Studies demonstrate the benefits of dual-needle in ovo vaccine delivery

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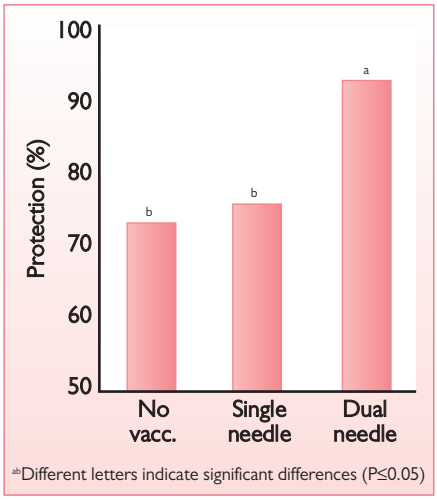
Studies conducted in the US and abroad indicate that in ovo vaccination with a dual-needle delivery system may be preferable to a single-needle delivery system – an important finding since many of the newer vaccines for poultry are intended for in ovo use.

In a US challenge study believed to be the first of its kind, broiler eggs from the same origin were injected at 18 days of incubation with either the Embrex Inovoject dual-needle system or with a single-needle system. The vaccine delivered was a herpesvirus of turkey (HVT) vaccine, often used in the broiler industry to protect against Marek's disease.

The hatch rate of eggs in breeder flocks at 40-61 weeks of age was numerically higher for those inoculated with the dual-needle system compared to the single-needle system. Next, investigators challenged both groups of birds with the RB1B strain of Marek's disease virus, which was administered intraperitoneally at three days of age. The birds were evaluated for seven weeks. The level of protection, determined by the absence of tumours, was significantly better in birds from the dual-needle group

Fig. 1. Level of protection against Marek's disease with the dual- and single-needle injection systems.



abDifferent letters indicate significant differences (P≤0.05)

The level of protection, determined by the absence of tumors, was significantly better in birds from the dual-needle group. They also had better weight gain.

compared to the single-needle group and a group of unvaccinated controls (Fig. 1), which indicates that the dual-needle system correctly delivered the vaccine and allowed for better replication of vaccine virus.

The dual-needle group also had better weight gain (3.24kg vs 3.15kg at 49 days), indicating that good vaccine delivery correlates with higher bodyweight at processing.

To my knowledge this was the first study that employed a viral challenge to compare the efficacy of in ovo vaccine application devices for delivering an HVT vaccine. The results also confirm the findings of an earlier, published study conducted at two US broiler hatcheries, where investigators used dye in dual- and single-needle systems to determine if a Marek's disease vaccine was delivered correctly. At the first hatchery, the dual-needle system correctly vaccinated more than 94% of eggs compared to 61% with the single-needle system. At the second hatchery, the dual-needle system correctly vaccinated 91% of eggs compared to 72% with the single-needle system.

Subcutaneous vaccine

In two field studies conducted at commercial broiler hatcheries in Brazil, investigators compared the dual-needle system with subcutaneous administration of a live, wild-type Marek's vaccine.

In the first field trial involving eight paired broiler houses, 95% of the in ovo group was positive for HVT compared to 66% of the subcutaneous vaccine group, based on real-time polymerase chain reaction testing of feather pulp at 21 days of age.

In the second Brazilian study, 10 paired houses were compared for vaccination coverage, which was 10.63% better in the in ovo group compared to the group vaccinated subcutaneously. The field study results demonstrate that vaccine take was better with the dual-needle system.

System differences

With the dual-needle system, one needle punctures the shell and another needle delivers the vaccine. The needle that delivers the vaccine never touches the shell, so it is a cleaner procedure than a single-needle system that uses the same needle to puncture and deliver.

The single-needle delivery system has a longer needle, so there is a greater chance that the needle could bend or break and that the vaccine does not get delivered or is delivered improperly.

In contrast, the dual-system needle that delivers the vaccine is protected inside the outer needle (puncher) and less likely to bend or break. In the US study, we believe this is why the results in the single-needle group were similar to the results in the unvaccinated controls.

More in ovo poultry vaccines are becoming available and a number of factors should be considered when selecting an in ovo vaccine delivery system. These include the general reliability and speed of the equipment, whether the system promotes good sanitation and whether it allows for selective vaccination – which can yield savings on vaccines. These recent studies demonstrate that the needle system is yet another important factor to consider. ■

The results of these studies were presented at the 2013 World Veterinary Poultry Association (WVPA) conference held in Nantes, France. References are available on request.