

IMPROVING PROTECTION, INCREASING PRODUCTIVITY

Innovax[®] ND-IBD: unique 3-in-1 long-term protection against IBD, ND and MD

ALWAYS REDUCING THE THREAT FROM INFECTIOUS DISEASES

POULTRY IS ONE OF THE FASTEST GROWING FOOD PRODUCTION SECTORS WORLDWIDE. TO TAKE FULL ADVANTAGE OF THIS OPPORTUNITY AND DELIVER THE HIGH PERFORMANCE REQUIRED, THE THREAT FROM INFECTIOUS DISEASES MUST BE CONTROLLED.

Innovax® ND-IBD has been developed to make disease control more effective and more convenient. It is the first ever dual-construct HVT vaccine to offer long-term protection against three of the most important infectious diseases that threaten today's commercial poultry operations – Newcastle Disease, Infectious Bursal Disease and Marek's Disease.

NEWCASTLE DISEASE

Newcastle Disease (ND) is a ubiquitous threat to the poultry industry hurting livability, broiler performance and causing plant rejects. The presence of ND can also restrict international trade, as well as production losses in egg-producing birds, causing further economic harm. Vaccination against ND is effective, but traditional live vaccines induce vaccination reactions and inactivated vaccines used in broilers may hurt performance. ND control remains a challenge to the poultry industry.

INFECTIOUS BURSAL DISEASE

Infectious Bursal Disease (IBD) is a widespread immunosuppressive viral disease that has been linked to mortality, susceptibility to other disease challenges, plant rejects and to reduced pullet uniformity. Field application of IBD vaccines requires labour and effort to achieve uniformity of vaccination, and it must be timed to achieve maximum efficacy

in the face of maternally derived antibodies using formulas such as the Deventer Formula. The challenges to best define the correct timing and manage optimal application, make IBD one of the biggest threats to productivity for the poultry industry.

MAREK'S DISEASE

Marek's Disease virus is present in most poultry facilities. The virus, located in poultry dust and dander, is impossible to eliminate from the complex poultry house environment, even with careful cleanout and disinfection procedures. This herpes virus attacks the nerves, which can produce lameness, but it can also cause tumours or enlarged feather follicles in affected birds. It results in broiler rejects at processing and can cause mortality and egg production losses in egg-laying birds. Hatchery vaccination has proven to be an extremely effective prevention strategy for many years.



NO NEED TO CHOOSE

HVT is a safe and effective foundation for biotechnology vaccines, but HVT-based vaccines interfere with one another.

Now there is no need to choose: Innovax® ND-IBD is a dual-construct HVT vaccine protecting against ND, IBD and Marek's disease in a single, non-reactive vaccine.

INTRODUCING INNOVAX[®] ND-IBD

FOR THE FIRST TIME, THE POULTRY INDUSTRY CAN ENJOY SAFE, EFFECTIVE, LONG-TERM PROTECTION AGAINST THREE OF THE MOST IMPORTANT INFECTIOUS AND COMMERCIALY DISRUPTIVE FLOCK DISEASES IN A SINGLE VACCINE.

Innovax[®] ND-IBD provides comprehensive, long-term protection against Newcastle Disease (ND), Infectious Bursal Disease (IBD) and Marek's Disease (MD) with just one injection.

Innovax[®] ND-IBD is the first ever dual-construct HVT vaccine available to the poultry industry. This unique development means protection against both IBD and ND is now possible in a single dose to

deliver improved flock protection, increase productivity and minimise operational disruption. Vaccination at the hatchery with a non-reactive HVT construct technology ensures more uniform protection while eliminating performance losses due to respiratory vaccination reactions or concerns about maternal antibody interference with traditional IBD vaccines.

IMPROVING PROTECTION INCREASING PRODUCTIVITY

UNIQUE 3-IN-1 PROTECTION

More dependable and complete performance, whether measured by growth rate, feed efficiency or egg production: all performance parameters can enjoy maximum potential without interference from ND, IBD or Marek's disease.

MORE EFFICIENT DISEASE CONTROL

Hatchery vaccination ensures better process control; 3-in-1 protection means that producers do not have to choose between reduced ND vaccination reaction or improved IBD protection without timing.

SUPERIOR, LONG-TERM DISEASE PREVENTION

Innovax[®] ND-IBD has demonstrated protection against standard virulent ND and IBD as well as genotype VII ND and vIBD challenges and classical, variant (Var E) and vIBDV (CS89) challenges.

