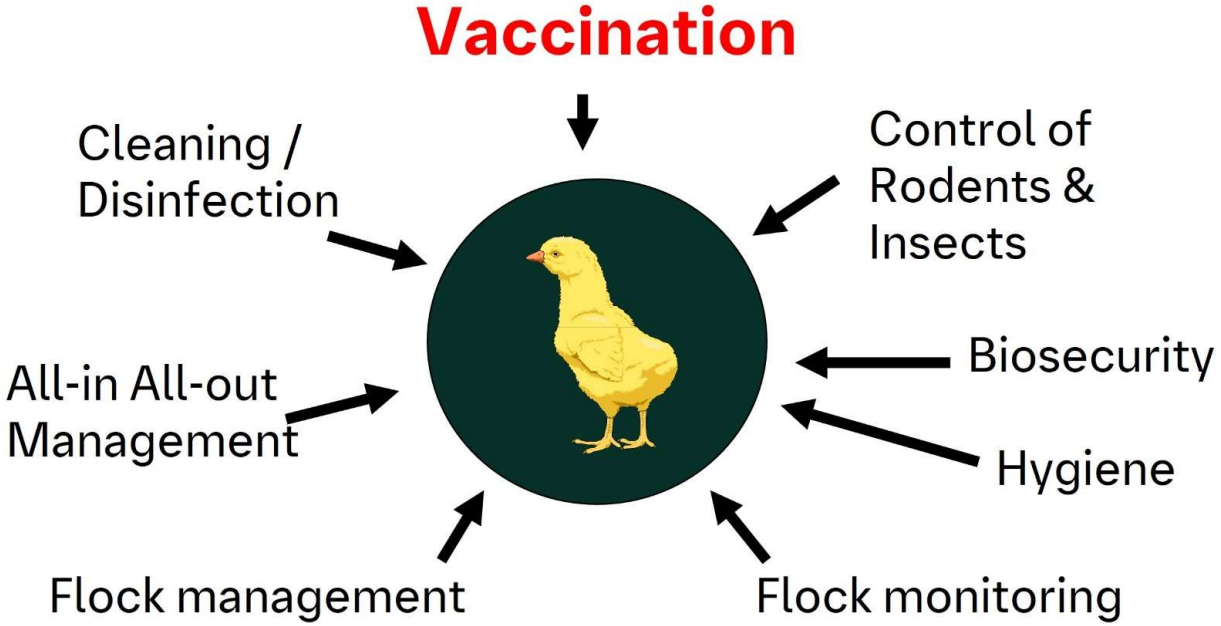
Three generations live Gumboro vaccines: Conventional, Immune-Complex and vHVT-IBD vaccines

Dr. Andreas Herrmann, Boehringer Ingelheim

Life forward

Gumboro Disease

Vaccination is an effective tool together with other measurements to control IBDV in poultry



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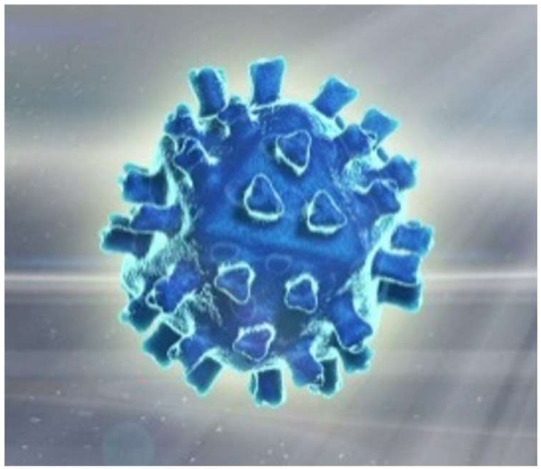
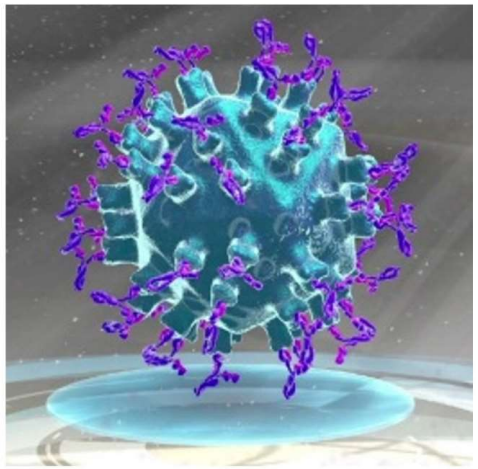
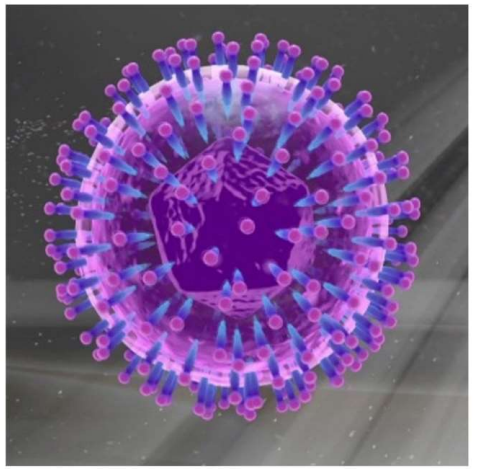
3 generations of IBD vaccines



Live by DW
Inactiv by Injection



Ag/Ab Immunocomplex



Vector HVT + IBD

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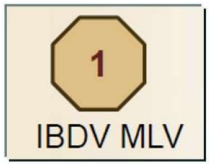
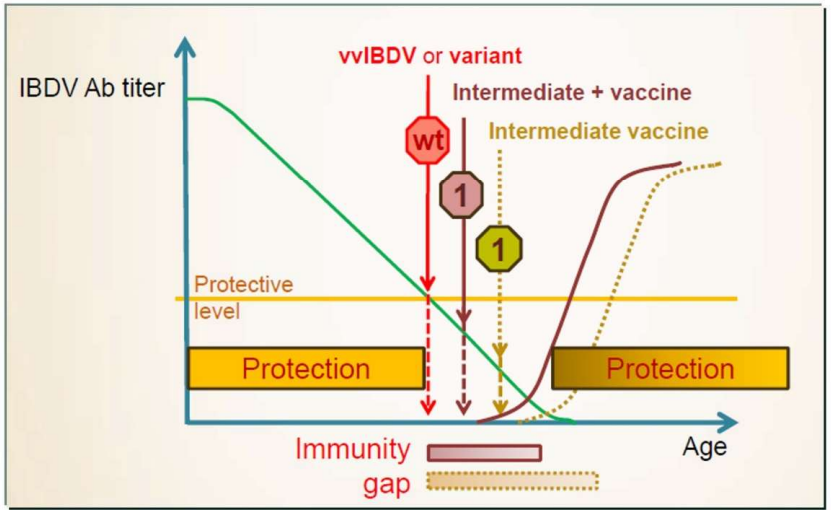
THE 1ST GENERATION: LIVE MODIFIED IBD VACCINES



BROILERS	LAYERS	BREEDERS



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Gumboro Disease
The most Critical Points for correct IBD Vaccination

Availability and type of IBD vaccines.

