New Approach to Gumboro Disease Control

Recent findings and application to the field.

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Introduction

« I. Complex » VS « rHVT-VP2 »
Introduction

« I. Complex » vs « rHVT-VP2 »

« Cevac Transmune » vs « Vectormune IBD »
Introduction

« I. Complex » vs « rHVT-VP2 »

« Cevac Transmune » vs « Vectormune IBD »
WHY?
Diseases & Vaccinations
Protection & Control

From the Past to the Future
Gumboro Disease

Gumboro Virus + Susceptible chicken = Diseased Chicken
Gumboro Disease & Vaccination

Gumboro Virus + Susceptible chicken = Diseased Chicken

Gumboro Virus + Vaccinated chicken = Protected Chicken
Vaccination = Protection
Vaccination = Protection

Is it only that?

Is this still only that?
DISEASE?

Contact
Challenge
DISEASE?

1 – Infection
DISEASE?

1 - Infection

2 - Clinical expression
DISEASE?

1 - Infection

2 - Clinical expression

3 - Re-excretion
PROTECTION?

1. Infection
2. Clinical expression
3. Re-excretion
PROTECTION?

1 - Infection

2 - Clinical expression

3 - Re-excretion

CLINICAL PROTECTION
PROTECTION AGAINST RE-EXCRETION

1 - Infection

2 - Clinical expression

3 - Re-excretion

CLINICAL PROTECTION
1 – Infection

2 – Clinical expression

3 – Re-excretion

PROTECTION AGAINST RE-EXCRETION

RESISTANCE TO INFECTION

CLINICAL PROTECTION

PROTECTION ?
VACCINATION?

1 - Infection

2 - Clinical expression

3 - Re-excretion

RESISTANCE TO INFECTION

CLINICAL PROTECTION

PROTECTION AGAINST RE-EXCRETION

EVOLUTION OF THE DISEASE
VACCINATION?

1 - Infection
   RESISTANCE TO INFECTION

2 - Clinical expression
   CLINICAL PROTECTION

3 - Re-excretion
   PROTECTION AGAINST RE-EXCRETION

EVOLUTION OF THE DISEASE | EVOLUTION OF THE VIRUS
Today,
Vaccination
has changed
Today,
Vaccination
(= vaccine + administration)
has changed
Today, Vaccination (= vaccine + administration) has changed Vaccination must bring more than clinical protection!
Vaccination: from « Protection » to « Control »
“Protection” vs “Control”

Virus

Chicken
“Protection” vs “Control”

Virus

Chicken

CHALLENGE
“Protection” vs “Control”

To work on this (by increasing the resistance to infection, reducing the lesions, etc.) is:
To work on this (by increasing the resistance to infection, reducing the lesions, etc.) is:

PROTECTION
“Protection” vs “Control”

To work on this (by decreasing the probability of challenge, the timing, the dose, etc.) is:

To work on this (by increasing the resistance to infection, reducing the lesions, etc.) is:

PROTECTION
"Protection" vs "Control"

To work on this (by decreasing the probability of challenge, the timing, the dose, etc.) is:

**PREVENTION**

To work on this (by increasing the resistance to infection, reducing the lesions, etc.) is:

**PROTECTION**
“Protection” vs “Control”

To work on this (by decreasing the probability of challenge, the timing, the dose, etc.) is:

PREVENTION + PROTECTION

To work on this (by increasing the resistance to infection, reducing the lesions, etc.) is:
“Protection” vs “Control”

To work on this (by decreasing the probability of challenge, the timing, the dose, etc.) is:

**PREVENTION**

To work on this (by increasing the resistance to infection, reducing the lesions, etc.) is:

**PROTECTION**

**PREVENTION + PROTECTION = CONTROL**
“Protection” vs “Control”

UNTIL RECENTLY

PREVENTION + PROTECTION = CONTROL
“Protection” vs “Control”

UNTIL RECENTLY

SANITARY POLICE & BIOSECURITY

PREVENTION + PROTECTION = CONTROL
“Protection” vs “Control”

Until recently

Sanitary Police & Biosecurity

Vaccination

Prevention + Protection = Control
“Protection” vs “Control”

BUT NOW...

