1 – COMPARISON OF TWO DIFFERENT NEWCASTLE DISEASE STRATEGIES IN SOUTHERN ASIA: A FIELD EXPERIENCE

by Limaye M., Nagargoje S., Perumal S.,
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Almost 100 years since the first report and Newcastle disease (ND) is still present worldwide as one of the most expensive diseases for poultry. The OIE/WAHIS surveillance system visualises the presence of ND in Asia recently (Table 1). We all know that epidemiology cannot be limited with the boundaries and we can expect its presence everywhere.

Poultry producers in the Indian subcontinent apply different strategies to control ND considering the seasonal pattern. Between March and September, it is the hot and dry season where the ambient temperature range is above 40°C in some parts, predisposing flocks to clinical/ subclinical ND problems as a high ND season. The rest of the year is cooler and rainy with milder temperatures. This is considered the 'low' ND season. A field case (Table 2) was run specifically during the low ND season, to demonstrate the advantage of a rHVT vector ND vaccine over the inactivated ND vaccines, even in low-challenge conditions.

We can easily expect, of course, much better advantages during the high ND season.

Table 2. Field case run during the low ND season.

Groups	Hatchery vaccination	Field vaccination
1	Inactivated ND + live ND (LaSota) at day 1	Live ND (LaSota) at day 14
2	rHVT - ND + live ND (LaSota) at day 1	Live ND (LaSota) at day 14

The rHVT Vector ND flocks showed a significant rise in haemagglutinin inhibition (HI) titers. 70% of the flocks reported high HI titers (above three) before four weeks of age (Fig. 1).

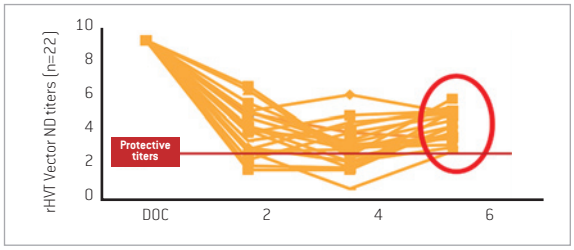

Fig. 1. 70% of the flocks reported high protective HI titers before 4 weeks.

The inactivated ND vaccine flocks showed a rapid decline in HI titers below the positivity threshold (3) from four weeks onwards, only 14% of the farms showed titers above three (Fig. 2). The rHVT Vector ND group has a lower mortality and an additional body weight.

Fig. 2. 14% of the farms showed marginally protective titers before 4 weeks.

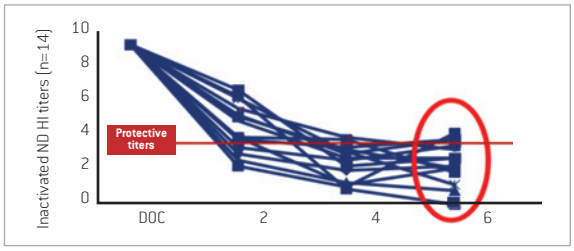

Table 1. The presence of Newcastle disease in Asia. ■ Present ■ Present

Newcastle disease virus (Inf. with)			Jan-Jun 2018	Jul-Dec 2018	Jan-Jun 2019	Jul-Dec 2019	Jan-Jun 2020	Jul-Dec 2020	Jan-Jun 2021
	Bangladesh	Domestic	■	■	■	■	■	–	–
	PRo China	Domestic	■	■	–	■	–	–	–
	Hong Kong	Domestic	■	■	■	■	■	■	–
	India	Domestic	■	■	■	–	–	–	–
	Indonesia	Domestic	■	■	■	■	–	–	–
	Malaysia	Domestic	–	–	■	–	–	–	–
	Myanmar	Domestic	■	■	■	■	–	–	–
	Nepal	Domestic	■	■	■	■	–	–	–
	Pakistan	Domestic	■	■	■	■	■	■	■
	Philippines	Domestic	■	■	■	■	–	–	–
	Sr Lanka	Domestic	■	■	–	–	–	–	–
	Vietnam	Domestic	■	■	■	■	–	–	–

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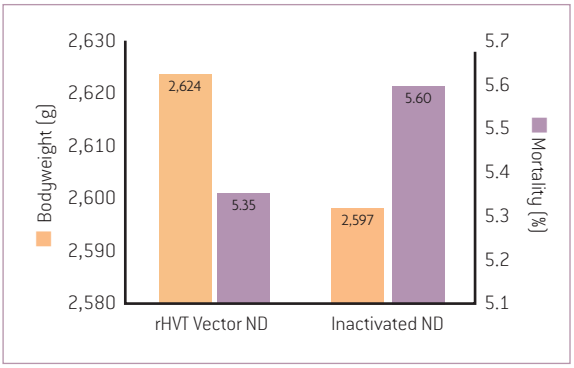

Fig. 3. Bodyweight and mortality.