1. Live IBD vaccines differ in their invasiveness.

➔ Mild, intermediate, intermediate plus and hot vaccines exist.

➔ The higher the invasiveness of a vaccine is the earlier the chick can be immunized in the presence of high maternal antibodies.

➔ But high invasiveness of a vaccine is related to damage of the bursa (= immune suppression).

× Use intermediate plus and hot vaccines in broiler only, not before 12 days of age, only after priming with intermediate vaccines, only on single age farms for 2-3 cycles.

✓ **Intermediate vaccines are completely safe.**

✓ **Intermediate vaccine might be used from 1st day on.**

× Choose the right date for vaccination (mAb) and perform drinking water vaccination correctly (water quality & volume & duration).

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Gumboro Disease

Rational of using live intermediate plus IBD vaccine

- Primarily used in situations of early Gumboro problems, particularly with vvIBD, and in emergency situations to control sudden Gumboro outbreaks with vvIBD.
- Intermediate plus live IBD vaccine can be used from about 12 days of age on.
- Intermediate plus live IBD vaccine might be used once or twice in a vaccination program, depending on the quality of the chicken, single age or multi age, expected age for field infection and the type of IBD field virus.
- First intermediate live IBD vaccination and second intermediate plus live IBD vaccination may allow chicken to develop better antibody titer after various other vaccinations.
- IBD intermediate plus live vaccine may be used for 3 cycles and after it is generally recommended to switch to classic intermediate IBD live vaccine.
- Live intermediate plus IBD vaccines are recommended for broiler, but not for layer in general.

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Gumboro Disease
LIVE IBD VACCINES

- Safety / Efficacy compromise:
  - **Intermediate**:
    - Breakthrough MDA IBD ELISA titres **125-250**
    - Safer (milder strains)
    - Less effective
  - **Intermediate plus**:
    - Breakthrough MDA IBD ELISA titres **250-500**
    - Less safe (more aggressive strains)
    - More effective

- ❑ Interference with MDA → delayed protection
- ❑ Bursal damage with immunosuppression
- ❑ Risk of mutations and recombinations

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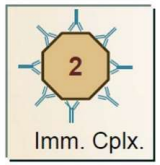
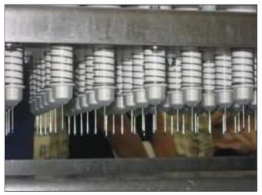
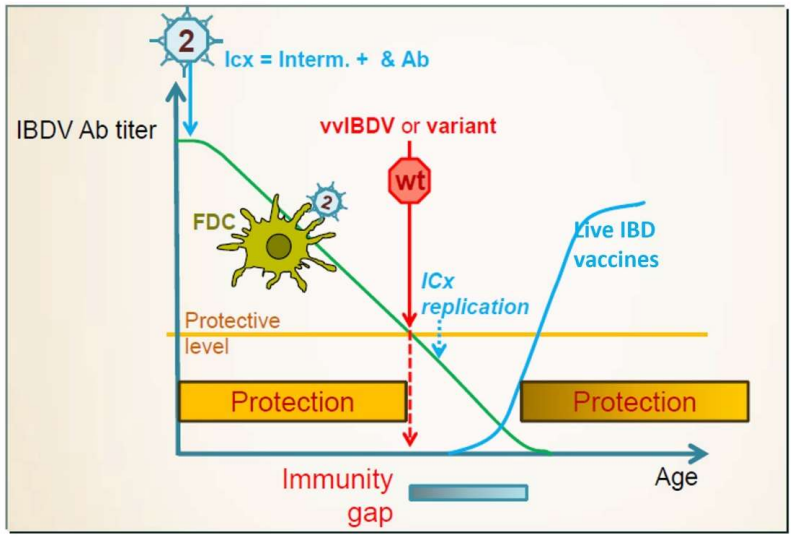
THE 2ND GENERATION: IMMUNE COMPLEX VACCINES





BROILERS ~~LAYERS~~ ~~BREEDERS~~



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IBDV-Icx vaccine - characteristics

PRINCIPLE: formulation of a **balanced** mix of a **live IBDV vaccine** Winterfield 2512 strain & **polyclonal IBDV antibodies**

AVIAN DISEASES 39:687–699, 1995

Determination of Optimum Formulation of a Novel Infectious Bursal Disease Virus (IBDV) Vaccine Constructed by Mixing Bursal Disease Antibody with IBDV

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Received 22 December 1994

TARGET FORMULA CRITERIA:

- ❑ Safety
- ❑ Efficacy / Immunogenicity

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IBDV-Icx vaccine - Mode of action

- Delayed Winterfield 2512 in vivo replication
- Replication in target organs i.e. from D8 of age instead of D3 for the nude virus

- Dentritic follicullar cells in contact with B lymphocytes to act as antigen-presenting cells
- Persistence following Ag-Ab complex vaccine administration
- No persistence for native IBDV

- Less bursa atrophy following IBDV-Icx administration vs native IBDV administration

The working mechanism of an immune complex vaccine that protects chickens against infectious bursal disease