SANITARY POLICE & BIOSECURITY

VACCINATION

PREVENTION + PROTECTION = CONTROL
Gumboro Disease

Control strategy
Gumboro Disease
or
Gumboro Diseases?
"the Gumboro Disease"

Gumboro Virus + Susceptible chicken = Diseased Chicken
"the Gumboro Disease"

Gumboro Virus + Susceptible chicken = Diseased Chicken
"the Gumboro Disease"

Gumboro Virus + Susceptible chicken = Diseased Chicken
"the Gumboro Disease"

Gumboro Virus + Susceptible chicken = Diseased Chicken
“the Gumboro Disease”

Gumboro Virus  +  Susceptible chicken  =  Diseased Chicken

“type”
“the Gumboro Disease”

Gumboro Virus + Susceptible chicken = Diseased Chicken

“type”

Pathotype
(clinical, subclinical, immunodepressive...)

Virulence
(very virulent, virulent, avirulent...)

Antigenotype

Genotype
“the Gumboro Disease”
“the Gumboro Disease”
“the Gumboro Disease”

Gumboro Virus + Susceptible chicken = Diseased Chicken

“type”
“dose”
“the Gumboro Disease”
“the Gumboro Disease”
“the Gumboro Disease”

Gumboro Virus + Susceptible chicken = Diseased Chicken
“the Gumboro Disease”

Gumboro Virus + Susceptible chicken = Diseased Chicken

Gumboro Virus + Vaccinated chicken = Protected Chicken
“the Gumboro Disease”

Gumboro Virus $+$ Susceptible chicken $=$ Diseased Chicken

Gumboro Virus $+$ Vaccinated chicken $=$ Protected Chicken
Gumboro Disease is not Newcastle Disease!
AIV\(^{(H5)}\)

NDV

IBDV
“Epizootic” vs “Enzootic”

NDV \[\text{AIV}^{(\text{H5})}\] IBDV
“Epizootic” vs “Enzootic”
“Epizootic” vs “Enzootic”
“Epizootic” vs “Enzootic”
“Epizootic” vs “Enzootic”

NDV
"Epizootic" vs "Enzootic"
"Epizootic" vs "Enzootic"
Challenge will come or not, early or late, independantly of the immune status

ND and AI are Epizootic diseases:

“Epizootic” vs “Enzootic”
“Epizootic” vs “Enzootic”

ND and AI are Epizootic diseases:

In other words:

It is not because your farm was hit by ND or AI yesterday, that it will be hit again tomorrow.
"Epizootic" vs "Enzootic"

- NDV
- AIV$_{(H5)}$
- IBDV
"Epizootic" vs "Enzootic"

IBDV
“Epizootic” vs “Enzootic”
“Epizootic” vs “Enzootic”

IBDV

YG - 140415
“Epizootic” vs “Enzootic”

IBDV
“Epizootic” vs “Enzootic”

IBDV

SHEDDING
“Epizootic” vs “Enzootic”

IBDV
"Epizootic" vs "Enzootic"

IBDV
“Epizootic” vs “Enzootic”

CLEANING + DISINFECTION + DOWN PERIOD

IBDV
“Epizootic” vs “Enzootic”
“Epizootic” vs “Enzootic”
"Epizootic" vs "Enzootic"

The Gumboro Cycle

IBDV
Infection
Growing
Waning of MDA
Delivery
Depletion
Cleaning Disinfection
Down time
Shedding
The Gumboro Cycle
IBD is an Enzootic disease:
Challenge will come immediately after protection by MDA has reached unprotective level and IBDV will persist, cycle after cycle if...
"Epizootic" vs "Enzootic"

IBD is an Enzootic disease:

In other words:
If a farm was with Gumboro yesterday, then, it will have it again tomorrow

Conclusion:
If vaccination prevents shedding, then virus pressure for the next cycle will be lower
Gumboro Disease

Parameters of challenge and levers of action
Passive Immunity (MDA)

Protection

Age

FARM IBDV
Protective Immunity

Protection level

Passive Immunity (MDA)

Age

Protection

FARM IBDV

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Passive Immunity (MDA)
Passive Immunity (MDA)

Vaccine (active) Immunity

Protection level

Protection

Age

CHALLENGE

VACCINATION

FARM IBDV

Protection level
Passive Immunity (MDA)