PRODUCING IMPROVED RETURNS ON INVESTMENT

Reduced field vaccination labour, reduced medication cost. Improved processing plant efficiency and reduced downgrading/condemnation rates, which leads to a better processing yield.

HEALTHIER, MORE PRODUCTIVE BIRDS

Innovax[®] ND-IBD eliminates live ND vaccination reaction, inactivated ND performance loss and protects against IBD without worry about MDA interference.

PRODUCING MORE OPPORTUNITIES

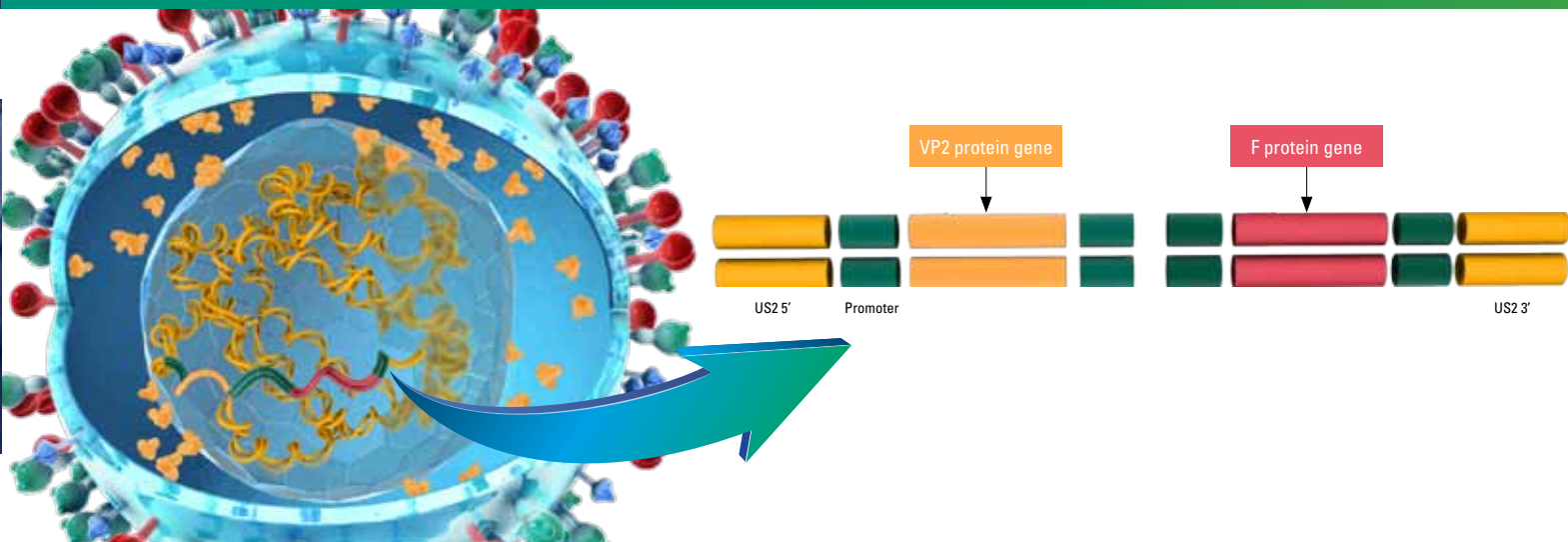
Innovax[®] ND-IBD is part of a complete bird health programme to reduce overall antibiotic use through better disease control without reaction.

INNOVATING TO PRODUCE MORE

TECHNICAL DEVELOPMENT

The FC126 HVT, a proven foundation for single-construct HVT vaccines, is the backbone of the dual-construct Innovax® ND-IBD. The cassette containing the important F protein gene from ND and the VP2 protein gene from IBD is inserted at the *Unique short* (US) region of the HVT virus.

