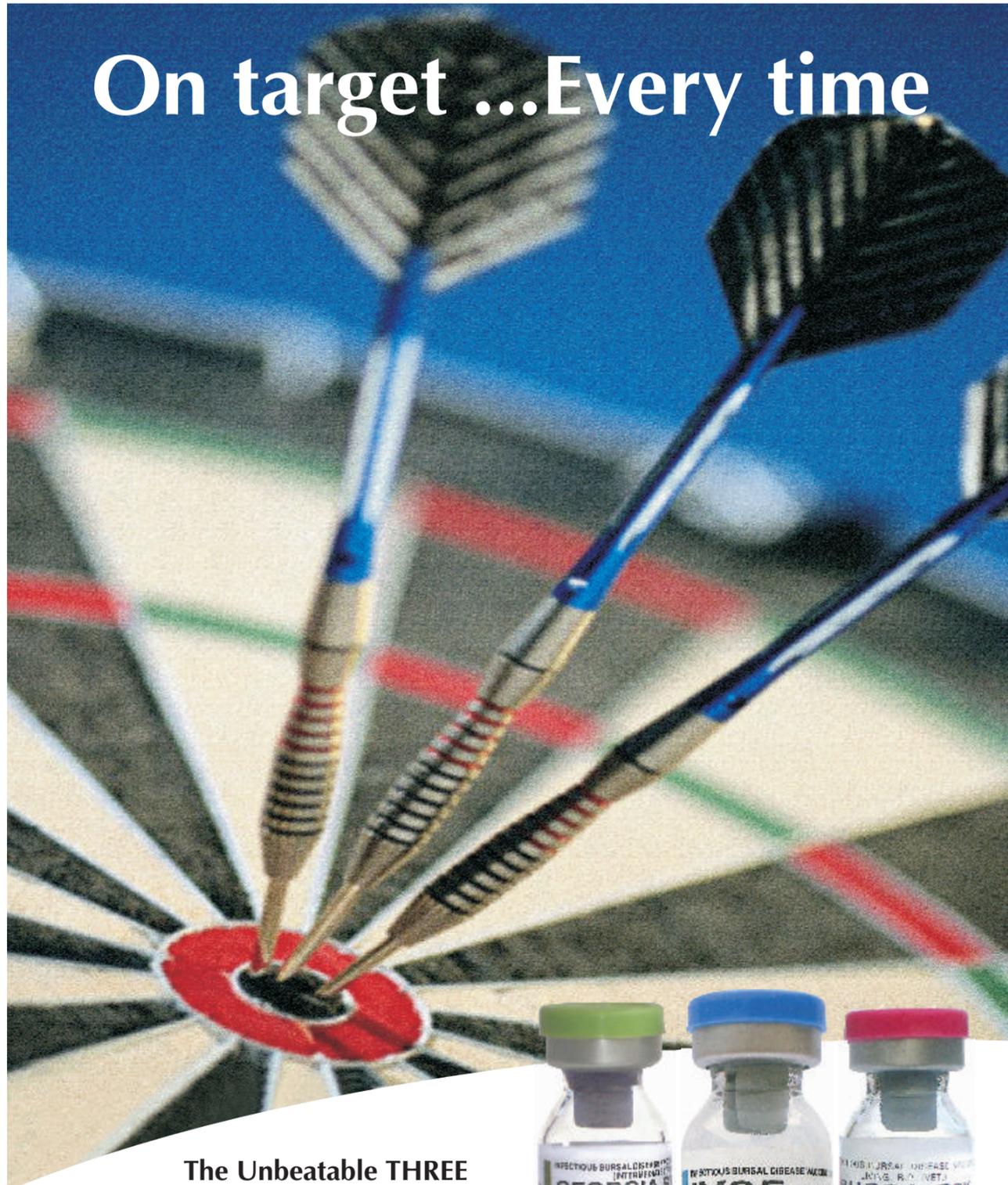


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The Unbeatable THREE - redefining Gumboro prevention

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Technical Services, INDOVAX



Use of live Infectious Bursal Disease vaccines in the presence of maternal antibody

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Infectious Bursal Disease (IBD), popularly known as Gumboro disease is widespread in India, affecting almost all farms. IBD causes clinical and sub-clinical disease and both live and inactivated vaccines are available in the market to control the same.