Vaccine (active) Immunity

No protection gap

Protection level

Age

Protection

VACCINATION

FARM IBDV
THE 4 KEY FACTORS OF IBD CONTROL

- Passive Immunity (MDA)
- Vaccine (active) Immunity

Protection level

Protection

Age

FARM IBDV
1 – FARM IBDV

THE 4 KEY FACTORS OF IBD CONTROL

Protection

Passive Immunity (MDA)

Vaccine (active) Immunity

Protection level

Age

1 – FARM IBDV
THE 4 KEY FACTORS OF IBD CONTROL

1 – FARM IBDV

2 – VIRUS PRESSURE

Protection

Passive Immunity (MDA)

Vaccine (active) Immunity

Age

YG - 140415
THE 4 KEY FACTORS OF IBD CONTROL

1 – FARM IBDV

2 – VIRUS PRESSURE

3 – PASSIVE IMMUNITY

Protection

Age

Vaccine (active) Immunity
THE 4 KEY FACTORS OF IBD CONTROL

1 – FARM IBDV

2 – VIRUS PRESSURE

3 – PASSIVE IMMUNITY

4 – VACCINE IMMUNITY

Protection

Age

Protection level

3 – PASSIVE IMMUNITY

2 – VIRUS PRESSURE

4 – VACCINE IMMUNITY

1 – FARM IBDV
Summary

THE 4 KEY FACTORS

1. Farm IBDV
2. Virus Pressure
3. Passive Immunity
4. Vaccine Immunity
THE 4 KEY FACTORS

1 Farm IBDV
2 Virus Pressure
3 Passive Immunity
4 Vaccine Immunity
Stop the Gumboro Cycle!

THE 4 LEVERS OF ACTION

1. Farm IBDV
2. Virus Pressure
3. Passive Immunity
4. Vaccine Immunity
Stop the Gumboro Cycle!

THE 4 LEVERS OF ACTION

1. Farm IBDV
2. Virus Pressure
3. Passive Immunity
4. Vaccine Immunity
THE 4 LEVERS OF ACTION

1 Farm IBDV
30 SURVEYED FARMS

30 INFECTED FARMS

GENETIC VARIANTS / TYPES

AR 265 (3/30 = 10 %)

T1 (AL-2) (7/30 = 23 %)

Del. E (1/30 = 3 %)

Del. A (4/30 = 13 %)

MO 195 (9/30 = 30 %)

STC (6/30 = 20 %)

Ritter D. & Gardin Y., AAAP 2010
Fig. 3. Dendrogram developed using nucleotide sequences of the hypervariable region of VP2 and the UPGMA method. IBDV strains isolated in this study are designated by state abbreviation followed by a number. Previously sequenced IBDV strains used for comparison and their GenBank accession numbers are Del-E variant (AF133904), T1 (AF281238), V1 (AF281235), AF281232 (Lukert), Bursine 2 (AF281232), Bursine (AF281231), vvlBDV ABIC MB71 (AF457103), vvlBDV BD 3/99 (AF362776), AF457014 (228E), Cu-1 (AF362747), STC (D00499), OH serotype 2 (U30818), and Penguin serotype 2 (AY539855).
* Recém incorporada a este grupo, anteriormente pertencia ao G8
** Idem, anteriormente G6.
THE 4 LEVERS OF ACTION

1 Farm IBDV
2 Virus Pressure
3 Passive Immunity
4 Vaccine Immunity
Passive Immunity (MDA)

Vaccine (active) Immunity

No protection gap

Protection

VACCINATION

FARM IBDV

Age
Passive Immunity (MDA)

Vaccine (active) Immunity

Protection level

Protection

Age

VACCINATION

FARM IBDV
Passive Immunity (MDA) vs. Vaccine (active) Immunity in relation to Age and Protection level.

- Passive Immunity (MDA) decreases with age.
- Vaccine (active) Immunity increases with age.

Protection level remains constant throughout.

VACCINATION

FARM IBDV
Passive Immunity (MDA)

Vaccine (active) Immunity

Protection gap

Protection level

Protection

Age

VACCINATION FARM IBDV
Stop the Gumboro Cycle!

THE 4 LEVERS OF ACTION

1 Farm IBDV
2 Virus Pressure
3 Passive Immunity
4 Vaccine Immunity
Passive Immunity (MDA)

Protection

US

ROW

Age

1 2 3 4 5
Quantity & Quality

Protection

Passive Immunity (MDA)

Age

FARM IBDV
Cross protection studies were conducted in the late 80’s, early 90’s to investigate protection afforded by various IBD vaccines against challenge with various IBDV strains.