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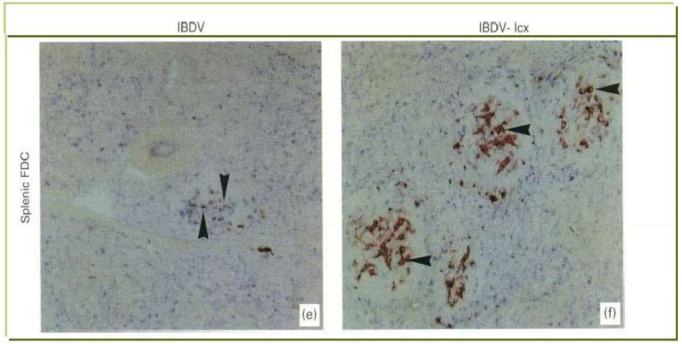
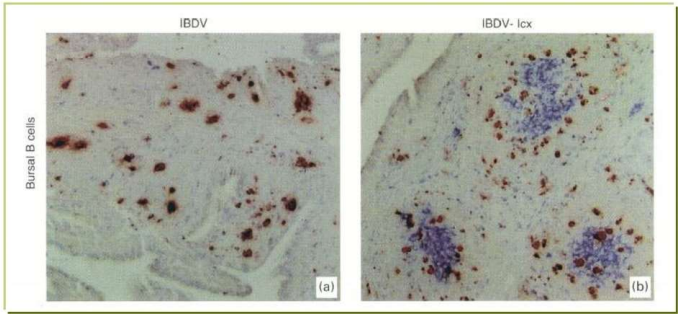
*ID-DLO, Department of Immunology, Lelystad, The Netherlands, †Fort Dodge Australia Pty Limited, Castle Hill, NSW, Australia, and ‡Embrex Inc., Research Triangle Park, NC, USA





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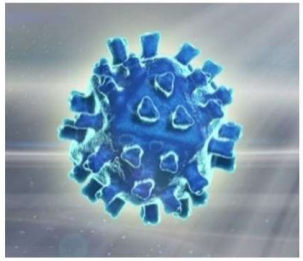
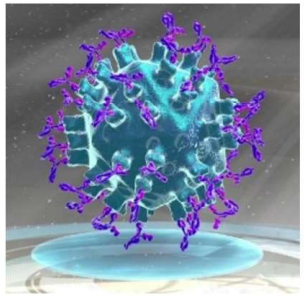
3 generations of IBD vaccines

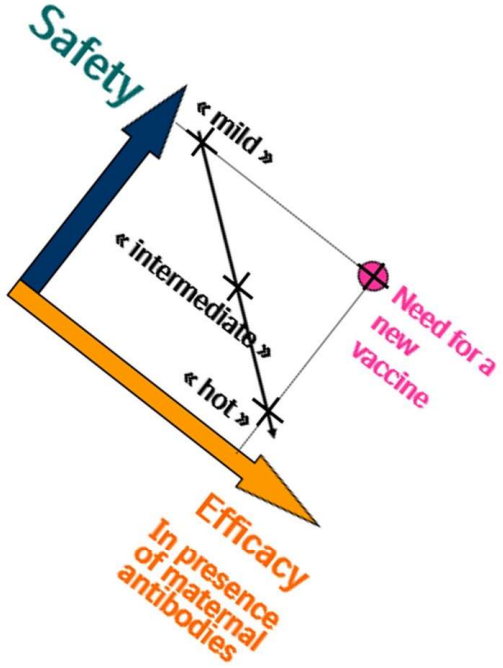


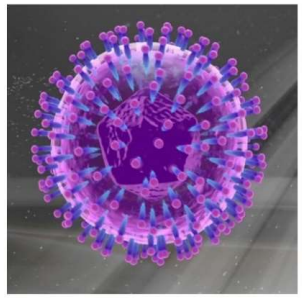
Live by DW
Inactive by Injection

How to overcome the safety–efficacy dilemma?



Ag/Ab Immune-Complex





Vector HVT + IBD

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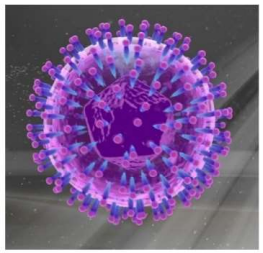
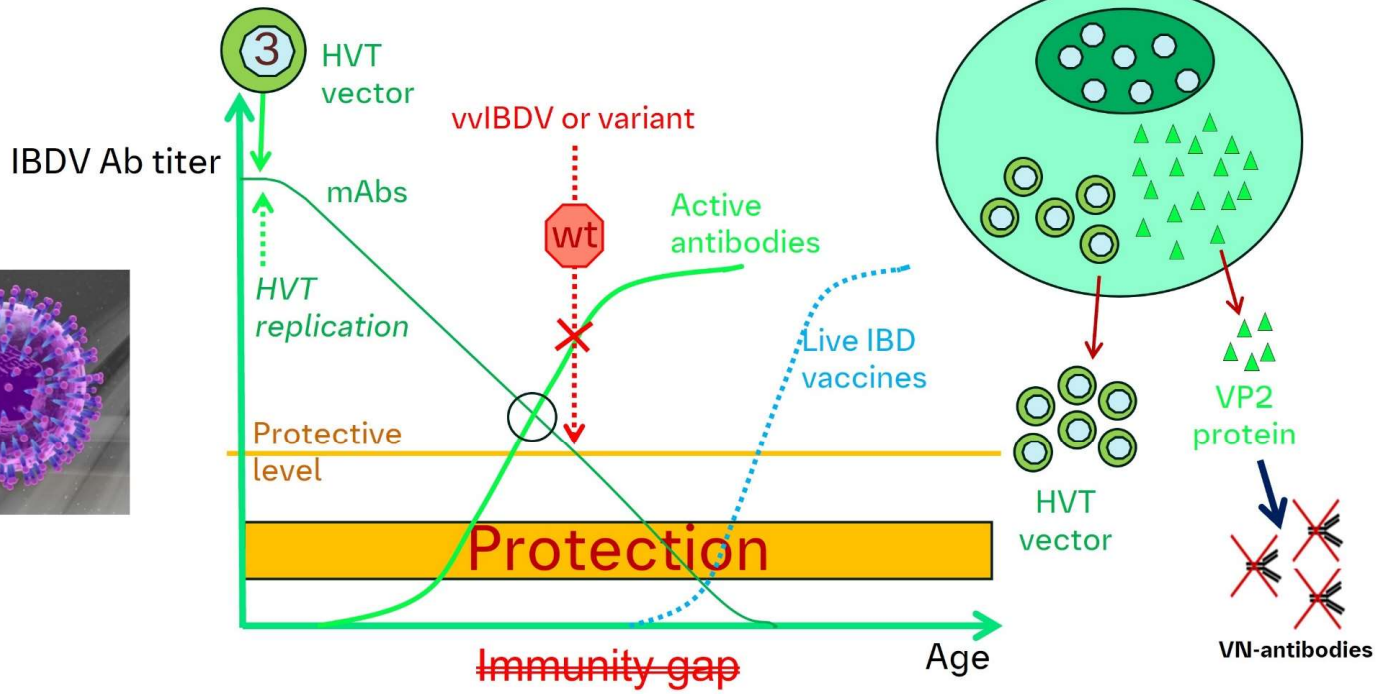
THE 3rd GENERATION: HVT VECTOR VACCINES