The purpose of use of vaccine in young birds is to protect them from sub-clinical and clinical form of disease, whereas vaccines in adult birds are used to increase and maintain the level of antibodies in the serum of laying breeding flocks. These serum antibodies are eventually passed on to the chicks through egg yolk when birds start laying. These yolk antibodies are known as maternal antibodies (MAB) that play an important role by protecting the chicks during early days from IBD virus infection.

One of the most perplexing problems for the poultry health specialist is the design of successful vaccination programs in the face of maternal immunity. This is especially true in the case of Infectious Bursal Disease (IBD) vaccination. Several factors make this task difficult, including the following:

1. Pathogenic nature of the resident wild-type viruses.
2. Level of field exposure, which may be a reflection of management and sanitation.
3. Level and uniformity of maternal antibodies (MAB) in breeder flocks.

This Technical bulletin aims at suggesting various approaches one might take to deal with MAB when establishing an active immune response in chickens at the earliest possible age.

After the release and use of the milder vaccine strains, the use of oil-adjuvant killed IBD vaccines for breeder flocks became popular. The purpose of these vaccines is to stimulate high and uniform MAB levels in the progeny, thereby protecting chicks against the immuno-suppression caused by early infection.

Because of the higher levels of MAB that neutralize the live vaccine virus thus rendering it ineffective and the fact that attenuated strains do not "break through" as much MAB as virulent strains, there was a move towards the use of "intermediate" strains of IBD virus as vaccines. The theory was that such strains would be effective in the presence of higher levels of MAB and that only one vaccination would be needed, at around 10 days to two weeks of age.

Variants identified

In the mid 80s, pathogenic "variants" of IBD were recognized. These "variants" could overcome higher levels of MAB than any of the vaccine strains available. Thus, they infected chicks much earlier than strains homologous to the vaccine strains. The term used to define this phenomenon is a shift to left as the organism is able to set up infection in the

host much earlier on a time scale (Fig : 1)

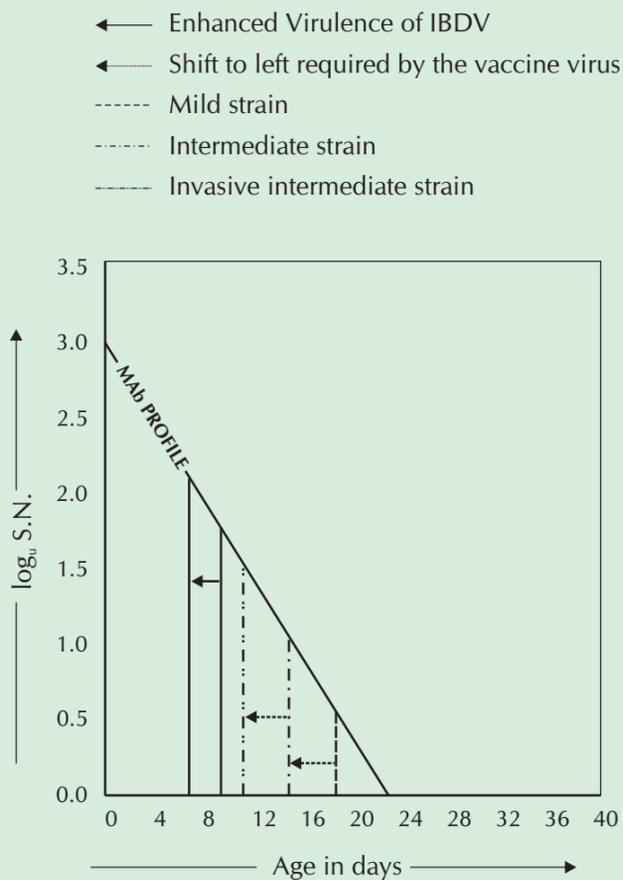


Figure 1

What role do maternal antibodies (MAB) play in vaccination programs against IBD virus?