CONCLUSION

Although this field case was run during the low ND season, day-old chicks showed a high level of maternally derived antibodies (MDA), since breeders are vaccinated several times with ND vaccines.

That high level of MDA brings both advantages and disadvantages, according to the vaccine selection in broilers.

IN INACTIVATED ND GROUP:

This group showed very low serological and lower performance results. The reason behind this worse result is due to the interference between MDA and the inactivated ND vaccines.

IN RHVT VECTOR ND GROUP:

This group showed very good serological and better performance results. The reasons for these better results are as follows:

- **Eliciting all immune responses:** Vectormune ND elicits humoral, mucosal and cell-mediated immune responses unlike the inactivated ND vaccines, which elicit only humoral immune response.

- **Avoiding MDA Interference on Immunity:** Vectormune ND vaccine generates early immunity through cell to cell replication without getting in contact with MDA.

- **Minimising ND field virus transmission:** Vectormune ND is a strong tool to stop the uncontrolled transmission of the velogenic and lentogenic forms of ND. ■

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References are available from the authors on request

2 – STRATEGIC DECISION FOR NEWCASTLE DISEASE PREVENTION STRATEGY IN LOW ND CHALLENGE COUNTRIES

by Sandikli M.S., Cherfane A., Sarabia J., González G., Sesti L., Ceva Santé Animale, France.

Newcastle disease virus (NDV), known as avian paramyxovirus serotype 1 (PMV-1), is considered one of the most important diseases of poultry.

Newcastle disease (ND) continues to challenge poultry production operations even in low ND challenge countries like the EU or in Brazil. With live ND vaccines it is not possible to keep the balance between safety and efficacy. There is a need for a better solution to protect against uncontrolled circulation of PMV-1 strains, especially in densely populated poultry areas.

Fig. 1 raises the awareness of the presence of PMV-1 and the rolling infection due to the classical vaccines used in Europe.

347 flocks with no ND vaccination were chosen randomly and tested at slaughter age with ELISA specific commercial kits. While expecting that flocks should not exceed the negative threshold, results came to highlight that 29% of the flocks showed positive titers. And 11% of the flocks showed challenge titers.

Table 1. Results from ELISA testing.

