

Newcastle disease control: the vaccine makes the difference

As we are approaching 100 years since it was reported for the first time, Newcastle disease (ND) continues to challenge the poultry industry globally causing devastating losses in some countries. Over this time, improvements have been made for better disease control, but some limitations have been encountered.

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Recent advances in vaccine development have allowed a significant impact in the control of this disease. Novel ND vaccines permit massive and uniform vaccine administration at the hatchery to induce early and lifelong lasting immunity with minimal additional field interventions.

Technological advances in the molecular biology field have allowed the design of a genetically engineered vaccine against ND to make it more effective than conventional vaccines with eliciting broader immunity with lifelong duration as well as avoiding interference with the maternally derived antibodies.

Additionally, mass administration at the hatchery ensures uniform immunisation without the limiting factor that the maternal immunity causes to inactivated conventional ND vaccines – delaying and lowering

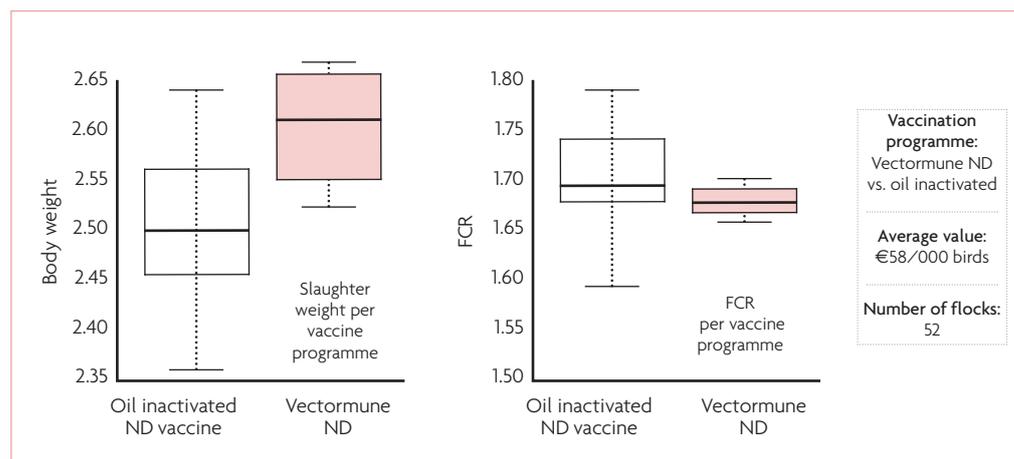


Fig. 1. Statistical analyses of Vectormune ND vs. inactivated ND vaccines showing higher body weight (100g) and a lower feed conversion ratio (three points) in broiler flocks vaccinated with Vectormune ND.

their immune response without mentioning the tissue reaction, transmissibility of ND field virus challenges and risks involved in self-injection of the operators during vaccination.

The cumulative advantages carried in the implementation of Vectormune ND vaccination at the hatchery as part of a regular health programme makes it the ultimate advanced tool for ND control.

Economical advantage

Large scale field trials enable the measurement of differences and consistency in ND protection when

programmes are compared to determine the distinctive benefits of one ND vaccination programme over another and to translate them into economic advantages.

Here, we present an example of a comparative field performance study. Over one million birds, from the same commercial operation and similar management system, received two distinct ND vaccination programmes and were grown to 41 days of age targeting 2.5kg average live body weight.

Commercial broiler flocks were raised during a contemporary period of time. Production performance parameters are presented in Table 1 indicating the statistical significance for the main parameters measured with its consequent economic benefits (Table 1).

The economical benefits were calculated based on the production differences considering additional 100g/bird in body weight and three points lower in the feed conversion ratio with the Vectormune ND vaccination programme which translates into 58 Euros per 1,000 birds in this study.

The economical benefits generated with Vectormune ND are the result of its three unique characteristics:

- Elicits all types of bird immunity.
- Avoids MDA interference.
- Minimises ND field virus transmission.

Protection parameters against ND

Several parameters must be included in the evaluation of a ND vaccine to be considered protective against this viral disease. Effective ND vaccines permit individual and mass administration at the hatchery, either by in-ovo or subcutaneous routes, to ensure a uniform and consistent immunisation early in the life of a bird. Additionally, the immunogen must elicit cell-mediated and systemic and local antibody-mediated immunity inducing early and lifelong lasting immunity with minimal additional field interventions. Several factors are listed in Table 2 to be considered in the selection of a ND vaccine as part of the health programme of a given flock, with minimal changes under different field pressure conditions.

