Impact of infectious bronchitis spray vaccination at the hatchery

Avian infectious bronchitis (IB) is probably one of the most widespread poultry diseases around the world, given its highly contagious nature. The disease induces very costly losses, due to uneven growth, high morbidity, egg drops, and/or kidney damages with secondary opportunistic respiratory infections and its related medication.

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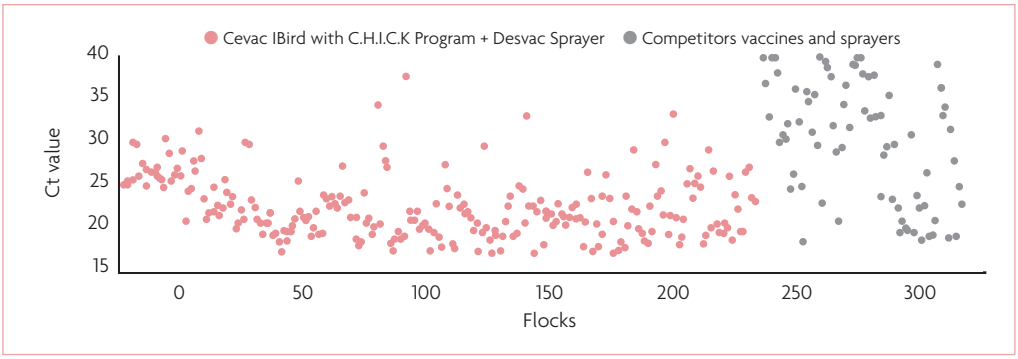

Fig. 1. Positivity rate using qPCR testing for IB vaccine strain detection in choanal swabs five days post-hatchery vaccination (Ceva Scientific Services Investigation Unit (SSIU), China. Internal Study, April 2021).

Therefore, the successful immunisation of day-old chicks is essential for prevention and ultimately ensuring a good performance in broiler, breeders, and layers production.

The disease control should start in hatchery, with an accurate and controlled application of the vaccine, using advanced spray equipment, batch after batch, in addition to the implementation of post-vaccination monitoring programmes.

The key points of the spray vaccination were already described in previous articles: 'Infectious Bronchitis Spray Vaccination at the Hatchery' and 'Correct spray vaccination is critical for effective IB flock immunisation', by Ceva Animal Health.

Vaccine take

For a proper immunisation against Infectious Bronchitis, it is essential for the vaccine strain to reach the upper respiratory tract to be able to replicate, with proper virus titer.

Therefore, even if it looks like a simple process of spraying water solution over the birds, there are many factors to be considered before, during and after the vaccination process to keep the vaccine viable.

Those factors are closely related to the vaccine preparation protocols, the sprayer equipment operational status and operator training and monitoring.

Additionally, a good quality of spray application will over time control the Avian infectious bronchitis in the field by considering the following points:

- Respect to vaccine preparation protocols.
- Optimal crate coverage.
- Uniform droplets of the right size.
- No impact on the chick distribution.
- A consistent volume of vaccine solution.

In 2021, a large-scale study in China was conducted by monitoring about 312 broiler flocks to assess the impact of the combination of the vaccine, the equipment used and the control of the vaccination process in hatcheries over the vaccine take in birds at five days post-vaccination.

Over 5,000 samples were collected and analysed by the Scientific Services Investigation Unit of Ceva Animal Health, China (SSIU).

The RT-qPCR technique (Test Universal IB-5 UTR – Callison et al. assay) was chosen for the study to determine the IB vaccination efficiency at the hatchery by sampling birds in the choanal swabs at five days post-vaccination (DPV).

Fig. 1 shows the high vaccine take rates of the IB vaccine (Cevac IBird) when it was well applied using the proper vaccine sprayer (Desvac sprayer) and it was monitored by the C.H.I.C.K Program that will be translated in immunisation of the flocks against Infectious Bronchitis.

The Cycle Threshold value (Ct) were recorded to determine the level of viral load present in individual birds. The results showed that the average Ct value of Ceva group was 7.75 lower than the Competitors' group, indicating that the vaccine take rates of Ceva group was more than 200 times higher than Competitors' group (Fig. 2).