347 Flocks. No ND vaccinated flocks.	71% negative serology	29% positive serology	11% challenge titers

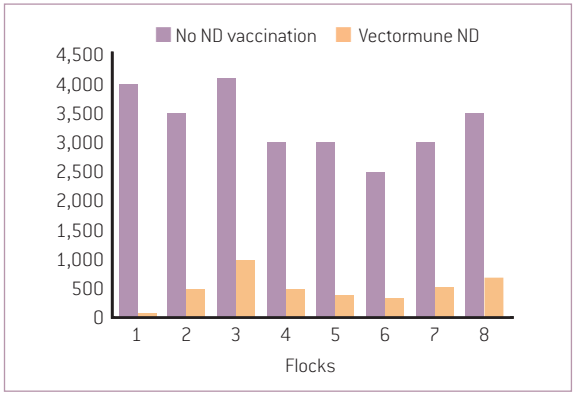


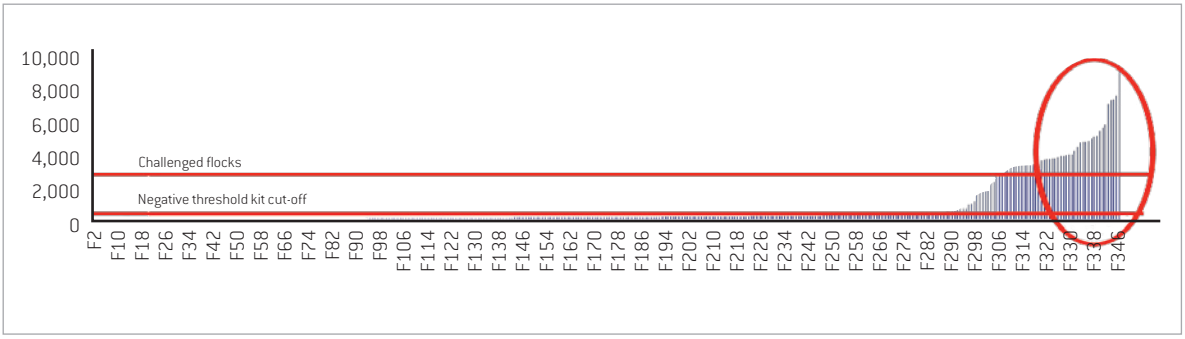
Fig. 2. Vectormune ND reduces live vaccine virus circulation.

Fig. 2 shows an example of a silent spread of PMV-1 strains in ND-free regions such as Brazil. A broiler integration in Brazil producing 7.7 million day-old chicks per month, with no history of ND vaccination conducted in the last 20 years was evaluated for the presence of a viral respiratory infection.

At processing age (42 days), Vectormune ND vaccinated flocks showed better and more uniform results than non-vaccinated flocks with high and heterogenous serology results.

In addition to the serology results, condemnation and airsacculitis rates and medication costs are also important elements to evaluate the production performance.

Fig. 1. Live ND vaccine circulation from neighbouring flocks. Rolling infections.



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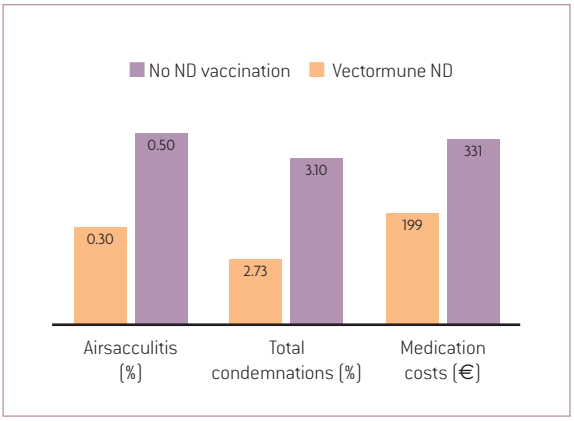

Fig. 3. Vectormune ND reduces live vaccine circulation, improving performance.

Fig. 3 shows the results of the condemnations rate and medication costs from a company. One group was without ND vaccination during two consecutive broiler cycles (298,000 chickens/cycle; eight houses) and the other group was with only Vectormune ND vaccination during one broiler cycle (285,000 chickens/cycle; same eight houses).

In Vectormune ND vaccinated flocks, we can clearly see the better results of the condemnation rates, airsacculits rates and, as a consequence, the better result of medication cost.

CONCLUSION

In low ND challenge countries, one of the options is live mild vaccines which can bring the risk of virus circulation in the field together with post-vaccination reactions and as a consequence of therapeutic antibiotics usage.

Another option is not to vaccinate. However, in the presence of live virus circulation, this option brings risks as well.

Vectormune ND in ND-free or low ND pressure areas:

- **Prevents the uncontrolled circulation of lentogenic NDV strains.**
- **Significantly increases performance by improving respiratory health.**
- **Reduces the use of antibiotics.** ■

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References are available from the authors on request

3 – STRATEGIC DECISION FOR NEWCASTLE DISEASE PREVENTION TAKING CONTROL OF TRANSMISSION

by Sandikli M.S., Cherfane A., Sarabia J., González G., Tatár-Kis T. and Cazaban Ch., Ceva Santé Animale, France.

Commercial poultry production is facing many health challenges, including respiratory ones. As a consequence, mitigation or reduction of virus circulation between houses or farms is of paramount importance to keep the respiratory tract healthy and be able to reach one's production targets.

Besides biosecurity, there is a need to get access to vaccines with the best features in terms of protection, but also prevention against the uncontrolled circulation of avian paramyxovirus type 1, also known as Newcastle disease virus (ND virus) in its pathogenic ('velogenic') form. Vectormune ND is an innovative vector vaccine which elicits an early, broad and long lasting immunity; vaccinated chickens shed significantly less virus than unvaccinated ones.