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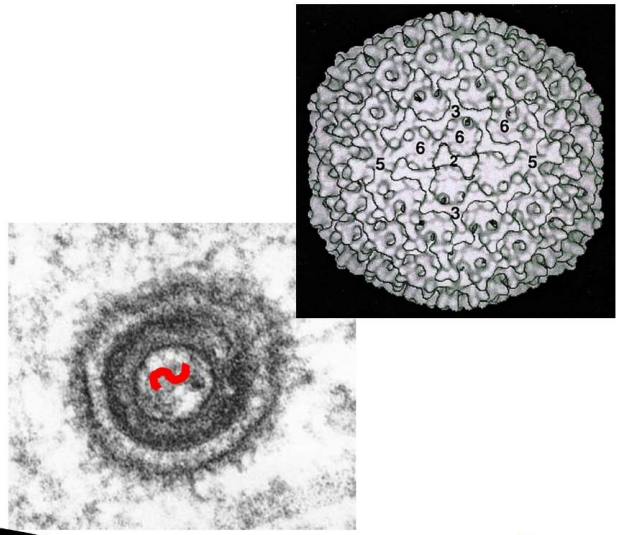
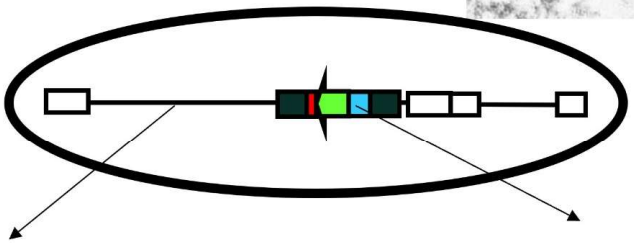
Marek's & IBD vaccination: a win-win solution

- vHVT-IBD vaccine.
- Not sensitive to maternal antibodies.
- Persistent immunity.
- Early vaccination (one day-old or in-ovo.)
- Well-established safety.
- Proven broad efficacy.
- No chicken-to-chicken transmission.





HVT vector

IBD VP2 gene insert

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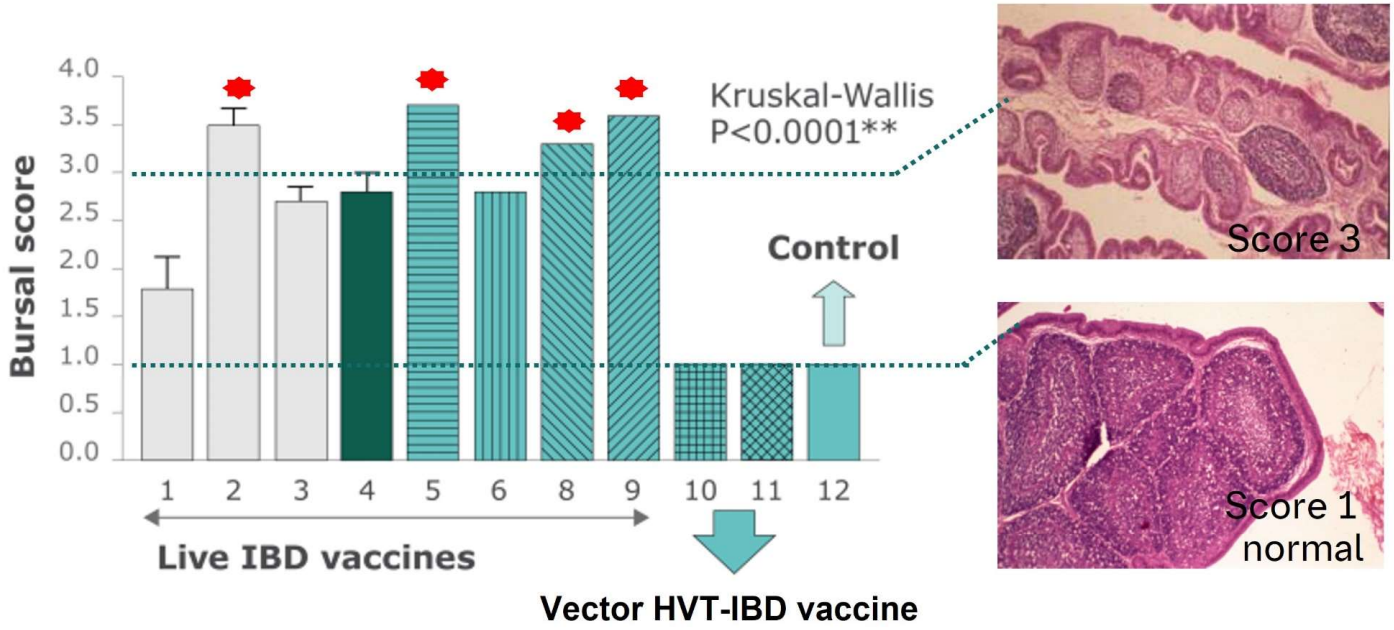
Safety

ANIMALS: EFFECT ON IMMUNE SYSTEM FUNCTION



Bursal lesions after vaccination of SPF chickens

= Live intermediate plus / hot or Immune Complex Vaccines

Bursa lesions 7 days further to vaccination (different tested vaccines numbered from 1 to 11)

