Use of Autovaccines in Poultry Flocks

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AniCon-Team

- founded 2005
- today appr. 80 employees

6 vets
7 biologists
1 biochemist
3 biotechnologists
2 food chemists
2 agric academics
40 qual tech staff
Service Lab
focussed on poultry and swine production:

- food safety
- veterinary diagnostic services
- autogenous vaccines
- in-vitro-diagnostics
- industry cooperations
- CMV – Custom Made Vaccine
- Tailor Made Vaccine
- Farm Specific Vaccine
- Autogenous Vaccine
- Autovaccine

*its all the same!*
AniCons business options

- Diagnostic Services
  
  independently from any CMV-business
  customer pays for diagnostic services

- Custom-Made-Vaccines
  
  including diagnostic services
  diagnostics are important for ongoing product updating
  customer pays for vaccine including diagnostics
• isolate from a farm
  vaccine back to the same farm

• needs diagnostics!

• GMP-like production

• non-GMP-product
  (the isolates are non-GMP)
autovaccine - principles (2)

diagnostics

isolates

products
direct shipment from producer to veterinarian (DE, UK, HU, CZ)

direct invoice from producer to veterinarian (HU)

no distributors!
how do we get diagnostic material to AniCon?

EU-wide import allowance for poultry and samples

based on EU-Directives 1069/2009 and 142/2011

Global shipments for PCR-diagnostics

FTA-cards for global shipments
(non-infectious / material is inactivated by the card)
autovaccine - principles (4)

- autovaccines are inactivated vaccines!
- autovaccines are adjuvanted products (oil or AlOH)
- most autovaccines are polyvalent
production and use of autovaccines are allowed:

if no licensed product is in the market

or

if the licensed product is not available actually

or

if the licensed product has been used without success
no registration of products
but
authorisation of producers
• combinations of antigens
• different isolates per antigen
• antigen concentration in the product
• different adjuvants (oil, aluminium, none)
• bottle size (100 ml – 250 ml – 300 ml – 500 ml)
• product volume per bottle
• volume per dose (0,1 – 0,25 – 0,3 – 0,5 – 1,0 – 2,0 – 5,0)
## Antigens for autogenous vaccines: Poultry

### Bacterial Antigens
- *Avibacterium* spp
- *Bisgaard Taxon*
- *Bordetella* spp
- *Brachyspira* spp
- *Campylobacter* spp
- *Clostridium perfringens*
- *Coenonia anatina*
- *Escherichia coli*
- *Erysipelothrix rhusiopathiae*
- *Gallibacterium* spp
- *Haemophilus* spp
- *Mycoplasma gallisepticum*
- *Mycoplasma synoviae*
- *Ornithobacterium rhinotracheale*
- *Pasteurella* spp
- *Riemerella anatipestifer*
- *Salmonella* spp
- *Pseudomonas* spp
- *Staphylococcus* spp
- *Streptococcus* spp

### Viral Antigens
- *Avian Reovirus*
- *Avian Rotavirus*
- *Duck Hepatitis Virus*
- *Duck Adenovirus*
- *Fowl Adenovirus*
- *Infectious Bronchitis Virus*
- **Avian Influenza (H9)**
1) invasivity: isolates from brain, bone-marrow, pericardium or lung

2) virulence-profiles

3) identical characteristics of the disease causing organism at population level

clonal isolate \[\rightarrow\] disease

poly-clonal isolates \[\rightarrow\] secondary
the diagnostics behind

- post-mortem diagnostics
- bacteriology
- MALDI-TOF-characterization
- serology
- PCR with very wide spectrum
- histology
- cultural virology
- sequencing
• Streak on Agar plates and/or enrichment of the samples
• Incubation
• Morphology/ smell
• Biochemical testing → MaldiTOF-MS
• Antibiotic sensitivity testing
• Serotyping (agglutination, agar gel precipitation)
• Cryo-conservation
post-mortem diagnostics
bacteriology
MALDI-TOF characterization
serology
PCR with very wide spectrum
histology
cultural virology
sequencing
Cascade of biomolecular testing „levels“

1. rapid veterinary diagnostic
2. isolate characterization by PCR
3. sequencing & phylogenetic analysis
1. **rapid veterinary diagnostics**
   - preferably real-time (RT-)PCR, e.g. screening
   - broad portfolio virus, bacteria, parasites
   - clinical relevance?
   - supports primary virus isolation efforts
2. **isolate characterization by PCR**
   - test for
     - virulence factors (e.g. **8 x APEC**)
     - adhesion associated
     - iron acquisition
     - serum resistance
     - toxins
     - plasmids
     - F11 fimbriae expression
2. **isolate characterization by PCR**
   - test for
     - sero-/ biotype (e.g. **FAdV 1-12**)
       - PCR
       - restriction pattern

