Correct spray vaccination is critical for effective IB flock immunisation

Spray vaccination at the hatchery is the most relevant procedure to achieve a uniform and effective prevention strategy for infectious bronchitis (IB).

Even though spray vaccination is a very common and well-established practice all over the world, the process needs to be re-evaluated and audited to ensure the successful immunisation of the flock.

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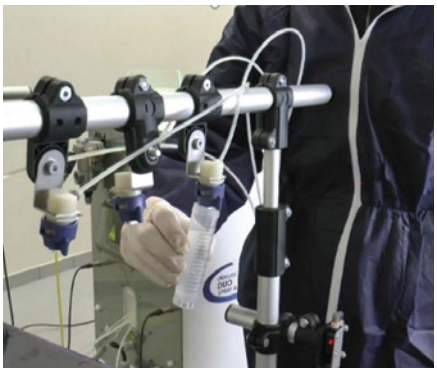
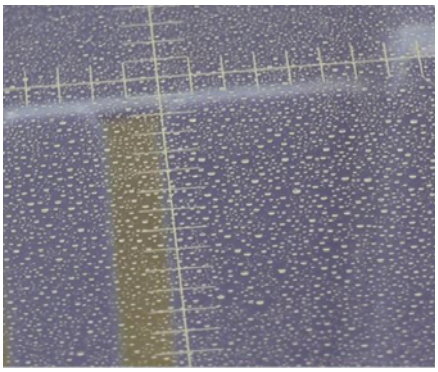
This article gives a review of the key control points for a good spray vaccination quality and provides field trial evidence on how some differences in the IB vaccine administration at the hatchery can have a serious impact on proper and effective flock immunisation.

Avian infectious bronchitis

IB is a highly contagious disease that affects several organ systems in chickens in addition to the respiratory system, such as the urinary and reproductive tract, and remains latent in the caecal tonsils of the birds.



Taking direct dosing control at the beginning of each vaccination day.



The results of good crate coverage and droplet homogeneity checking with the Droplate.

The disease is caused by a coronavirus and has worldwide distribution in commercial poultry operations and also in backyard flocks.

Spray vaccination at the hatchery

Spray vaccination at the hatchery is a practical and habitual method of immunisation for IB or Newcastle disease in poultry operations.

A worldwide hatchery survey conducted in 2020 showed that 90% of hatcheries use spray vaccination regularly.

At first glance, spray vaccination appears to be a simple technique to master, you select the type of nozzle and pressure applied to generate the right droplet size and then expose a standard number of chicks in a box to the spray to cover them with the IB vaccine solution attempting to reach the upper respiratory tract of the chicks.

In reality, there are many variables that affect the quality of spray vaccination among different hatcheries, mainly due to the sprayer equipment operational status and operator training and monitoring.

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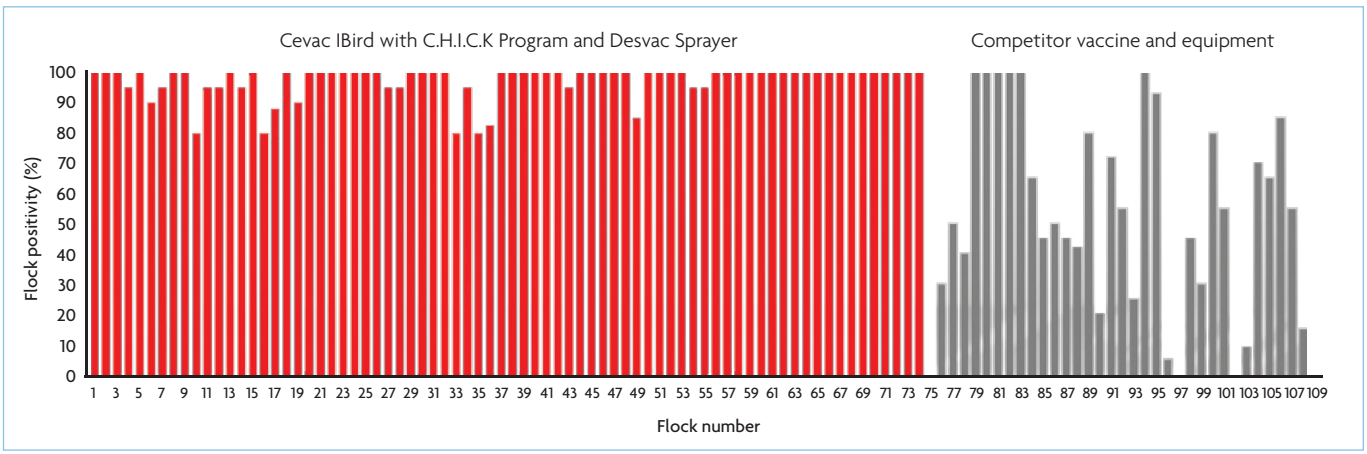
Fig. 1. Positivity rate using qPCR testing for IB vaccine strain detection in choanal swabs five days post-hatchery vaccination (Ceva Scientific Services Investigation Unit (SSIU), China. Internal Study, April 2021).