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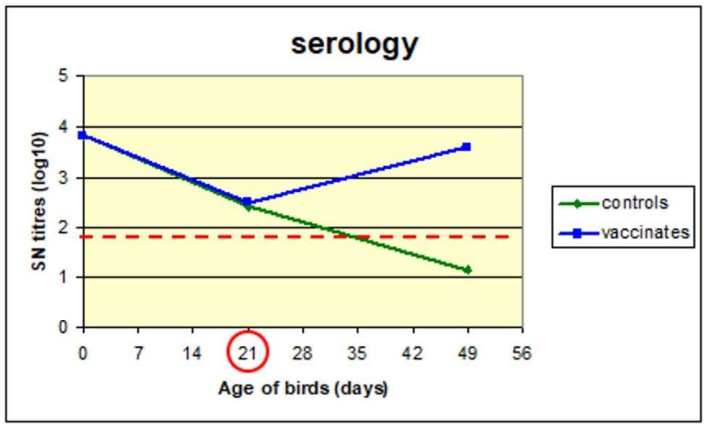
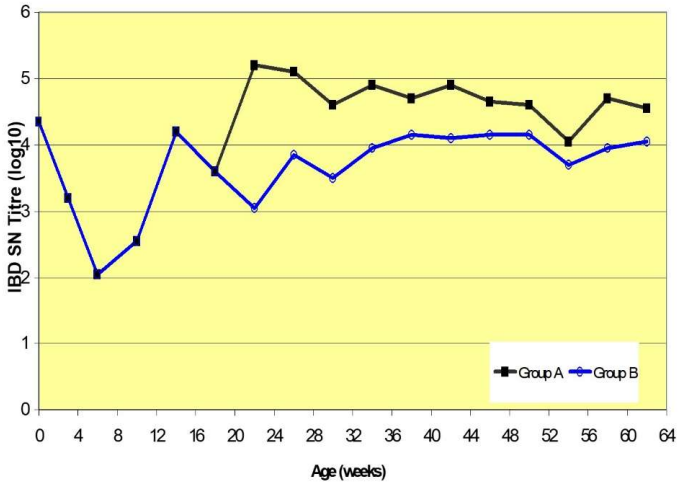
Vector HVT+IBD
Early onset of long lasting protection

IBD SN antibody titer





Group B: vHVT-IBD; Group A: vHVT-IBD & inactiv booster

Vector HVT+IBD: Early onset of seroconversion and lasting

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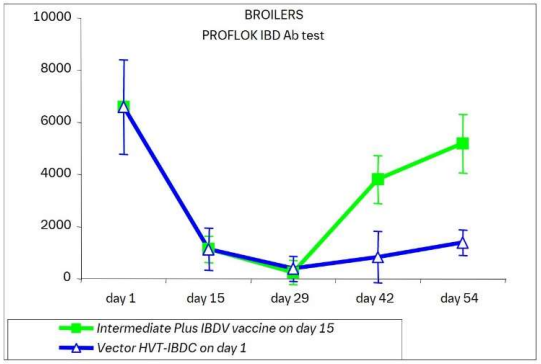
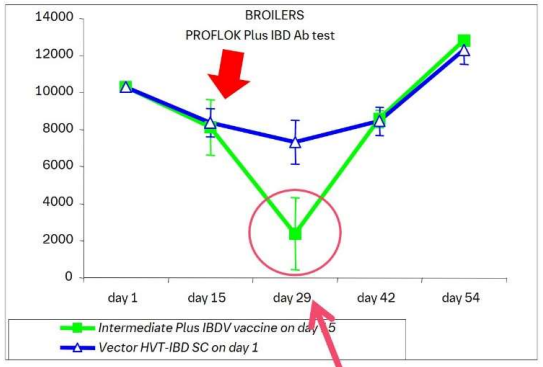
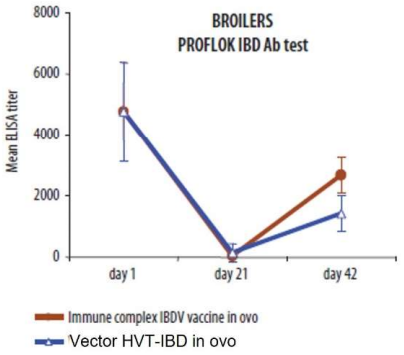
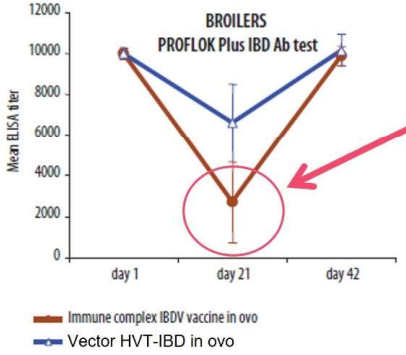
Vector HVT-IBD Efficacy

Seroconversion – Onset of Immunity









Gap of Immunity

Ref: Prandini et al., Zootechnica 9 / Sept. 2008

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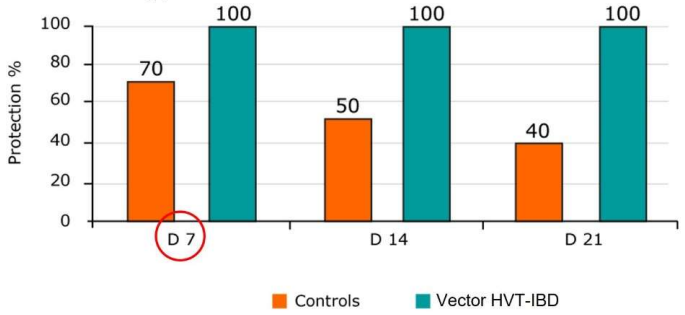
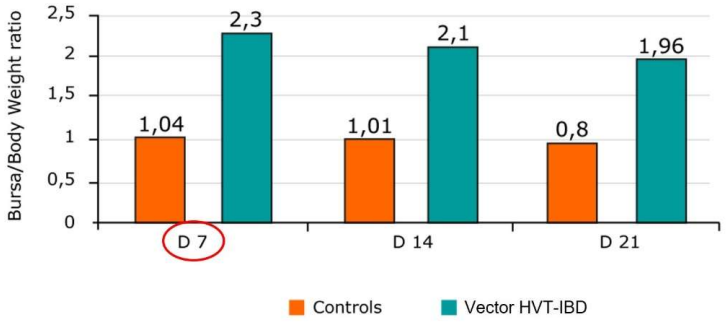
Vector HVT+IBD
Onset of protection

Efficacy in commercial broiler with MDA:

Broilers (MDA) - DO SC - Classic F52/70 - Clinical + Histology



Broilers (MDA) - DO SC - Variant E - Bursa/BW ratio

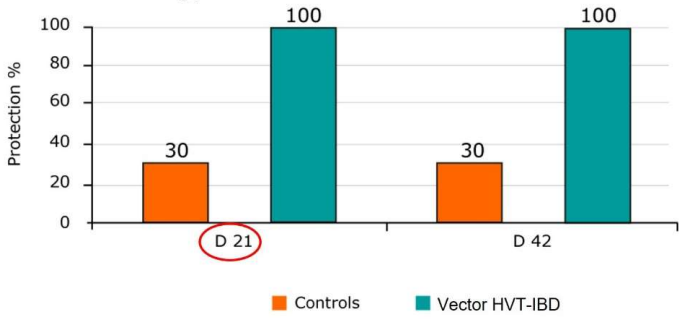


Proven early protection against:

✓all type of IBDV strains

✓also effective against Marek's like classic HVT (data not shown)

Broilers (MDA) – DO SC – vvIBD 91168 – Clinical + Histology



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Live IBD ICx vaccine vs vHVT + IBD vaccine

Design Study 1: Vaccination & vvIBDV challenge study (2013)
Safety and Efficacy Vector HVT+IBD vs IBD ICx vaccine

- Commercial broilers (20 per group)
  - VACCINATION: rHVT-IBD or ICx vaccine (s.c.) day 1
  - Challenge vvIBDV at day 28 (D6948) (100 LD50)
  - Clinical signs p.c., Bursa size, Muskett score at 10 d.p.c., serology

- SPF birds were added to an antigen/antibody complex vaccinated group of commercial broilers to study vaccine spreading and safety to SPF broilers and SPF layers.

Results Study 1: Bursa Lesion Score post vaccination at day of challenge (d28)

Vaccinated group	Mean Muskett score at 28 d.p.v.	
Vector vHVT-IBD	**0.0**	**= Immune Foundation**
ICx vaccine	**4.2**	**= Immune Suppression**
Negative control	0.0	

* Sjaak de Wit , GD Deventer study

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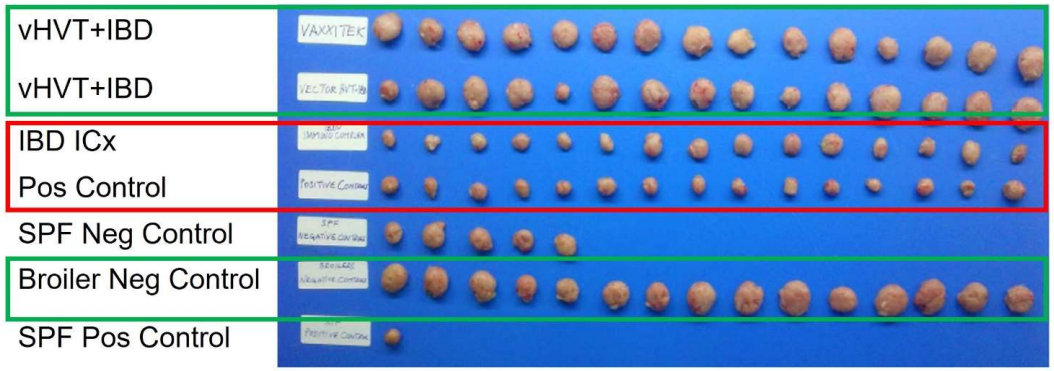
Live IBD ICx vaccine vs vHVT + IBD vaccine

Results Study 1: Clinical signs post challenge

- No clinical signs in both vaccinated groups
- 80% mortality in the non-vaccinated SPF layers
- No mortality in the SPF broilers

Results Study 1: Bursas at 10 days post challenge



* Sjaak de Wit , GD Deventer study

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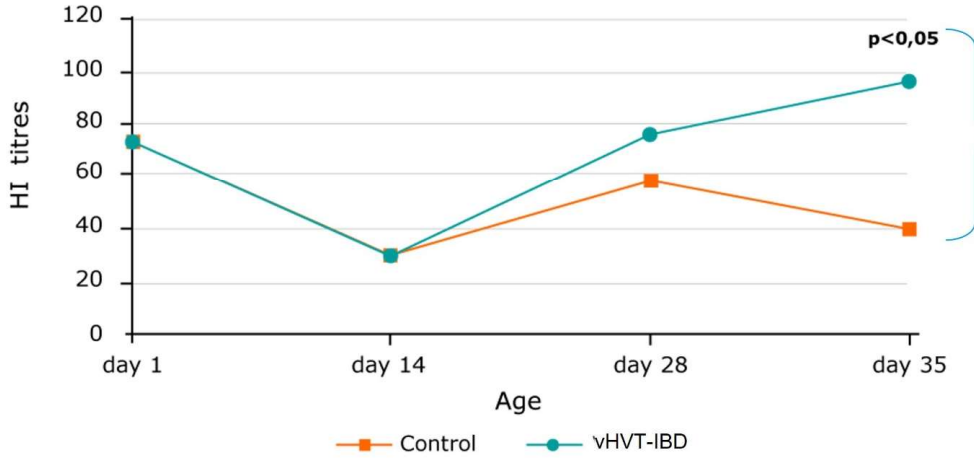
Vector HVT+IBD –

Benefits for immunization against Newcastle disease

	Vector HVT+IBD	Control
Age (Days)	16 000 chickens	9 000 chickens
1	Vector HVT+IBD	-
	IB H120 + VG/GA-Avinew	IB H120 + VG/GA-Avinew
7	inactive ND	Inactive ND+IBD
9	-	Vaccin live IBD intermediate
14	VG/GA-Avinew	VG/GA-Avinew
21	IB H120	IB H120



The Vector HVT+IBD flock shows a significantly higher ND seroconversion, as compared to the control flock.

Pr. Mohamed El Houadfi, Drs Bruno Cluzel & Taoufik Rawi.; Congrès Mondial Aviaire - MARRAKECH – 9 novembre 2009.