A recent publication about Vectormune ND provided the additional asset of significantly reducing the likelihood of virus transmission among birds. Indeed, a velogenic ND virus was provided with a reproduction ratio (R value) figure of 3.20; it basically means that 10 infected chickens are able to transmit the disease to 32 new birds, hence explaining the spreading capacity of this disease to neighbouring houses; the outcome will be increased losses, including high mortality rate in case of velogenic strains.

On the contrary, in Vectormune ND-vaccinated broilers, the reproduction ratio (R value) dropped to 0.82, which means that vaccinated flocks will significantly reduce and slow down the spreading of the virus. In addition, they will survive thanks to a strong protection. This publication helps us to understand that Vectormune ND controls and prevents Newcastle disease outbreaks despite a different genotype between challenge strain and vaccine insert.

CONCLUSION

Vectormune ND is a strong tool to break the uncontrolled transmission of NDV among chickens in a house, in between houses in a farm, and ultimately among farms in a high densely populated poultry area. Hence, Vectormune ND helps to prevent and control Newcastle disease outbreaks in the poultry industry and also protects performance.

In this way, Ceva Animal Health provides more evidence towards supporting its customers to achieve their targets all around the world. ■

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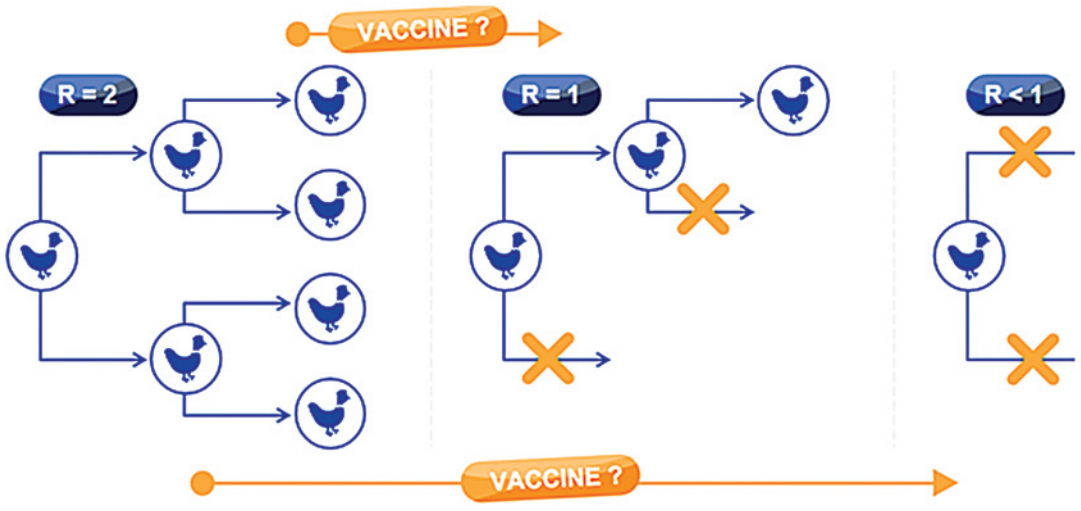


4 – STRATEGIC DECISION FOR NEWCASTLE DISEASE PREVENTION

RHVT-ND VACCINE MAKES THE DIFFERENCE VS. INACTIVATED ND VACCINES

by Sandikli M.S., Cherfane A., Sarabia J., González G., Tatár-Kis T. and Cazaban Ch., Ceva Santé Animale, France.

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 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 make it the ultimate advanced tool for ND control. In this field study, one million birds from the same commercial operation had two different ND vaccination programmes and grown-up to 41 days of age targeting 2.5kg average live body weight.

