IB: minimising the impact of variant strains on breeder productivity

Infectious bronchitis (IB) remains a common and costly challenge for poultry producers around the world, resulting in widespread morbidity and variable mortality. This highly infectious disease is caused by the IBV, a coronavirus which mainly affects both the respiratory and urogenital tract.

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The most severe clinical signs are seen in chicks younger than six weeks of age. Signs of IB in affected birds include depression and respiratory signs such as gasping, coughing and nasal discharge; when the kidneys are affected, birds may also have increased water intake. Scouring and wet litter are then common findings. The mortality rate will also increase.

IB infections in layers and breeders can result in drops in production and poor egg quality; in these birds, infections during the first weeks of life can result in false layers, which are birds that look and behave like normal hens but are unable to lay eggs.

IBV types

IBV has the ability to change rapidly in nature and new serotypes may emerge as a result of small changes in the amino acid sequence of the S1 gene of the virus spike. This can result in new variant viruses.

Traditionally, IBV strains are classified into different serotypes based largely on virus-neutralisation (VN) tests in several laboratory systems. IB isolates can also be identified molecularly (RT-PCR and RFLP test or nucleotide sequencing). Different serotypes can co-circulate in the same area at the same time. Some are found worldwide, but others have a more restricted geographical spread.

Extensive surveys reveal many different serotypes of IBV in different parts of the world. Among the known IB serotypes, the most important are the Massachusetts and Arkansas serotypes in North America, Variant 2 in the Middle East and the Q1, QX and 793B serotypes in Asia, Europe and other parts of the world.

Conjunctivitis and excessive tearing of the eyes are symptoms of IB infection.

	Vaccination			VN titer
Group	1 day	4 weeks	8 weeks	14 weeks
1	Massachusetts	793B	Inactivated IB vaccine	8.3
2	Massachusetts	Massachusetts	Inactivated IB vaccine	6.9

Table 1. Average level of neutralising antibodies (2log) resulting from two different programs against IBV Q1, Variant 2, QX, Arkansas, Mass/M41 and 793B.

Vaccination and broad protection

Both live attenuated and inactivated (usually oil-adjuvanted) vaccines are used to control IB infections.

It should be kept in mind that IBV strains with different antigenic or genetic features may still cross-protect in vivo, in the bird.

Such is the case for the Massachusetts serotype. Vaccines based on this serotype provide a fairly broad spectrum of protection against other serotypes.

Nevertheless, controlling IB is challenging because new strains of the virus continue to emerge and the development of a new vaccine for every important pathogenic strain is unrealistic, time consuming and costly.

Live attenuated vaccines are used both to protect young chickens and also to prime future layers and breeders prior to the administration of an inactivated vaccine.

Vaccination usually starts in the hatchery, by coarse spray. The use of an inactivated vaccine in layers and breeders leads to high levels of antibodies and therefore long-lasting immunity.

In spite of the large number of variants there are ways of improving the vaccination program in order to broaden protection. Broad protection can be provided against most variants using existing live and inactivated IB vaccines.

Research demonstrates that a vaccination protocol, which features vaccines of more than one serotype, can provide broad protection against a variety of strains. An example would be a vaccination protocol that includes a live IB vaccine of the Massachusetts serotype plus a live vaccine based on a different (variant) serotype.

Broadening protection in layers and breeders is essential to safeguard egg production. This can be achieved by administering heterologous live priming followed by the use of the inactivated IB vaccine. This was evaluated in a study in which the level of neutralising antibodies against different types of IBV was measured.

Neutralising antibodies have the characteristic of inhibiting or neutralising any effect a virus may have biologically. The higher the level of neutralising antibodies found in the blood of immunised birds, the higher the chance of blocking the virus and preventing the damage that results from infection.

As shown in Table 1, a program featuring vaccination with live attenuated vaccines of the Massachusetts and 793B types resulted in the highest average level of neutralising antibodies against different strains (Q1, Variant 2, QX, Arkansas, Mass/M41 and 793B) included in the study. ■

References are available from the author on request