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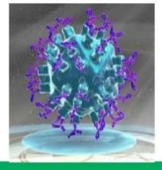
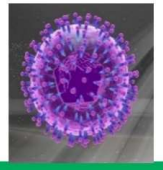
CONCLUSION

	1 LIVE - DW	2 Ag/Ab ICx	3 rHVT + IBD
Hatchery Application	-	+	+
Closing Protection Gap	-	-	+
No Immunosuppression	-	-	+
Broilers & Pullets	+	-	+
MD control	-	-	+

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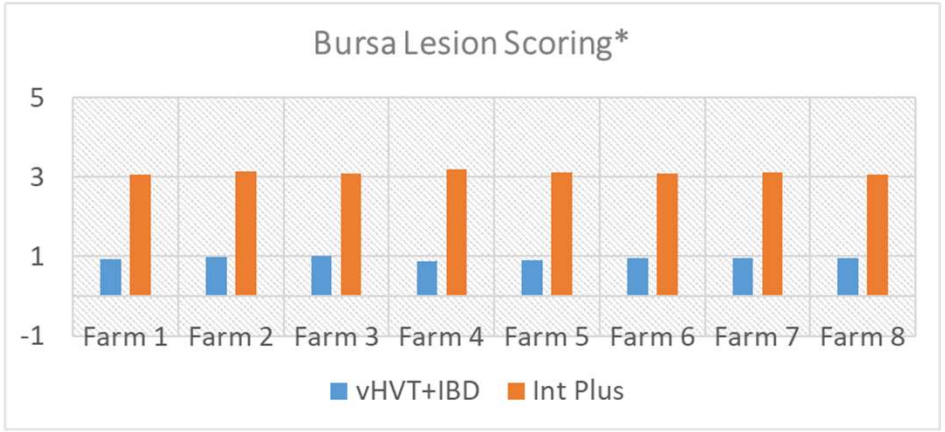
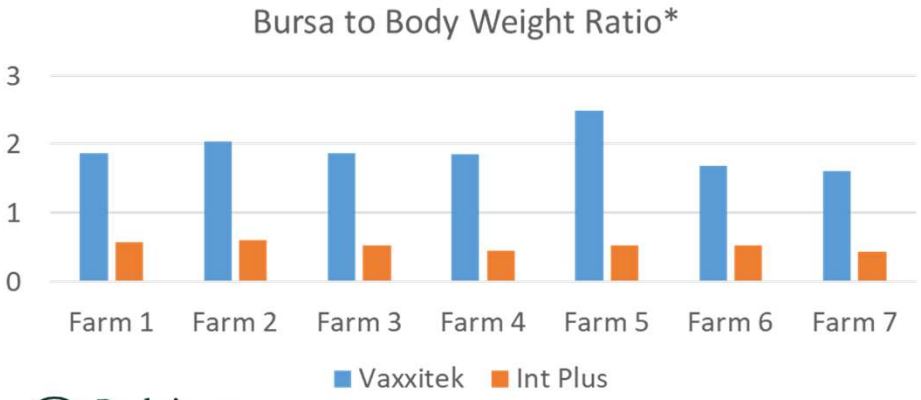
vHVT+IBD: Safe & Strong Immune Foundation

Tamil Nadu





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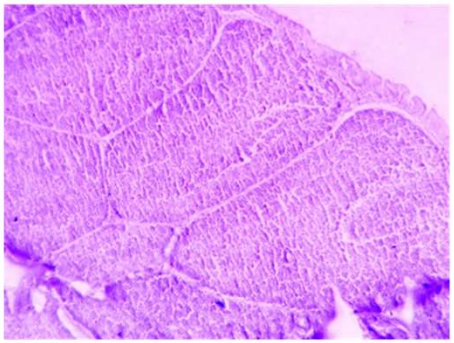
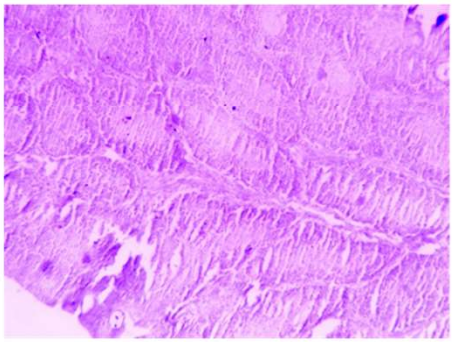




vHVT+IBD: Bursal Lesion – No to minor changes

Intact bursa • Immune foundation •

Int. Plus: Bursal Lesion – Moderate to clear changes

*Data on file

vHVT+IBD: The Vaccine That Pays It Forward

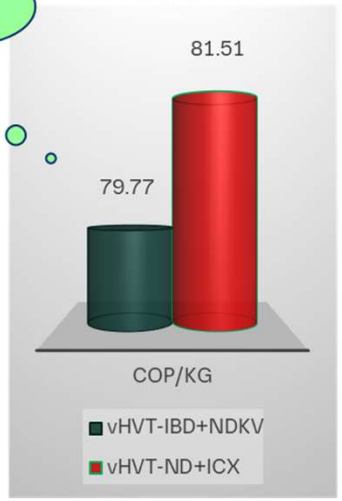
Field trial – vHVT-IBD+Volvac ND Conc KV vs Vector ND+Immune complex vaccine during Q2-2022

Production performance Summary*
(Age – 39 day)

Group	Chick placed	Ave. B. Wt. (Kg)	Act. FCR	Mort %	EEI
vHVT-IBD+ND K	55,988	2.264	1.765	8.74	304
vHVT-ND+ICX	25,258	2.250	1.807	9.17	291
Diff.		+0.014	-0.042	-0.43	13

Rs. 1.74/kg Less CoP

Trial economic result



CoP – Cost of Production

Assumption:
Chick cost – Rs. 25; Feed cost – Rs. 38/kg; Lifting rate – Rs. 85/kg
Vaccine cost: Vaxxitek+ND KV gr. – Rs. 1.24/chick & Vector ND+ICX gr. – Rs. 1.25/chick

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*Data on file

vHVT+IBD: The Vaccine That Pays It Forward

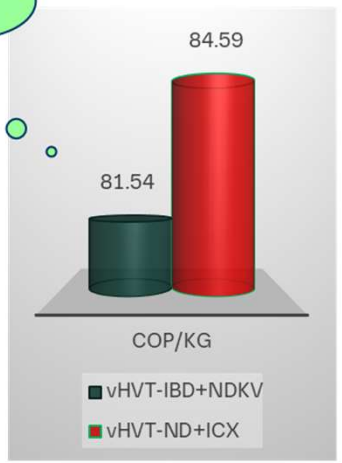
Large scale field study – vHVT-IBD+ND Conc KV vs vector ND+Immune complex vaccine in heavy disease challenge area during Q3-2022