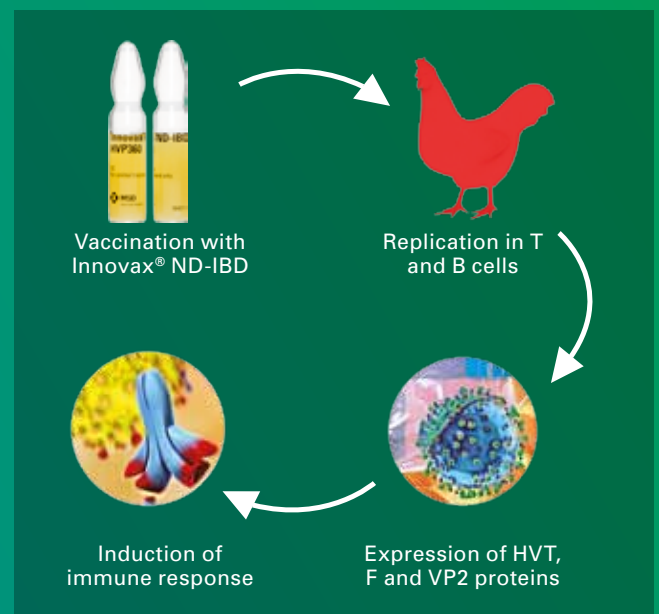
- The HVT virus is broken into cloned fragments which are reassembled with the new genes in chicken embryo fibroblast cells.
- The new dual-construct HVT virus is checked by testing to ensure that the new virus is configured correctly with the ND-F + IBDV-VP2 genes in the correct orientation, correct location, and without foreign sequences.
- The new dual-construct proved to be stable, after multiple passages in tissue culture and in chickens, the virus continues to express the VP2 and F proteins.



HOW IT WORKS

Innovax® ND-IBD is vaccinated into day-old chicks with care to ensure the viability of this cell associated vaccine. It is extra important to ensure that every chick or every hatching egg is properly vaccinated because HVT-based vaccines cannot spread from bird-to-bird in the field.

Once birds are vaccinated, the virus infects T and B lymphocytes, expressing and presenting the proteins for HVT, F and VP2. The immune system develops immunity (antibodies and cell mediated) to the HVT virus, but also to the IBD-VP2 and ND-F proteins expressed by the inserted genes. The antibodies against the F protein prevent ND challenge virus from fusing or attaching to cells, providing protection against ND. The antibodies against the VP2 protein prevent IBD challenge virus from infecting cells, providing protection against IBD.



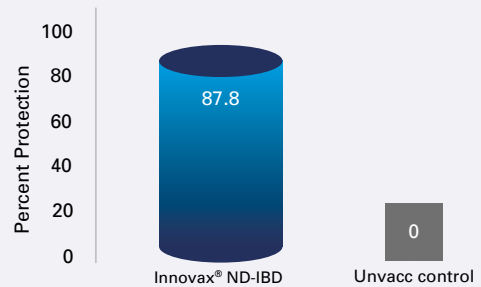
Introduction of protective immunity against MD, ND and IBD

THE PROTECTION YOU NEED

ONSET AND DURATION OF IMMUNITY: MAREK'S DISEASE

SPF birds were vaccinated with the minimum dose of Innovax® ND-IBD via subcutaneous route. They were challenged at 9 days post vaccination using very virulent Marek's disease virus (vvMDV) RB1B according to monograph 0589 of the EU Pharmacopoeia. Protection is considered long-term to Marek's disease because the vaccine is a persistent herpes virus.

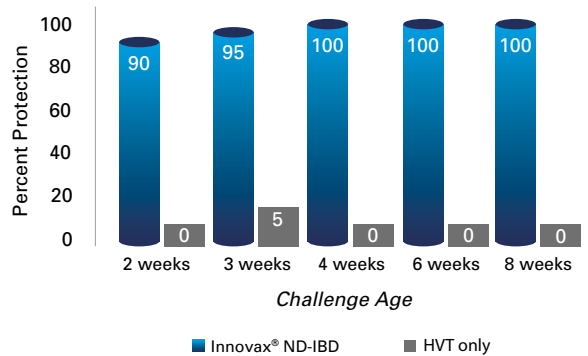
MAREK'S PROTECTION¹



ONSET AND DURATION OF IMMUNITY: INFECTIOUS BURSAL DISEASE

SPF birds were vaccinated with a minimum dose of Innovax® ND-IBD via subcutaneous route and challenged at 2, 3, 4, 6 and 8 weeks of age with very virulent IBD virus (vvIBDv) CS 89 according to monograph 0587 of the EU Pharmacopoeia. Controls were vaccinated with regular HVT vaccine.