Elicits all types of immunity

Numerous studies have demonstrated the activation of the different branches of the immune system after vaccination with Vectormune ND. Evaluation of several types of immune responses (cell-mediated, systemic and local antibody-mediated immune responses) under severe challenge

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Table 1. Production performance parameters comparing ND vaccination programmes.

Production parameters	Inactivated ND	Vectormune ND	P value*
Number of flocks	39	13	
Chick quantity (m ²)	14.89	14.82	>0.05
Slaughter age (days)	41.39	41.71	>0.05
Slaughter weight (kg)	2.50	2.60	<0.05
FCR	1.73	1.70	<0.05
Total mortality (%)	5.33	4.88	>0.05
EPEF	332.03	348.36	<0.05

*Statistical significance when P values are <0.05

Protection parameters	Vectored	Inactivated (oil emulsion)
Massive immunisation via SQ	YES	YES
Massive immunisation via in-ovo	YES	NO
Avoiding MDA interference on immunity	YES	NO (delayed and lowered response)
Onset of immunity with MDA*	2-3 weeks	4-6 weeks
Avoiding tissue reaction	YES	NO
Systemic antibody-mediated immunity	YES	YES
Cell-mediated immunity	YES	NO
Local immunity	YES	NO
Vaccine safety	YES	Operator's self-injection risk + local injury risk in chicks
Virus excretion (oral and cloacal) after NDV field challenge (shedding control)	Minimum ND virus transmission (very low 'r' value)	Much higher virus transmission
Bird's life sustained immunity	YES	NO
Antigen matching to field prevalent NDV	Not needed	Needed for better immune response

*MDA: Maternally-derived antibodies (Passive immunity).

Table 2. Factors to consider in broiler hatchery vaccination for ND control.

Continued from page 13 studies using a variety of very virulent ND viruses that have emerged in different regions of the world, have demonstrated the broad spectrum of protection and lifelong immunity elicited by Vectormune ND when compared with conventional inactivated vaccines.

Avoiding MDA interference

Achieving earlier protection against ND at the hatchery with a combined passive and active immunity offers

immediate protection benefits and allows the build-up of a strong and lifelong immunity. This may be accomplished with the use of an adequate immunisation programme. Vectormune ND vaccine strain generates its early immunity through cell to cell replication without getting in contact with the systemic maternal antibodies.

The use of conventional live inactivated vaccines at the hatchery in the presence of maternally derived antibodies has been proven to be ineffective with a delayed and low immune response.

Minimise ND field virus transmission

Vaccination against ND at the hatchery has significant advantages, especially when the most effective ND vaccines are included in the programme. Virulent challenge studies help to evaluate and compare the protection given by different vaccination regimens.

Morbidity, mortality and diverse types of immune responses (cell-mediated, systemic and local antibody-mediated immune responses) were measured after very virulent ND challenge to evaluate the protection given by a conventional ND vaccination regimen versus a vectored vaccine administered to commercial broilers at the hatchery. Virulent ND challenge virus excretion helps to measure efficacy in the control of systemic virus replication after inoculation (Fig. 1). Challenge with a vvNDV (Genotype VII) was performed at 28 days of age.

In summary, Newcastle disease continues to challenge poultry production globally causing some

countries devastating losses. Implementation of ND immunisation programmes must be adopted to minimise the risks involved with this viral challenge. Comparison of different ND vaccination regimens allows protection levels and consequent economic benefits to be evaluated.

Studies have shown the broad spectrum of protection and lifelong immunity elicited by Vectormune ND when compared with conventional inactivated vaccines.

Maternally-derived immunity does not interfere with the immunity induced by Vectormune ND. Additionally, it allows massive and uniform immunisation when applied at the hatchery along with a live ND enterotropic strain, inducing a synergistic immune response early in the life of the bird. The superior performance of Vectormune ND is due to its ability to avoid MDA interference and the capability to elicit all types of immunity. ■

References are available from the author on request

Fig. 2. Comparison of virus excretion after virulent NDV challenge.