The variable coefficient (CV) of the Ceva group was 7.1% lower than Competitors' group, indicating that Ceva group had better uniformity and stability in immunity.

Vaccination monitoring

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

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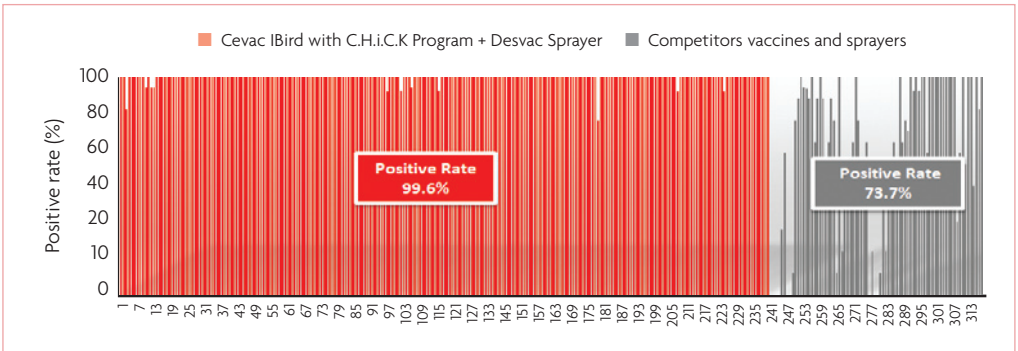
Fig. 2. Ct value of Ceva and Competitors' group (Ceva Scientific Services Investigation Unit (SSIU), China. Internal Study, April 2021).



Vaccine preparation	Vaccination process
Cold chain & storage	Equipment setup
Water quality and temperature	Equipment performance
Dosing control	Operational control
Preparation procedure SOP	Cleaning & disinfection

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

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For this reason, to achieve good results, it is essential to have a close monitoring system able to guarantee that all the steps from the vaccine preparation until de application in the chicks are well followed.

Ceva aims at contributing with the poultry partners companies by making available the C.H.I.C.K Program Quality Code of Practices and relevant vaccination procedures, controlled and internationally quality approved by the Bureau Veritas Group.

Ceva's Vaccination Services national teams, visit hatcheries regularly to assess the key control points during the spray vaccination according to the C.H.I.C.K. Program standard. Those are listed in Table 1.

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

In farms, the infectious bronchitis vaccination can be monitored by serology and PCR:

- **Serology analysis and standard:** The results are defined for 35-45 days old broiler (minimum 30 days old).

The interpretation of serology titers in broilers is described in Table 2. (source: IBird Technical booklet).

- **PCR and sequencing analysis:** In case of clinical sings, samples can be taken from caecal tonsils, trachea, and kidneys. After positive results, IBV strain identification should be requested.

To support poultry producers on these investigations, Ceva's Veterinary Services Teams implement the Health Monitoring Services (formerly Global Protection Services – GPS), which allows poultry farm owners and managers to make data-based decisions thanks to a regular field monitoring process of their birds' health status. In the implementation of Health Monitoring Services, two key tools are critical: Scientific Support and Laboratory Network and Real-world evidence and data management.

Conclusion

A proper spray vaccination in the hatchery, considering all the critical factors for the proper delivery of the IB vaccine, will provide a high rate of vaccine take, and leads to flock immunisation and protection.

The results of a large-scale monitoring in China, showed how the differences in the IB vaccine application in hatcheries, evidenced by the presence or not of a monitoring service (C.H.I.C.K Program) and the adapted equipment, had an impact on the proper and effective flock immunisation.

In a nutshell, to guarantee a proper immunisation of the chicks, the combination of the proper IB Vaccine + proper equipment + monitoring is the recipe to success. ■

Table 2. Interpretation of serology titers in vaccinated broilers.

Vaccination programme	Limits	ELISA Kit		
		Biochek	Idexx	ID Vet
Cevac IBird + Cevac Mass L	Expected	2,000-4,000	›1,500	3,000-5,000
	Field challenge	›3,000 (GMT) ›4,500 (20% individual samples)	›2,500	›5,000 (GMT) ›5,000 (20% individual samples)