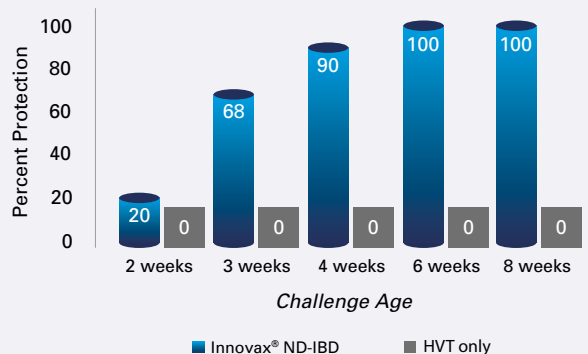
IBD ONSET OF IMMUNITY¹



ONSET AND DURATION OF IMMUNITY: NEWCASTLE DISEASE

SPF birds were vaccinated with the minimum dose of Innovax® ND-IBD via subcutaneous route. They were challenged at 2, 3, 4, 6 or 8 weeks of age with virulent Herts 33/56 NDV according to monograph 0450 of the EU Pharmacopoeia.

NDV ONSET OF IMMUNITY¹



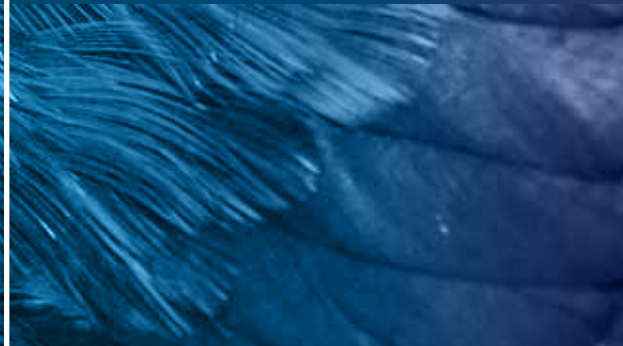
CONCLUSION

Innovax® ND-IBD demonstrated:

- ✓ Proven protection against vvMDV at 9 days of age
- ✓ Consistent protection against NDV Herts strain challenge
- ✓ Protection against vvIBDV CS89 strain
- ✓ Duration of immunity against all three disease challenges is considered long-term for broilers



innovax[®]
ND-IBD



POULTRY IS ONE OF THE
FASTEST GROWING FOOD
PRODUCTION SECTORS
WORLDWIDE. TO TAKE
FULL ADVANTAGE OF THIS
OPPORTUNITY AND DELIVER
THE HIGH PERFORMANCE
REQUIRED, THE THREAT FROM
INFECTIOUS DISEASES MUST BE
CONTROLLED.

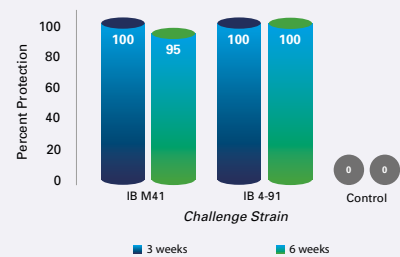
PROVING COMPATIBILITY

INNOVAX® ND-IBD COMPATIBILITY WITH LIVE INFECTIOUS BRONCHITIS (IB) VACCINES

1. IB CHALLENGE STUDY

SPF birds were vaccinated with a minimum dose of Innovax® ND-IBD by subcutaneous route and with a concurrent dose of Nobilis® IB Ma5 or Nobilis® IB 4-91 via oculonasal route. Birds were challenged with virulent IB M41 and virulent IB 4-91 at 3 and 6 weeks post-vaccination.

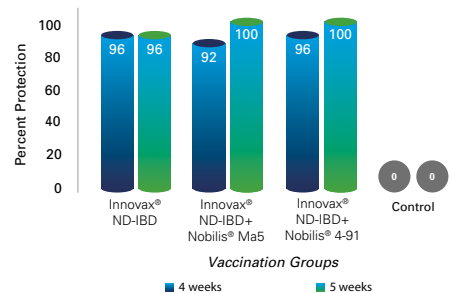
NO IMPACT ON IBV PROTECTION¹



2. ND CHALLENGE STUDY

SPF birds were vaccinated with a minimum dose of Innovax® ND-IBD by subcutaneous route and with a concurrent dose of either Nobilis® IB Ma5 or Nobilis® IB 4-91 via oculonasal route. Birds were challenged with virulent Herts 33/56 NDV at 4 and 5 weeks of age.

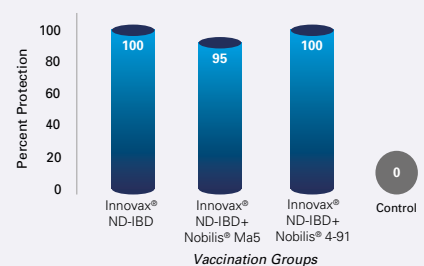
NO IMPACT ON NDV PROTECTION¹



3. IBD CHALLENGE STUDY

SPF birds were vaccinated with a minimum dose of Innovax® ND-IBD by subcutaneous route and with a concurrent dose of either Nobilis® IB Ma5 or Nobilis® IB 4-91 via oculonasal route. Birds were challenged with vvIBDV CS89 at 2 weeks of age.

