working and the use of more virulent vaccines was damaging bursae of Fabricius resulting in differing immunosuppression pictures which resulted in production problems.

In Colombia in 2008 the availability of recombinant IBD based on Marek's disease gave protection against IBD without compromising bursal integrity and allowed Mac Pollo to start using a recombinant IBD vaccine. The results were promising so in 2009 they started to use it with an oil based killed vaccine in the breeders to help improve the transmission of maternal antibody to their broiler progeny. Results were favourable which was reflected in live bird performance, ELISA profiling of broiler flocks at the abattoir and condemnation rates. They concluded that in a situation where there is IBD caused by a combination of classic, very virulent and variant IBD viruses, control of the disease in broilers caused by all three IBD virus types is achievable by using a recombinant vaccine.

IBD immunity

Dr Rubén Merino Guzmán from Mexico then shared his experiences on assessing the immunity aspects of IBD.

To adequately assess the estimated immune response due to vaccination requires base line creation, or serological profiles of the flock that have excellent performance parameters to allow the poultry companies to establish the antibody titres that are considered as normal.

In addition, the lower and upper limits that constitute the range of the curve of the results of antibodies produced by the vaccination program and the general management of the farm need to be defined.

Comparing the serological results from flocks with less performance, with the expected base line, can be used as a way to improve the productive index in those flocks to make them have a serological profile similar to those flocks with a better performance.

Besides the serological profile, the effectiveness of the vaccination program can be supplemented by an histological study of the primary lymphoid organs, like thymus and the bursa of Fabricius.

The integrity of these organs will be the indicator of protection of an immunocompetent system, which is related to the health status of the flock and, therefore, with the performance expectation that may be accomplished in the commercial broiler flocks.

The costs incurred by the periodic serological assessment that follows up the humoral immune response as a consequence of the vaccination will be recovered in enhanced profits when the deviations are detected in the expected antibody titres in certain age. This is because this will allow corrective management decisions to be made and implemented to reduce the negative impact in such deviations.

Maybe, the major benefit comes from an increase in performance from less productive flocks so that their serological profiles become similar to those in the best flocks. ■