All live attenuated IBD vaccines are susceptible to virus-neutralizing MAb, which can neutralize them or delay their action. Serological monitoring is usually necessary to predict the optimal timing for vaccination. Age(s) at vaccination should be decided according to the level and homogeneity (uniformity) of MAb present in the day-old chicks.

A quantitative serological test, like ELISA is used to evaluate antibody levels in chicks (expressed as geometric mean titre - GMT) and calculate the optimal time of vaccine application. This is done using well established calculation formulas.

Indovax Technical Services offer the facility for evaluating MAb levels in the chicks and

recommend a vaccination schedule on its basis.

How important is the decay rate of Mab?

The level of MAb in day old chicks is always higher as compared to the titres present at 10 to 15 days of age because of a gradual fall in the antibody level. Fast growing birds like broilers have a fast and uniform MAb decay rate with a half-life of 3-3.5 days. An application of a single live vaccine is, therefore, often sufficient to confer good protection to the whole flock provided a uniform level of MAb exist. Birds exhibiting a slow growth rate (pullets, layers or breeders) have a slow and uneven MAb decay rate with half life of 5-6 days. This results in greater uncertainty of the optimal time to vaccinate and the number of applications that must be increased to ensure success.

How does the uniformity of MAb levels affect the vaccination program?

The MAb uniformity is the result of breeder's vaccination program, exposure to any field challenge and the age of breeder. The flock uniformity is expressed as a coefficient of variation (%CV). When the %CV is less, it is considered to be a homogenous flock and usually one vaccine application should provide good and uniform protection to the whole flock. In case the variance is high, the flock is heterogeneous and two or more vaccine applications are required for the protection of the entire flock.

What is the optimal time for vaccine administration?

An effective immunization programme changes the bird from being passively immune by maternal antibody into an actively protected bird through the development of its own antibodies.

Therefore, the correct timing of vaccination plays a critical role in this operation. If the vaccine is

applied too early while the MAb titre is too high, the vaccine is neutralized and no protection can be expected. On the other hand if vaccine is applied too late, an exposure to field virus and a consequent disease outbreak may occur. Therefore, the accurate identification of the window of opportunity is extremely important.

An ELISA test for serological monitoring makes it possible to calculate the MAb level at which the vaccine can breakthrough. For instance, invasive intermediate vaccines are capable of breakthrough at a high MAb titre while intermediate vaccines can breakthrough at a lower titre. This means one has to wait longer before being able to apply an Intermediate vaccine.

How many administrations are required?

After determining the approximate age of vaccination, the number of administrations necessary will vary according to the following factors:

1. The spreading capacity of the vaccine :

Due to an uneven MAb level in the chicks, several applications of a poorly spreading vaccine are necessary to ensure 100% coverage of the whole chick population. Provided that optimal age at vaccination is properly selected, Invasive Intermediate vaccines require only one administration because these vaccines have good spreading capacity.

2. Homogeneity of MAb levels in the baby chicks.

The higher the heterogeneity (low uniformity) of MAb levels in the chicks, the higher the number of desired applications, particularly if a poorly spreading mild or intermediate type vaccine is employed.

3. The expected level of protection or the accepted risk of failure.

The accepted level of risk has economic consequences. The use of serological testing and a heavy vaccination program is more expensive but will help lower the risk of encountering an IBD outbreak

What contributes to successful vaccination program?

Successful vaccination depends on the choice of a correct vaccine strain and vaccination schedule. In addition to sero-monitoring, successful vaccinations must take account of:

- The existence of certain virus pathotypes circulating in the field.
- The local epidemiological situation on the farm in question and on surrounding farms/area.
- The day old chick quality, the presence of different levels of interfering MAb and uniformity of Mab
- The type of birds (broiler or breeder or layer), which determines the speed of decay of the MAb and the optimal age of vaccine application
- The spreading capacity of vaccine

One can conclude that estimation of MAb levels is of paramount importance while using IBD live vaccines for immunizing the birds against Gumboro disease. **Indovax Technical Services** offer serological monitoring and, based on that, advice the preferred IBD vaccination program. It also encourages the farmers to seek guidance from their local consultant / advisor while deciding an optimal vaccination program for IBD control after MAb profiling of each flock.