Production performance Summary*
(Age – 42 day)

Group	Chick placed	Ave. B. Wt. (Kg)	Act. FCR	Mort %	EEI
vHVT-IBD+ND K	1,51,304	2.132	1.774	12.7	251
vHVT-ND+ICX	1,33,838	2.098	1.835	16.14	228
Diff		+0.034	-0.061	-3.44	23

Rs. 3.05/kg Less CoP

Trial economic result



CoP – Cost of Production

Assumption:
Chick cost – Rs. 25; Feed cost – Rs. 38/kg; Lifting rate – Rs. 85/kg
Vaccine cost: vHVT-IBD+ND KV gr – Rs. 1.33/chick & vHVT-ND+ICX gr – Rs. 1.28/chick

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*Data on file

vHVT+IBD: The Vaccine That Pays It Forward

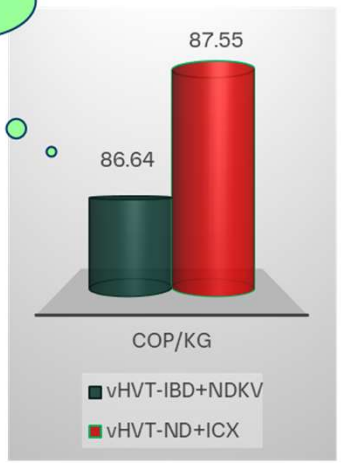
Large scale field study - Vaxxitek+ND Conc KV vs vector ND+Immune complex vaccine in heavy disease challenge area during Q2-2023

Production performance Summary*
(Age – 41 day)

Group	Chick placed	Ave. B. Wt. (Kg)	Act. FCR	Mort %	EEI
vHVT-IBD+ND K	21,04,914	2.004	1.780	7.26	256
vHVT-ND+ICX	85,79,586	1.999	1.767	9.29	251
Diff		+0.005	+0.013	-2.02	+5

Rs. 0.91/kg Less CoP

Trial economic result



CoP – Cost of Production

Assumption:
Chick cost – Rs. 28; Feed cost – Rs. 40/kg; Lifting rate – Rs. 95/kg
Vaccine cost: vHVT-IBD+ND KV gr – Rs. 1.62/chick & vHVT-ND+ICX gr – Rs. 1.60/chick

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*Data on file

Vector HVT+IBD -
FIELDEXPERIENCE BROILER SE-Asia

Trial location: Selangor, Malaysia

Duration of trial: 5 months

Number of houses involved: 9 at one farm

Number of broilers involved: 360 000 broilers

Farm design: Closed house, tunnel ventilated system, a mixture of deep litter houses and slated houses.

9 – piece cut:

- The desired 9 pieces of cut at the slaughterhouse for KFC outlets which requires the dressing weight of broiler to be between 1.15 – 1.6kg.
- Meeting more than 75% of the desired dressing weight per load, the contract farmer will be able to benefit from additional monetary incentives calculated per kg basis.

Age	Previous cycle	vHVT-IBD cycle	Route
1	Inactivated ND vaccine	Inactivated ND vaccine	SC
	VG/GA-Avinew + H120	VG/GA-Avinew + H120	Spray
	-	vHVT-IBD	SC
	IB 88	IB 88	Spray
14	ND-IB (La Sota)	ND-IB (La Sota)	Drinking water
	live IBD intermediate	-	-

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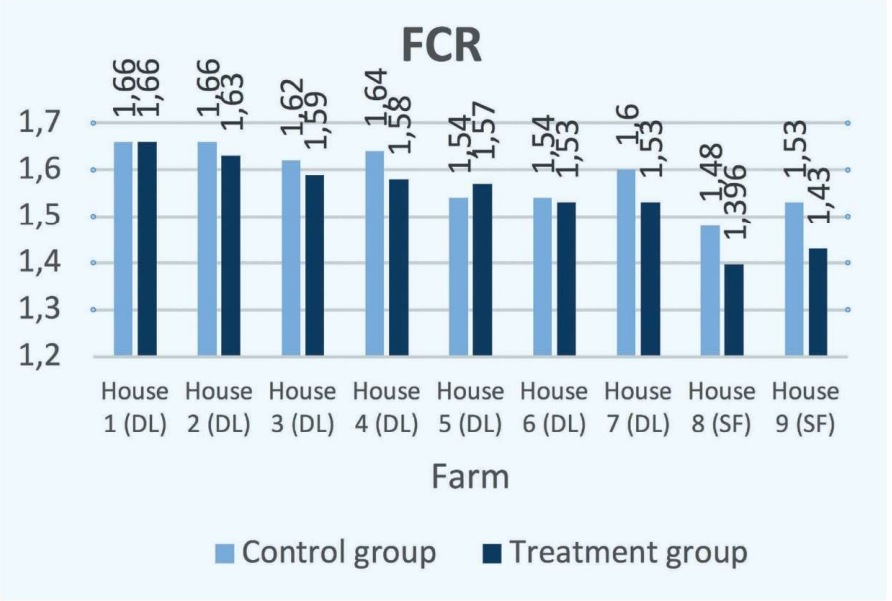
Vector HVT+IBD -
FIELDEXPERIENCE BROILER SE-Asia

Farm performance of both groups.

Key Parameter of Farm Performance	Control	Treatment	Difference
Uniformity (%)	76.80	83.88	7.08
Slaughterhouse meat recovery (%)	93.21	94.41	1.20
Average body weight harvested (kg)	1.85	1.81	-0.04
FCR	1.59	1.55	0.04



In this trial, vHVT-IBD vaccine was proven to be able to provide additional value in uniformity, slaughterhouse meat recovery, and FCR as compared to conventional live IBD vaccine.

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Vector HVT+IBD –
FIELDEXPERIENCE BROILER CONCLUSION

- Vector HVT+IBD strongly supports the integrity and proper function of the immune system
- Good protection against detrimental effects from vIBDV field challenge and MDV
- Supports efficacy of other vaccinations, especially against respiratory infections
- Performance improvement

✓ High daily weight gains
✓ Reaching target body weight in short time
✓ Low FCR
✓ High Broiler Production Index
✓ Low feedcost
✓ Low cost of medication & vaccination (less secondary infections)
✓ High economical value of produced life weight
✓ Low condemnation rate at slaughter

➢ Improved overall economical results

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Thank You!

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