NO IMPACT ON IBD PROTECTION¹



CONCLUSION

Innovax® ND-IBD demonstrated compatibility with Nobilis® IB Ma5 and Nobilis® IB 4-91.

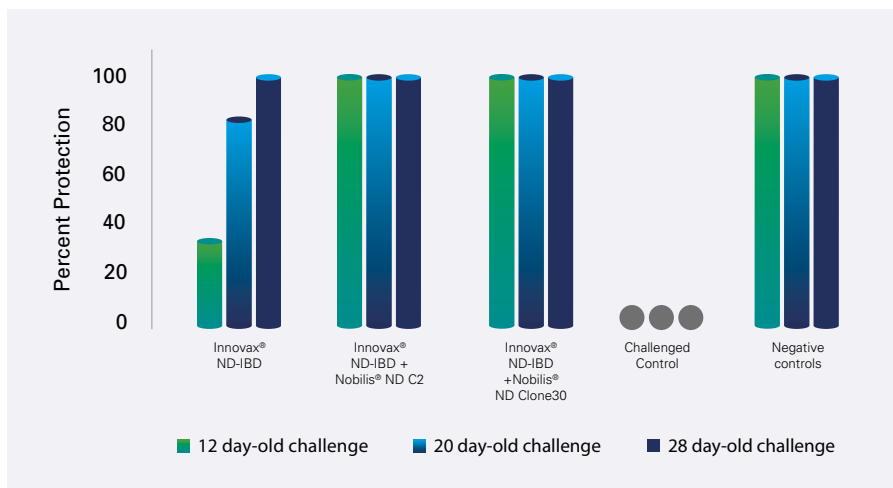
- ✓ Protection against virulent Herts 33/56 NDV challenge at 4 and 5 weeks of age
- ✓ Protection against virulent M41 and 4-91 IBV challenge at 3 and 6 weeks of age
- ✓ Protection against very virulent CS89 IBDV challenge at 2 weeks of age

EXPANDING PROTECTION

INNOVAX® ND-IBD COMPATIBILITY WITH LIVE NEWCASTLE DISEASE VACCINES AGAINST VELOGENIC NDV GENOTYPE VII

SPF birds were vaccinated with a minimum dose of Innovax® ND-IBD by subcutaneous route and with a concurrent dose of either Nobilis® ND C2 or Nobilis® ND Clone 30 via oculonasal route. Birds were challenged with virulent Egyptian isolate of genotype VII ND virus at $10^{5.0}$ ELD₅₀ per bird at one of three time points: 12 days, 20 days or 28 days. Innovax® ND-IBD gave significant protection at 20 days post vaccination, which was extended to full protection when Nobilis® ND C2 or Nobilis® ND Clone 30 was added to the vaccination programme.

EXPANDING NEWCASTLE DISEASE PROTECTION¹



CONCLUSION

- ✓ Innovax® ND-IBD protects against NDV genotype VII strain challenge
- ✓ The addition of Nobilis® ND C2 and Nobilis® ND Clone 30 enhance protection when birds are challenged with NDV genotype VII strains in endemic areas

ALWAYS PRODUCING MORE

WHY USE INNOVAX® ND-IBD

- Superior, long-term disease protection and prevention
- Healthier, more productive birds
- Higher, more consistent profits
- Improved process control and consistency
- Lower costs
- Fewer disruptions to production
- Reduced antibiotic usage and medication costs
- Access to new markets

For more information contact your local MSD Animal Health representative about how you can start using Innovax® ND-IBD to protect chickens against ND, IBD and MD, or go to www.innovax-vaccines.com



REFERENCES:

¹Data on file. MSD Animal Health. Reports: GNI/0039/15, GNI/0060/16, GNI/0067/15, GNI-062R, 16R/0169, GNI/0045/16, GNI/0121/15, and NDV16.22.030

Reg. No. G4375 (Act 36/1947)

REGISTRATION HOLDER

Intervet South Africa (Pty) Ltd, Reg. No. 1991/006580/07, 20 Spartan Road, Spartan 1619, RSA
Tel: +27 (0) 11 923 9300 | Fax: +27 (0) 11 392 3158 | www.msd-animal-health.co.za
ZA/INI/1119/0002