Ismail N.M. and Saif Y.M., 1991

Immunogenicity of IBD in chickens. Av.Dis. 35: 460–469
Materials and methods

- SPF chicken

- Vaccination with various IBD killed vaccines made from various IBDV strains

- Challenge 3 weeks later with:
  - Classical IBDV (STC) or Delaware E variant IBDV
  - High or low dose

- Evaluation of the protection:
  - 5 and 10 days post challenge
  - Body weight
  - Bursa / Body weight ratio
  - Gross lesions of the BF
  - Histology (lesions)

Ismail N.M. and Saif Y.M., 1991
Immunogenicity of IBD in chickens. Av.Dis. 35: 460–469
### Importance of the quality of Passive Protection

#### Materials and methods

Vaccines made from following IBDV strains:

<table>
<thead>
<tr>
<th>ABBREV.</th>
<th>FULL NAME</th>
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<tbody>
<tr>
<td>SAL</td>
<td>Poulvac Bursine</td>
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<tr>
<td>D 78</td>
<td>Nobilis D 78</td>
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<tr>
<td>UV</td>
<td>Univax BD</td>
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<tr>
<td>BLN</td>
<td>IBD Blen (W. 2512)</td>
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<tr>
<td>MD</td>
<td>Variant MD</td>
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<tr>
<td>OH</td>
<td>Serotype 2 OH</td>
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<td>STC</td>
<td>Standard Classical Challenge strain</td>
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<tr>
<td>Variant E</td>
<td>Delaware variant E</td>
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<tr>
<td>Variant A</td>
<td>Delaware variant A</td>
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## Importance of the quality of Passive Protection

### Results

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<td>Dose</td>
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<td>P</td>
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| STC Low        | P   | P   | P  | P   | P  | P  | NP  | P      | P      |
| High           |     |     |    |     |    |    |     | P      | P      |

| Variant. E Low | P   | P   | P  | P   | P  | P  | NP  | P      | P      |
| High           |     |     |    |     |    |    |     | P      | P      |

P = Protected    NP = Not Protected
# Importance of the quality of Passive Protection

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## Results

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P = Protected  NP = Not Protected
Stop the Gumboro Cycle!

THE 4 LEVERS OF ACTION

1. Farm IBDV
2. Virus Pressure
3. Passive Immunity
4. Vaccine Immunity
Control of Gumboro Disease: Immune Complex or rHVT-VP2?
« I. Complex » vs « rHVT-VP2 »

IBDV

HVT
I. Complex vs rHVT-VP2

a) Mechanism of action
“rHVT-VP2” vs “Immune-Complex”

rHVT-VP2 and Immune Complex IBD vaccines work according to 2 completely different protection mechanisms.
rHVT-VP2 : mechanism of immunization

IBDV = Donor

VP2 gene

IBDV genome

HVT = Vector

rHVT- VP2

Insertion site

Inserted VP2 gene
rHVT-VP2 vector vaccine is injected

The rHVT vector replicates,

VP2 antigen is expressed,

and immunity is induced
The rHVT vector replicates, VP2 antigen is expressed, and immunity is induced. This immunity is mostly composed of antibodies that will neutralize the VP2 epitope on the Gumboro virus.
I. Complex mechanism of immunization

Winterfield 2512 IBDV strain + Specific antibodies VPI (Virus Protecting Factor)
I. Complex mechanism of immunization

The Immune Complexes are injected and then captured by FDC from the spleen

VPI are catabolized and W2512 vaccine virus is progressively released

When MDA level is low, W2512 reaches the bursa and replicates

All follicles of the BF are stimulated and protected

This immunity makes the follicles resistant to infection by IBDV, whatever this IBDV
rHVT-VP2 and Immune Complex IBD vaccines work according to 2 completely different protection mechanisms.

Immunity induced by rHVT-VP2 is mostly based on antibody response. It is more efficacious against homologous VP2 and does not prevent replication and shedding.
rHVT-VP2 and Immune Complex IBD vaccines work according to 2 completely different protection mechanisms.

Immunity induced by rHVT-VP2 is mostly based on antibody response. It is more efficacious against homologous VP2 and does not prevent replication and shedding.