Production parameters	Inactivated ND	Vectormune ND	P value*
Number of flocks	39	13	–
Chick quantity (m²)	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

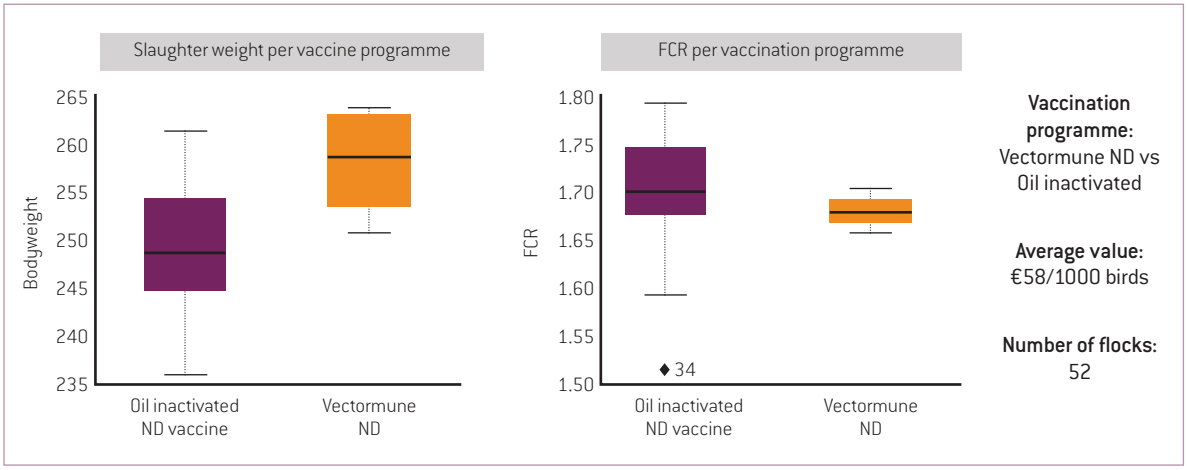
Table 1. Production performance parameters comparing ND vaccination programmes.

These results bring €58 economical benefits per 1,000 birds.

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

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

Fig. 1. Statistical analyses of Vectormune ND vs. Inactivated ND vaccines showing higher body weight (100g) and a lower feed conversion ratio (3 points) in broiler flocks vaccinated with Vectormune ND.



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ELICITS ALL TYPES OF IMMUNITY

Vectormune ND elicits humoral, mucosal and cell-mediated immune responses unlike the inactivated ND vaccines, which elicit only humoral immune response.

AVOIDING MDA INTERFERENCE ON IMMUNITY

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 strong and lifelong immunity. This may be accomplished with an adequate immunisation programme. Vectormune ND vaccine strain generates its early immunity through the cell to cell replication without getting in contact with the systemic maternal antibodies.

MINIMISE ND FIELD VIRUS TRANSMISSION

Virulent ND challenge virus excretion helps to measure efficacy in the control of systemic virus replication after inoculation between a conventional ND vaccination versus a vectored vaccine administered to commercial broilers at the hatchery. (Fig. 1). Challenge with a vvNDV (Genotype VII) was performed at 28 days of age.

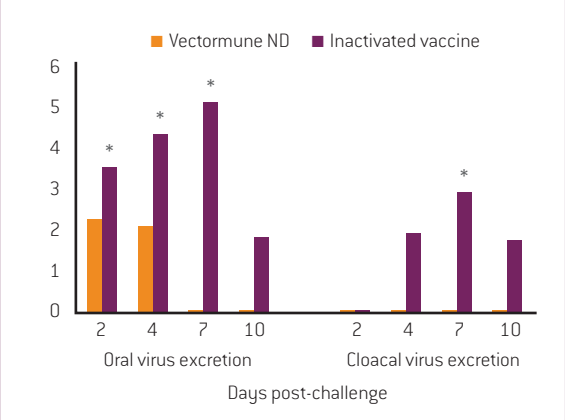

Fig. 2. Comparison of virus excretion after virulent NDV challenge.

SUMMARY

The superior performance of Vectormune ND is due to its ability to avoid MDA interference and the capability to elicit all types of immunity. ■

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

Production parameters	Vectored	Inactivated (oil emulsion)
Massive immunisation via SQ	Yes	Yes
Massive immunisation via In-ovo	Yes	No
Avoiding MDA interference	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 and 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)

5 – STRATEGIC DECISION FOR NEWCASTLE DISEASE PREVENTION

RHVT-ND VACCINE MAKES THE DIFFERENCE VS. LIVE ND VACCINES

by Sandikli M.S., Movenko O, Cherfane A., Sarabia J., and Cazaban Ch., Ceva Santé Animale, France.

