

Merck Animal Health

Protectotype: Mildvac-Ma5™ (Ma5) + Shor-Bron®-D (Del 072) Effective Strategy to Combat Variant Infectious Bronchitis (IB)

Introduction:

Infectious bronchitis is caused by an RNA virus (avian coronavirus). RNA viruses are prone to antigenic variation due to transcription errors. As a result, the broiler industry faces frequent outbreaks of variant IB, and vaccines cannot be developed as quickly as the viruses change.

Arkansas-type IB vaccines have been widely used to control variant IB challenge on broiler farms, but the Arkansas vaccine virus also exhibits a prolonged period of circulation within a broiler flock. The virus circulation may lead to more opportunity for transcription errors and development of variants from the original vaccine strain itself.

“Protectotype” utilizes Mildvac-Ma5™ (Ma5) and Shor-Bron®-D (Del 072): two IB vaccine virus populations with different antigenic profiles. These unique antigenic strains produce a synergistic cross protection that is more protective against variant IB strains than either of the IB vaccines independently. This strategy may be used to induce cross protection against a variety of variant IB viruses including the Arkansas strain, and it may enable integrators to remove Ark vaccines from the broiler program.

Ma5 is a unique Mass-type IB vaccine. The vaccine is plaque-purified for predictable behavior and genetic stability.

Conclusions

- SPF birds vaccinated with Ma5 + Shor-Bron-D demonstrated stronger protection against three challenge viruses (GA 11, Mass 41 and GA98) than either Ma5 or Shor-Bron-D alone as measured by ciliostasis, by virus detection post-challenge (RT-PCR) or by clinical signs.
- The individual vaccines provided good protection against individual challenge viruses, but the combined vaccines demonstrated the Protectotype concept by protecting against ALL of the challenge strains.
- Protectotype, using Ma5 + Shor-Bron-D (Del 072) offers a strategy to protect against emerging IB variants while reducing the use of Arkansas vaccines on broiler farms.



Cross Protection Studies

SPF leghorn chickens were vaccinated with Ma5 only, Shor-Bron D only or a combination of both Ma5 and Shor-Bron D. The birds were challenged with Mass 41, GA 98 or a new variant IB GA 11. The new GA 11 variant was chosen because it was appearing with increasing frequency from clinical cases of IB in US broilers from the southeast.

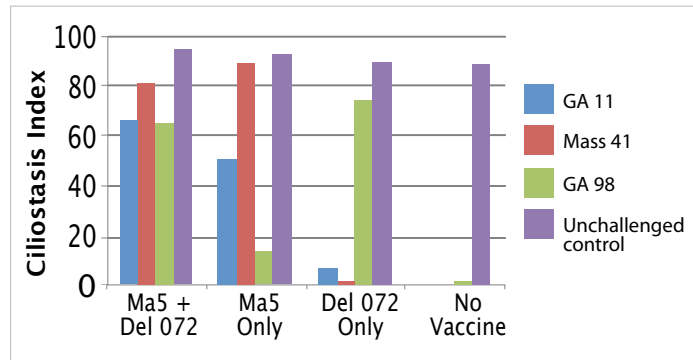
Ma5 was administered at 1 day of age and Shor-Bron-D was administered at 14 days of age. A full dose of each vaccine was administered by eye-drop and intranasal methods. All birds were challenged with at least 1×10^4 EID₅₀ at 35 days of age.

RESULTS:

A. Ciliostasis

The ciliostasis test involves the examination of tracheal ring cultures for ciliary activity post IB challenge. The results are reported as percent of ciliary activity, with > 50 % activity indicating protection. The best overall cilia activity could be found in the birds vaccinated with both Ma5 and Shor-Bron-D. The post-challenge ciliostasis results are reported in Figure 1.

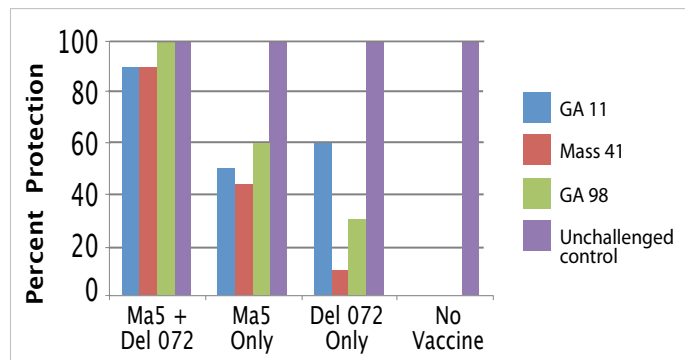
Figure 1: Ciliostasis Score - Protection against Ciliostasis (>50% Score = Protected)



B. Real time RT-PCR IB Virus Detection

Tracheal swabs were collected 5 days post-challenge for the detection of challenge virus. IB challenge virus was detected by RT-PCR in 100% of non-vaccinated challenge birds. The lowest virus detection rate was in the group vaccinated with both Ma5 and Shor-Bron-D. The percent protection based upon virus or lack of detection by RT-PCR is summarized in Figure 2.

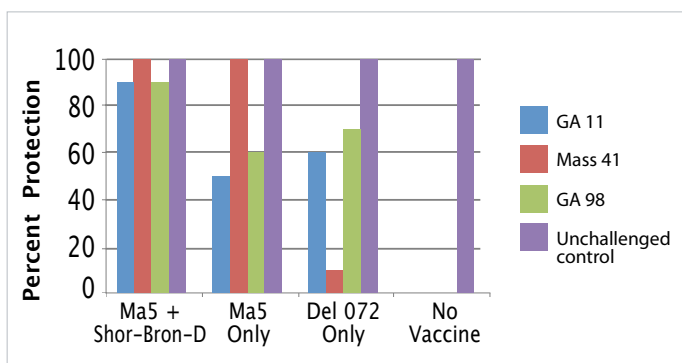
Figure 2: RT-PCR IB Virus Detection Post-Challenge: Percent Protection (RT-PCR negative)



C. Percent Protection Based on Clinical Signs

Clinical signs were determined five days post-challenge. Clinical signs included watery eyes, mucus in the nares and the trachea, and tracheal rales. Clinical signs were noted in all of the non-vaccinated, challenged birds, while no signs were noted in the negative controls. The combination of Ma5 and Shor-Bron-D resulted in 90 to 100% protection against clinical signs from all three challenge strains. Results of the vaccinated groups are summarized in Figure 3.

Figure 3: Percent Protection Based on Clinical Signs



Discussion

The concept of Protectotype gives broiler integrators a strategy to maximize the breadth of protection against emerging variant IB strains.

Arkansas IB vaccines have often been used to help enhance protection against new IB variants, but the Arkansas vaccines themselves may be subject to transcription errors and contribution to the development of new variants.

Shor-Bron-D is rapidly eliminated from vaccinated flocks, and Ma5 is plaque-purified for consistent reaction and genetic stability. These two vaccines used in combination as a Protectotype offer a safer alternative to Arkansas vaccination programs.

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