Immune Complex stimulates all the follicles of the bursa, and make them refractory to subsequent infection with IBDV, whatever the challenge virus.
“rHVT-VP2” vs “Immune-Complex”

2 DIFFERENT MECHANISMS OF PROTECTION

IBDV

Target organ = BF
“rHVT-VP2” vs “Immune-Complex”

2 DIFFERENT MECHANISMS OF PROTECTION

IBDV

rHVT-VP2 neutralizes IBDV with AB

As long as AB are homologous

Target organ = BF
"rHVT-VP2" vs "Immune-Complex"

2 DIFFERENT MECHANISMS OF PROTECTION

IBDV

rHVT-VP2 neutralizes IBDV with AB
As long as AB are homologous

Immune Complex makes BF resistant to IBDV
Whatever IBDV type

Target organ = BF
b) Dynamic of immunization
Onset of Immunity
PROTECTION FROM IMMUNE COMPLEX TYPE LIVE IBD VACCINE

- Protection
- Passive Immunity (MDA)
- Active Immunity induced by:
  - Intermediate Plus type vaccine (Immune Complex form)
- No protection gap
- Protection level
- Age
PROTECTION FROM IMMUNE COMPLEX TYPE LIVE IBD VACCINE

- Passive Immunity (MDA)
- Active Immunity induced by: Intermediate Plus type vaccine (Immune Complex form)

Protection level

Age
Protection from Immune Complex Type Live IBD Vaccine

- **Passive Immunity (MDA)**
- **Active Immunity induced by:**
  - Intermediate Plus type vaccine
    - (Immune Complex form)

**Protection level**
Protection from Immune Complex Type Live IBD Vaccine

Passive Immunity (MDA)

Active Immunity induced by:
Intermediate Plus type vaccine
(Immune Complex form)

No protection gap

Protection level

Age
PROTECTION FROM LIVE RECOMBINANT rHVT-VP2 TYPE VECTOR IBD VACCINE

Protection

Passive Immunity (MDA)

Active Immunity induced by: rHVT-VP2 vector vaccine

No protection gap

Protection level

Age
PROTECTION FROM LIVE RECOMBINANT rHVT-VP2 TYPE VECTOR IBD VACCINE

Protection

- Passive Immunity (MDA)
- Active Immunity induced by: rHVT-VP2 vector vaccine

Protection level

Age
PROTECTION FROM LIVE RECOMBINANT rHVT-VP2 TYPE VECTOR IBD VACCINE

Protection

Passive Immunity (MDA)

Active Immunity induced by: rHVT-VP2 vector vaccine

Protection gap

Protection level

Age
“rHVT-VP2” vs “Immune-Complex”

Onset of immunity of Immune Complex adapts to lower level of MDA because of an earlier take of the vaccine virus.

Onset of immunity of rHVT-VP2 cannot adapt to lower level of MDA because the mechanism is independent of MDA.
Onset of immunity of Immune Complex **adapts** to lower level of MDA because of an earlier take of the vaccine virus.

Onset of immunity of rHVT-VP2 **cannot adapt** to lower level of MDA because the mechanism is independent of MDA.

For rHVT-F (Vectormune ND), this possible gap is compensated by application of 1 or 2 live vaccines in the early days to trigger mucosal immunity. **This is not possible for rHVT-VP2.**
PROTECTION FROM LIVE RECOMBINANT rHVT-VP2 TYPE VECTOR IBD VACCINE

Protection

Passive Immunity (MDA)

Active Immunity induced by:
rHVT-VP2 vector vaccine

protection gap

Protection level

Age
PROTECTION FROM LIVE RECOMBINANT rHVT-VP2 TYPE VECTOR IBD VACCINE

Protection

Passive Immunity (MDA)  FOR BROILERS

Active Immunity induced by:
- rHVT-VP2 vector vaccine

Protection gap

Protection level

Age
PROTECTION FROM LIVE RECOMBINANT rHVT-VP2 TYPE VECTOR IBD VACCINE

Protection

Passive Immunity (MDA)  FOR BROILERS
FOR LAYERS

Active Immunity induced by:
rHVT-VP2 vector vaccine

Protection level

Age
PROTECTION FROM LIVE RECOMBINANT rHVT-VP2 TYPE VECTOR IBD VACCINE

- Passive Immunity (MDA)
  - FOR BROILERS
  - FOR LAYERS
- Active Immunity induced by: rHVT-VP2 vector vaccine
- Protection level

Age
PROTECTION FROM LIVE RECOMBINANT rHVT-VP2 TYPE VECTOR IBD VACCINE

Protection

Passive Immunity (MDA)

FOR BROILERS

FOR LAYERS

Active Immunity induced by:

rHVT-VP2 vector vaccine

No protection gap

Protection level

Age
PROTECTION FROM LIVE RECOMBINANT rHVT-VP2 TYPE VECTOR IBD VACCINE

Protection from live recombinant rHVT-VP2 type vector IBD vaccine.