Newcastle disease (ND) is a highly contagious and often severe disease present worldwide that affect multiple species of birds including domestic poultry.

Live ND vaccines are essential piece of a complete vaccination programme in ND endemic regions. Until the vector ND vaccines developed, the live ND vaccines were the only tool of the common vaccination programmes. Depending on the higher ND challenges the producers used to increase the number of live ND vaccines. However, indeed there are consequences of increasing the live ND vaccines such as; post vaccination reactions, worsen flock uniformities, higher ND virus shedding and circulation.

Post vaccination reactions can lead subtle to overt respiratory signs, because of the inflammation of the trachea. It may worsen in case of suboptimal husbandry conditions (too high stocking density, high ammonia level, wet litter, poor ventilation).

As a result, flock uniformity will decrease, and secondary opportunistic respiratory infections (eg, E.coli) may arise with the need to apply antibiotic medication. Ultimately, slaughterhouse condemnations may increase due to excessive airsacculitis.

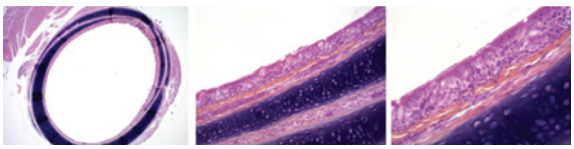
The application of certain live vaccines in the field can cause the appearance of undesired post-vaccination reactions.

The following company showed respiratory symptoms from 25 days of age. The vaccination programme had four live ND vaccines:

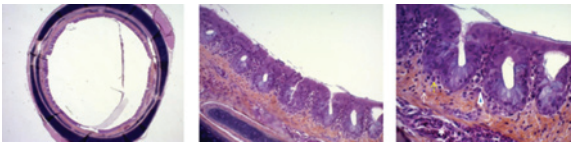
- Two clone 30 applications via spray at day old and at day 7
- Two La Sota applications by drinking water at day 12 and 21

Due to the frequent occurrence of post-vaccination respiratory problems, it was decided to carry out a comparative study between two groups of chickens. In the first group, the aforementioned vaccination programme was applied and in the second group, in addition to the vaccination programme with live ND vaccines, they were vaccinated with Vectormune ND at day old at the hatchery. Each study group included more than one million commercial broilers.

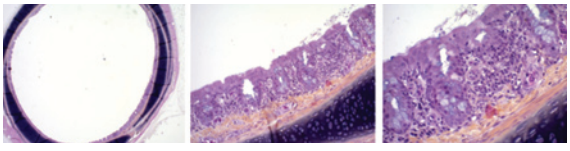
SCORE 0
No inflammatory lesion. Rare lymphocytes and plasmocytes. No congestion.



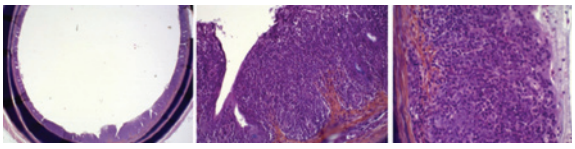
Score 1
Light inflammatory lesions. Spots of lymphocytes and plasmocytes. Light congestion.

