Benefits of a Herpesvirus of Turkey vector vaccine for Infectious Bursal Disease (HVT-IBD) in control of immuno-depression in broiler chickens and decrease of use of antibiotic medication
LESS ANTIBIOTICS?
LESS ANTIBIOTICS?

A growing concern worldwide:

- Veterinary Vaccines - Brussels, Belgium, Dec 5-6th, 2012
- Antibiotics Conference - Atlanta, USA, Jan 30-31st, 2013
- XVIIIth WVPA Congress, - Nantes, France, Aug 19-23rd, 2013
- Etc.
Main concerns of the poultry health specialist:

- **Control of respiratory disorders** (Chronic Respiratory Disease with primary viral cause, infectious bronchitis, avian pneumovirus, *etc.* + secondary bacteria infections, as *Mycoplasma gallisepticum*, *E. coli*, *etc.*)

- **Control of enteric disorders** (Necrotic Enteritis with primary parasitic cause *Eimeria* spp. Agent of coccidiosis + secondary bacteria infections, as *Clostridium perfringens*)

- **Control of locomotive disorders** (lameness, foot pad ulceræ, *etc.*)

- **Immunodepression** (Gumboro disease, Marek’s disease, chicken anemia infections, reovirosis, mycotoxins in feed, *etc.*)
Alternatives to antibiotics used as curative treatments:

- Control of immunosuppression
- Early vaccination against the main viral immune depressors *i.e.* Gumboro disease and Marek’s disease either *in ovo* or at day-old in the hatchery
- Passive protection induced against the main viral immune depressors *i.e.* Gumboro disease, chicken anemia infections and reovirus by appropriate vaccination program ‘hyper-immunization’ of the breeders
IMMUNO-DEPRESSION
CAUSES OF IMMUNO-DEPRESSION

Stress:
- Management
- Density
- Hatch stress
- Lighting program
- Handling
- Air quality
- Noise
- Litter
- Temperature

Immune system

Infectious agents:
- Interaction with vaccine strains
- Obligatory pathogens
- Facultative pathogens

Animal:
- Age
- Genotype
- Hormonal stress
- Interaction with the environment
- Maternal antibodies

Feed:
- Imbalance
- Mycotoxins
- Environmental toxins

[Courtesy of Pr S Rautenschlein, University of Hannover, Germany]
CAUSES OF IMMUNO-DEPRESSION

Broilers of 24 days of age

Broilers, 26 days of age

Atrophic

Normal

GUMBORO
CAUSES OF IMMUNO-DEPRESSION

vvIBDV

GUMBORO

vvIBD
CONSEQUENCES OF IMMUNO-DEPRESSION

- Impaired function of cells of the innate and acquired immune system

- Secondary infections
  - Bacteria (*E. coli* etc.)
  - Coccidia
  - Fungi etc.

- Reduced Performance

- Impaired vaccine response
EARLY CONTROL OF IMMUNO-DEPRESSION
Antibodies of maternal origin inducing passive immunity

Transfer of immunity to the embryo

- Ovary
- Blood IgY
- Oviduct
- Locally secreted IgAs
- IgA in albumin injected by the embryo - protects the intestine
- IgY in the yolk then distributed by the blood circulation

EARLY IMMUNITY

CAV (chicken anemia virus)  
IBD (infectious bursal disease)  
REOVIRUS
EARLY IMMUNIZATION – vHVT-IBD

Injection of a dyed suspension

Target date for in ovo vaccination = date of transfer setter/hatcher

D18 mostly
D19 tested/validated

Vector HVT-IBD live vaccine
Protection of the immune function of the chicken:

Enhancement of the immune function

A COMPARISON OF THE EFFECTS ON THE HUMORAL AND CELL-MEDIATED IMMUNITY BETWEEN AN HVT-IBD VECTOR VACCINE AND AN IBDV- IMMUNE COMPLEX VACCINE AFTER IN OVO VACCINATION OF COMMERCIAL BROILERS

Silke Rautenschlein¹*, Stéphane Lemiere², Birgida Simon⁴ and Francesco Prandini²

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Embryonic and neonatal splenic cells are highly sensitive to PMA/Iono

=> No vaccine impact

Neonatal thymic cells are sensitive to PMA/Iono

=> No vaccine impact

*significant difference between activation conditions in both groups (p<0.05)

Vaccinal HVT DNA detection by PCR

<table>
<thead>
<tr>
<th>Time points</th>
<th>ED19</th>
<th>D1</th>
<th>D5</th>
<th>D8</th>
<th>D12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spleen</td>
<td>-</td>
<td>-</td>
<td>++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Thymus</td>
<td>-</td>
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<td>-</td>
<td>+</td>
<td>-</td>
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</tbody>
</table>
Neonatal bursa cells are sensitive to PMA/Iono

IFNγ SFC (5x10^5 cell/well)

- Non vacc. + PMA Iono
- HVT-IBD vacc. + PMA Iono
- Non vacc. + Medium
- HVT-IBD vacc. + Medium

=> HVT-IBD vaccine impacts on bursa cell responsiveness

* significant difference between groups (p<0.05)

Neonatal cells from blood are not sensitive to PMA/Iono

IFNγ SFC (5x10^5 cell/well)

- Non vacc. + PMA Iono
- HVT-IBD vacc. + PMA Iono
- Non vacc. + Medium
- HVT-IBD vacc. + Medium

=> No vaccine impact

*significant difference between activation conditions in both groups

Chicken IFN gamma secreting cells detection by ELIspot in BURSA of Fabricius and BLOOD

Vaccinal HVT DNA detection by PCR

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<thead>
<tr>
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<th>D12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bursa of Fabricius</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+++</td>
<td>++</td>
</tr>
<tr>
<td>Blood*</td>
<td>-</td>
<td>-</td>
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*Non-optimized PCR conditions for blood
Protection of the immune function of the chicken:

Enhancement of vaccine take

Evaluation of the effects of an HVT-IBD vector vaccine on the immune system of layer pullets in comparison to two commercial live IBD vaccines

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2Merial S.A.S., 29 Ave. Tony Garnier, F-69034 Lyon, France

ND vaccine take IB vaccine take
Protection of the immune function of the chicken:

IB live vaccine immunization

The influence of bursa of Fabricius on infectious bronchitis vaccination in commercial broiler chicks

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²Merial S.A.S., 29 avenue Tony Garnier, 69348 Lyon cedex 07 France
South America

Over 35 millions chickens vaccinated with vHVT-IBD

Year to year comparison

Performances

Mortality decreased from 6.76% to 6.23%

Condemnation rate decreased from 0.58% to 0.39%

EPI increased from 268 to 287

Medication cost savings
- 33%

High Gumboro challenge
EARLY IMMUNIZATION – vHVT-IBD

Africa

3 rounds of 50,000 chickens with vHVT-IBD vaccination

Performances

Culled chickens decreased from 1.90% to 1.42%

Average daily weight gain increased from 45.45 g to 46.58 g

34-35 days for slaughter

EPI increased from 231 to 241

Medication cost savings

- 0.37 US cents per 1.6 kg of bird weight
Antibiotic use linked to poor control of different syndromes like respiratory, digestive, locomotion; immuno-depression is the common determinant

Immuno-depression: many causes, but one of the major causes can be controlled by early vaccination, IBD

Early protection, as early as D18-D19 embryo vaccination against Mareks & IBD, helps build a strong immune response
Thank you for your attention!