One of the major contributors to controlling Gumboro disease is vaccination. Vaccines to control the clinical signs of Gumboro have been used successfully since the initial outbreak of Gumboro disease in the 1960s.

As the Gumboro virus is a very persistent virus and can easily survive in the environment, complete Gumboro control is only possible with a strong focus on cleaning and disinfection, in addition to a solid breeder vaccination program to provide high and prolonged Maternally Derived Antibodies (MDA) in order to prevent early infection of the field Gumboro virus. Also, an efficacious and well applied Gumboro vaccine in offspring (broilers or layers) is essential.

Vaccine choices
In order to control Gumboro disease several vaccine options are widely available and used. Some have been available for quite some time already, whereas others are more innovative and more recently introduced.

- **Inactivated (or killed) Gumboro vaccines** contain a high amount of inactivated whole or subunit IBD virus presented in a mineral oil emulsion. These vaccines are given to boost antibodies for the bird and/or to boost MDA for breeders.
- **Conventional live attenuated Gumboro vaccines** are live attenuated Gumboro viruses that replicate in the bursa of Fabricius, resulting in immunity generated by the replication of the whole virus. There are different Gumboro disease virus strains used in the vaccines and there are different levels of attenuation: Vaccine types are categorised in ‘Mild’ which are highly attenuated, ‘Intermediate’ which are very attenuated, ‘Intermediate Plus’ which are moderately attenuated and ‘Hot’ which are poorly attenuated.
- **Immune-complex IBD vaccines** are prepared from live attenuated IBDV strains of the intermediate plus type, mixed in with specific anti IBDV serum to regulate safety and release of the vaccine once the MDA levels of the bird are reduced. A correct balance between the IBD virus and the anti IBDV antibodies is of crucial importance for the efficacy and safety of these vaccines. These vaccines have the ability to fully colonise the bursa and to protect against all field IBD viruses.
- **Vector IBD vaccines** are constructed from a genetically engineered virus (the vector) whose genome contains a gene from a specific IBDV (the donor) encoding for the VP2 capsid protein. As of today the Herpes Virus of
Turkey (HVT) is mainly used as a vector. Although these vaccines provide proper protection against clinical signs of IBDV, they are not fully colonising the bursa, leading to field IBD viruses being able to enter and replicate in the bursa.

**Immune complex Gumboro vaccines**

Immune complex Gumboro vaccines are a suspension of a live attenuated Gumboro virus which is then mixed in with antiserum against IBD. The suspension needs to be in well-defined proportions and in strict procedures with antisera prepared in SPF chickens in order to contain a relevant balance between virus and antibodies. The vaccine virus is in this way covered and consequently protected from recognition by the immune system of the chickens by specific immunoglobulins (Virus Protecting Immunoglobulins, or VPI). After injection, VPI are stored in the same way as MDA are stored in the dendritic cells. After decay of the MDA, the vaccine virus is released. The take of the vaccine (which is demonstrated by the replication of the vaccine virus in the bursa) occurs when the MDA level has reached a sufficient level that allows the vaccine virus to leave the immune complex.

The benefits of this technology are that the quality and strength of the protection comes from replication of a complete intermediate plus type IBD vaccine, resulting in full protection against clinical signs, complete resistance against infection, high reduction of shedding and no selection of farm IBDV population. The vaccine adapts to the immune status of each individual chicken and replicates at the optimum time. Due to the VPI, the vaccine does not get neutralised by MDA allowing it to be applied in the presence of passive immunity.

Also, the vaccine has to be injected in the hatchery, improving reliability, quality and consistency of the vaccine application compared to drinking water vaccination. Finally, the vaccine fully colonises the bursa, blocking the entry of field IBD viruses. The safety of the immune complex vaccine is similar to the safety of intermediate plus type Gumboro vaccines, with the additional advantage that every individual chicken is immunised with the same, well controlled dose of vaccine.

When considering the various elements of efficacy of Gumboro vaccines and the capacity to not only protect against clinical signs, but also to control Gumboro disease, immune complex Gumboro vaccines are very attractive compared to other vaccines. Provided passive immunity is adapted to the challenging farm Gumboro virus and cleaning and disinfection procedures have been well respected, active immunity can be induced before challenge occurs and will successfully resist whatever level of Gumboro challenge there is. Chickens will be highly resistant to infection and consequently reduce shedding of the challenge virus. As a result, cycle after cycle, virus pressure will decrease, and no selection pressure on the farm is induced.

**Transmune vaccine solution**

Transmune is a Gumboro disease immune complex vaccine consisting of the original Winterfield 2512 strain which is blended with specific antibodies called Virus Protecting Immunoglobulins, see Figure 1. The product was developed in the 90’s, after which it was registered in many countries in Asia, Latin America and later in Europe. Currently the vaccine is marketed in over 75 countries worldwide. As Figure 2 shows, it has been used in over 53 billion broilers worldwide since 2006.

As the vaccine is registered in Europe a unique QC procedure had to be developed safeguarding the efficacy and safety of the vaccine. Every single production batch is thoroughly tested using a CID (Chick Infective Dose) 50 test. This test is used with live birds and with the final blended vaccine to guarantee the potency and safety of the vaccine. As the formulation between attenuated vaccine virus and specific antibodies needs to be extensively tested, to have the optimum balance for the safety and efficacy of the product, more than 100 different formulations were tested before introduction on the market.

In order to monitor the correct application of the vaccine, Ceva developed and implemented several years ago the C.H.I.C.K program. More recently Ceva has introduced the GPS-IBD services to screen IBD pressure on farms and to monitor the replication of Transmune in the bursa. These service programs are services by local and fully dedicated vaccination services managers and veterinary services experts. Several scientific papers and publications are available which demonstrate the efficacy, safety and compatibility of the vaccine. A good example is the compatibility between Transmune and Vectormune ND providing protection against Gumboro, Newcastle Disease and Marek’s Disease in one application.

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**Figure 1 - Transmune vaccine.**

VPI protect the vaccine virus from maternal antibodies

VPI avoid the early contact between the embryo and the live virus.

VPI delay the virus release by 7 – 10 days

**Figure 2 - A 10-year perspective of Transmune usage.**

(In billion doses used).