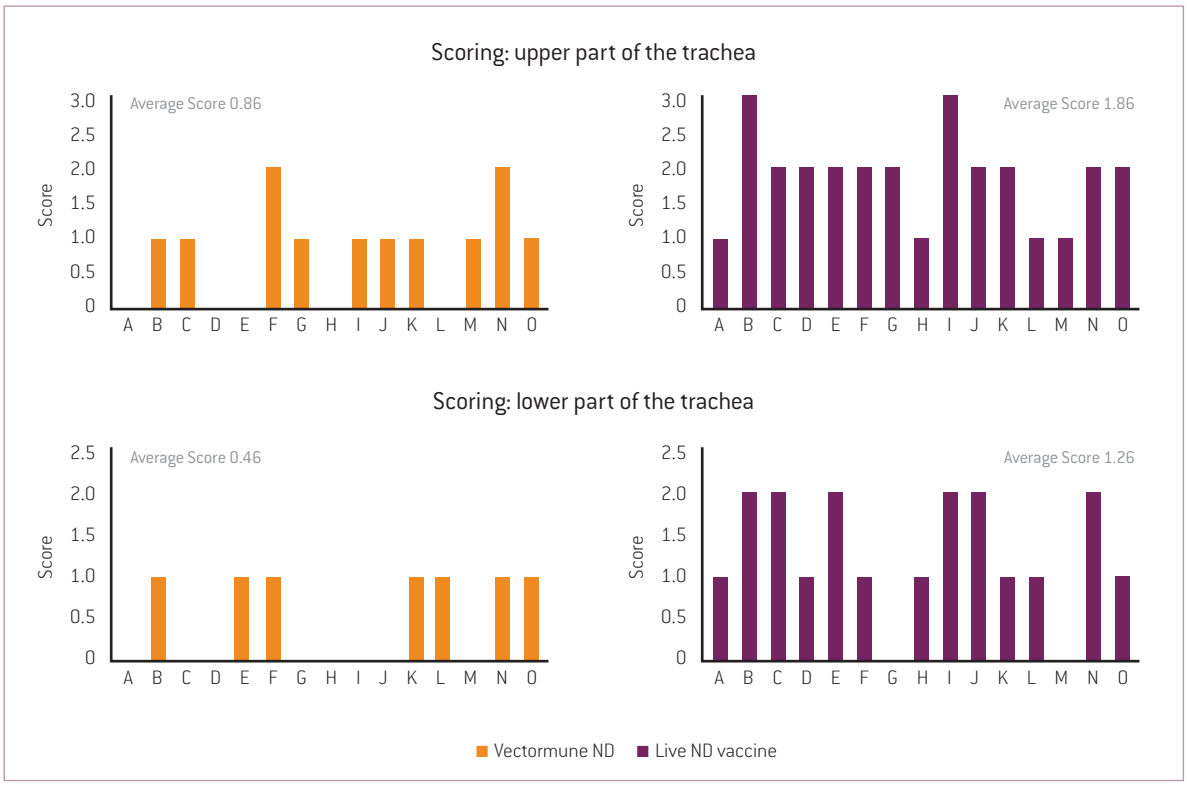


Score 2
Moderate inflammatory lesions. Lymphocytes and plasmocytes invasion inducing thickening spots around the trachea wall.



Score 3
Severe inflammatory lesions. Lymphocytes and plasmocytes invasion inducing thickening all around the trachea wall.





MATERIAL AND METHODS

To evaluate the effect on tracheal tissue, 15 chickens were randomly chosen from each group at 25 days of age. Healthy birds were selected and none of the flocks showed respiratory symptoms during the previous days.

Complete trachea samples from the larynx to the bifurcation of the bronchi were taken. Histological evaluation ranges from 0 (no inflammatory lesion) to 3 (severe inflammatory lesions). Previously a control necropsy was performed to verify the absence of lesions.

At the slaughter age (43 days), the serological HI test study and an economic evaluation was carried out for both groups.

RESULTS

The Live ND vaccine programme birds, clearly showed a higher level of inflammatory lesions both in the lower and upper tract of the trachea than the Vectormune ND group.

Regarding serology, only 31% of the vaccinated group showed protective antibody levels (HI>3), while 100% of the Vectormune ND vaccinated group showed protective levels of antibodies.

As for the broiler performances, the Vectormune ND group showed an improvement in the productive parameters compared to the Live ND group.

Vectormune ND group showed an improvement of 21 points in EPEF, 3.3% better livability and 1.2kg more of meat/m².

Vaccination Programme	Vectormune ND programme	Live ND programme
Number of birds (Million)	1.07	1.06
Birds HI test >3 at Day 43 (%)	100	31
Livability (%)	96.3	93.0
Meat (kg/m²)	54.2	53.0
European Index	353	332

CONCLUSION

• Histological analysis of the trachea reveals the negative impact of La Sota vaccine. These Post Vaccination Reactions (PVR) are susceptible to affect the trachea health and facilitate respiratory outbreaks.

• Vectormune ND is decreasing the intensity of La Sota vaccine Post vaccination reaction and decreasing the number of respiratory outbreaks

• Vectormune ND group showed a better immune response level measured with HI tests leading to a better level of protection.

• Vectormune ND group, showed stronger economical results of; Livability, EPEF, Meat kg/m².