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There are four main considerations for good spray vaccination quality:

● **Optimal crate coverage:**
The entire crate surface has to be covered by the spray in order to guarantee that all the birds receive the proper vaccine dose.

Nowadays, by using current nozzle technology, such as a flat pattern nozzle, crates can be perfectly covered from beginning to end without any missed areas.

● **Uniform droplets at the right size**:
The recommended droplet size to vaccinate day-old chicks is around 150µm. The droplet size is defined by two main parameters: nozzle type and air pressure.

● **Keep a good distribution of chicks in the crate:**
Sudden stops by the automatic conveyor before the crate enters the sprayer could, for example, cause uneven distribution of the chicks in the crate. In other cases, manual handling of the crates is too rough when it should be smooth. This could cause vaccine waste (vaccine on areas with no chicks) and deficient vaccine delivery (birds receiving less vaccine than needed).

Table 1. Control points during a spray vaccination quality audit according to the C.H.I.C.K program standard.

VACCINE PREPARATION	VACCINATION PROCESS
Cold chain & storage	Equipment setup
Vaccine preparation room	Equipment performance
Water quality	Operational control
Dosing control	Cleaning & disinfection
Preparation procedure	

Hatcheries	Flocks	Choanal swabs (5 DPV)	qPCR positive (%)	Ct values <35 (%)
Cevac IBird w/Desvac sprayer (C.H.I.C.K. program included)	74	1,445	97	100
Other IB vaccine w/Sprayer X	34	626	56	59
Total	108	2,071	–	–

Table 2. Results of qPCR IB detection in flocks sampled by choanal swabs at five days post-vaccination.

● **A consistent volume of vaccine solution:**
The vaccine volume sprayed into every crate must be consistent. Some older sprayers use a pressurised vaccine system that is susceptible to variations in air pressure. This can result in vaccine volume variations up to ± 50% of the desired volume, which will be very detrimental to achieve good flock coverage and immunisation.

Large scale monitoring of IB vaccination efficiency after hatchery spray application

A large trial was performed in China to compare and monitor vaccination efficiency with different IB vaccines, sprayers and hatchery services. The PCR on reverse transcribed RNA (RT-PCR) is a very sensitive and rapid detection method for IBV which helps to discriminate vaccine and field viruses strain for epidemiological studies.

The RT-qPCR technique was chosen for the present study to determine the IB vaccination efficiency at the hatchery by sampling birds in the choanal swabs at five days post-vaccination (DPV). Their Cycle Threshold value (Ct) were recorded to determine the level of viral load present in individual birds.

● **Study design:** Hatcheries selected by the IB vaccination programme and type of sprayer were selected for this study. The control points used during the spray audits were according to the C.H.I.C.K. Program standard (Table 1). A total of 2,071 choanal swabs from 108 commercial broiler flocks were analysed by quantitative PCR and their Ct value recorded for analysis.

The flocks vaccinated with Cevac IBird/ Desvac sprayer (C.H.I.C.K. Program included) showed 97% positivity by PCR and 100% of them obtained Ct values less than 35 versus 56% PCR positivity and 59% Ct values greater than 35 for competitor vaccine and equipment (Table 2).

Conclusion

The results of this large scale monitoring showed how the differences in the IB vaccine application in hatcheries, evidenced by the presence or not of a monitoring service and the adapted vaccination equipment, had an impact on the proper and effective flock immunisation.

Indeed, superior vaccination effectiveness was proven by quantitative PCR detection of the vaccine strain that was observed in commercial broiler flocks vaccinated with Cevac IBird using the Desvac sprayer and audited with the C.H.I.C.K. program.

This trial is still ongoing and more data is being collected. This will be statistically analysed for publication in the future. ■

References are available from the authors on request