- **Protection**
  - Passive Immunity (MDA) FOR BROILERS
  - Active Immunity induced by: rHVT-VP2 vector vaccine FOR LAYERS

For layers, security margin is better.
« I. Complex » vs « rHVT-VP2 »

c) Level of protection
**Materials and methods**

- **Broiler chickens** (Hubbard flex) provided with passive immunity (VN = 11.85 / ELISA = 7026)

- **Vaccination at Day 1 – SQ route:**
  - Immune Complex vaccine
  - rHVT-VP2 vector vaccine

- **Challenge:**
  - at 2, 3, 4 or 5 weeks of age
  - vvIBD (10⁴ EID₅₀ – D407/2/04/TR strain)

- **Evaluation of the protection:**
  - Clinical observation
  - Bursa / Body weight index
  - Histology (lesions)
  - Virology (RT-PCR / RFLP)
Comparison Immune Complex – rHVT-VP2

Results

Clinical protection

- Protection (%) vs. Age at challenge (days)
  - Immune Complex
  - rHVT-VP2
Comparison Immune Complex – rHVT-VP2

Results

Clinical protection

[Bar chart showing protection levels over different ages for Immune Complex and rHVT-VP2]
Comparison Immune Complex – rHVT-VP2

Results

Protection against Shedding

![Bar chart showing protection against shedding at different ages.](image_url)
Comparison Immune Complex – rHVT-VP2

Results

Protection against Shedding

![Graph showing protection against shedding for different age groups.](chart.png)
Results

Challenge demonstrates that protection of the follicles with a rHVT-VP2 vaccine is of the « plus / minus » type.

(After Z.Penzes et al., 2008)
Conclusions

Following administration of a rHVT-VP2 vaccine, the protection starts building up very soon after application and keeps on increasing, at least for several weeks.

The protection against infection and re-excretion of the challenge virus also keeps increasing but never (?) reaches 100%.
Protection of bursa against infectious by challenge virus after vaccination with rHVT-VP2
Protection of bursa against infectious by challenge virus after vaccination with rHVT-VP2

<table>
<thead>
<tr>
<th>Chicken type</th>
<th>Chg Age</th>
<th>Vac Prog</th>
<th>3 dpi</th>
<th>5 dpi</th>
<th>7 dpi</th>
<th>10 dpi</th>
<th>14 dpi</th>
<th>21 dpi</th>
<th>28 dpi</th>
<th>35 dpi</th>
<th>42 dpi</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPF</td>
<td>4 wk old</td>
<td>No vac</td>
<td>NT</td>
<td>NT</td>
<td>3/3</td>
<td>NT</td>
<td>3/3</td>
<td>3/3</td>
<td>3/3</td>
<td>3/3</td>
<td>2/3</td>
</tr>
<tr>
<td>Com. Broiler</td>
<td>2 wk old</td>
<td>rHVT IBD (io)</td>
<td>2/3</td>
<td>3/3</td>
<td>2/3</td>
<td>2/3</td>
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</tr>
</tbody>
</table>

Detection of vRNA in bursal tissues (STD strain)

Protection of bursa against infectious by challenge virus after vaccination with rHVT-VP2

Detection of vRNA in bursal tissues (STD strain)

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</tr>
</tbody>
</table>

Vaccination with rHVT-VP2 IBD vaccine does not prevent infection
"rHVT-VP2" vs "Immune-Complex"

Picture: Ping-Yin Kuan and Jessica Lee: BF from chickens vaccinated with rHVT-VP2 – Malaysia.
“rHVT-VP2” vs “Immune-Complex”

Picture: Bursa of Fabricius of 31 day-old broiler flock vaccinated with rHVT-VP2 vaccine - Russia
Following administration of an Immune Complex vaccine, the protection starts immediately after vaccine virus replication, which occurs when MDA have reached moderate level. The protection against infection and re-excretion of the challenge virus most of the time reaches 100%.
“rHVT-VP2” vs “Immune-Complex”

YG - 140415 Picture: Mango Chen (China): Bursa of Fabricius of 42 day-old broiler flocks vaccinated either with rHVT-VP2 or I. Complex vaccines
Comparison Immune Complex – rHVT-VP2

Conclusions

Immune Complex as well as rHVT-VP2 vaccines can significantly protect the chickens against clinical signs, but only Immune Complex vaccine prevent against infection and shedding.
d) Spectrum of protection
Comparison Immune Complex – rHVT-VP2

Materials & methods

- Broiler chickens (Ross 708 x Ross 708)
- Vaccination and isolation:
  - Vaxxitek
  - Transmune

Challenge: at 28 days with $10^{4.0}$ EID$_{50}$ / Ck of:

- vvIBDV TUR (TR)
- sc IBDV Mexico (MX)
- sc IBDV Brazil (BR)
- sc IBDV USA (Del.E)
- sc IBDV RSA (ZA)
- sc IBDV USA (AVS-EL)

Criteria:
- Clinical observations
- Histopathology of the BF
- B:BW ratio & B:B Index
- serology
- virology

4 & 14 dpc
Comparison Immune Complex – rHVT-VP2

Results – Histopathology

Protection of the BF 4

<table>
<thead>
<tr>
<th>Region</th>
<th>4 dpc Im.Complex</th>
<th>4 dpc rHVT-VP2</th>
<th>4 dpc Controls</th>
<th>14 dpc Im.Complex</th>
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Comparison Immune Complex – rHVT-VP2

Results – Histopathology
Protection of the BF 4 & 14 dpch

![Graph showing protection levels of different BF types at 4 and 14 days post challenge (dpch). The graph compares Immune Complex and rHVT-VP2 treatments, with different colors representing 4 and 14 dpch for various BF types including TR, DEL. E, MX, ZA, BR, and AVS-EL.]
Comparison Immune Complex – rHVT-VP2

Results – Histopathology
Protection of the BF 4 & 14 dpch

FULL PROTECTION with I.Complex

PARTIAL PROTECTION with rHVT-VP2
## Comparison Immune Complex – rHVT-VP2

### Results – Serology before & after challenge

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*(Biochek ELISA)*
## Comparison Immune Complex – rHVT-VP2

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## Comparison Immune Complex – rHVT-VP2

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*(Biochek ELISA)*
## Comparison Immune Complex – rHVT-VP2

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*(Biochek ELISA)*
# Comparison Immune Complex – rHVT-VP2

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*(Biochek ELISA)*
Summary & Conclusion
Stop the Gumboro Cycle!

PREVENTION + PROTECTION = CONTROL
The objective of Gumboro vaccination is to protect the chickens, lower the challenge, and exert no pressure on farm IBDV population i.e. to ensure: \( \text{Stop the Gumboro Cycle!} \)
## Summary of the properties

<table>
<thead>
<tr>
<th>Criteria</th>
<th>rHVT-VP2</th>
<th>Im. Complex</th>
</tr>
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<tbody>
<tr>
<td>Onset of Immunity</td>
<td>Dependant on HVT replication with no flexibility</td>
<td>Individually adapted to level of passive immunity</td>
</tr>
<tr>
<td>Protection against classical IBDV</td>
<td><strong>Yes</strong></td>
<td><strong>Yes</strong></td>
</tr>
<tr>
<td>Protection against variant IBDV</td>
<td><strong>No</strong></td>
<td><strong>Yes</strong></td>
</tr>
<tr>
<td>Prevention of infection</td>
<td><strong>No</strong></td>
<td><strong>Yes</strong></td>
</tr>
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<td>Prevention of shedding</td>
<td><strong>No</strong></td>
<td><strong>Yes</strong></td>
</tr>
<tr>
<td>Reduction of Farm challenge pressure</td>
<td><strong>No</strong></td>
<td><strong>Yes</strong></td>
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<tr>
<td>Selective pressure on farm IBDV population</td>
<td><strong>Yes</strong></td>
<td><strong>No</strong></td>
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Stop the Gumboro Cycle!

Only Immune Complex ensures

PREVENTION + PROTECTION = CONTROL
THANK YOU FOR YOUR ATTENTION