Meulemans et al. 2001
Biomolecular testing

- sequencing & phylogenetic analysis
  - virus isolates
  - compare to strains of commercial vaccines
  - e.g. S1 gene IBV
    - not restricted to known variants
    - mapping to clusters of variants/ vaccine strains
<table>
<thead>
<tr>
<th>Disease Suspected</th>
<th>Specimen</th>
<th>Sample Preparation</th>
<th>Laboratory Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avian Influenza (AIV)</td>
<td>Trachea, Lung, Brain, Caecal Tonsils</td>
<td>Refrigerate / Frozen</td>
<td>Virus Isolation, PCR</td>
</tr>
<tr>
<td></td>
<td>Serum</td>
<td>Refrigerate</td>
<td>Serology</td>
</tr>
<tr>
<td>Bordetellosis</td>
<td>Trachea, Lung</td>
<td>Refrigerate</td>
<td>Culture sensitivity</td>
</tr>
<tr>
<td></td>
<td>Serum</td>
<td>Refrigerate</td>
<td>Serology</td>
</tr>
<tr>
<td>Colibacillosis</td>
<td>Heart, Liver, Spleen, Lung, Air sacs, Ovary, Salpinx, Yolk, Joint, Kidney, Bone marrow, Brain</td>
<td>Refrigerate</td>
<td>Culture sensitivity, Serotyping, PCR (virulence factors)</td>
</tr>
<tr>
<td>Mycoplasmosis (CRD, MG)</td>
<td>Sinus, Trachea, Lung</td>
<td>Refrigerate</td>
<td>Culture, PCR</td>
</tr>
<tr>
<td></td>
<td>Serum</td>
<td>Refrigerate</td>
<td>Serology</td>
</tr>
<tr>
<td>Ornithobacteriosis</td>
<td>Heart, Sinus, Trachea, Lung, Air sacs, Joint</td>
<td>Refrigerate</td>
<td>Culture sensitivity, Serotyping</td>
</tr>
<tr>
<td></td>
<td>Serum</td>
<td>Refrigerate</td>
<td>Serology</td>
</tr>
<tr>
<td>Reovirus</td>
<td>(Trachea), Liver, (Spleen), Caecal Tonsils, Joint, Gizzard</td>
<td>Refrigerate / Frozen</td>
<td>Virus Isolation, PCR</td>
</tr>
<tr>
<td></td>
<td>Serum</td>
<td>Refrigerate</td>
<td>Serology</td>
</tr>
<tr>
<td>Pasteurellosis (Fowl cholera)</td>
<td>Heart, Liver, Spleen, Lung</td>
<td>Refrigerate</td>
<td>Culture sensitivity, PCR (toxins, capsule type)</td>
</tr>
<tr>
<td></td>
<td>Serum</td>
<td>Refrigerate</td>
<td>Serology</td>
</tr>
<tr>
<td>Riemerellosis</td>
<td>Heart, Liver, Spleen, Conjunctiva, Sinus, Trachea, Lung, Air sacs, Brain</td>
<td>Refrigerate</td>
<td>Culture sensitivity, Serotyping, PCR</td>
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- select invasive strains (brain, heart, joints, bone-marrow, liver)
- send material from freshly dead or culled animals
- verify the clonality of the isolates
- bacterial populations will change under the selective pressure of successful vaccines
- if you are successful: continue diagnostics, check for the eradication, search for new (clonal) isolates
• autogenous vaccines are individually manufactured products

• isolate-typing and production need time

• from ordering the vaccine until delivery it takes about 6-8 weeks!!!  
  (Isolate-typing may prolong the process!)
autogenous vaccines

- **Laying hens:**
  E.coli, Pasteurella multocida, Erysipelas, Gallibacterium anatis, Mycoplasma synoviae, Salmonella gallinarum, Infectious Bronchitis

- **Broiler Breeders:**
  E. coli, Pasteurella, Salmonella spp, Enterococcus spp, Staph. aureus, Infectious Bronchitis
autogenous vaccines

- **Turkeys**: ORT, Riemerella, Staph. aureus, Bordetella, Reovirus, E coli, Mycoplasma

- **Ducks and Geese**: Riemerella, Erysipelas, Pasteurella, Mycoplasma, Duck Hepatitis
the new diagnostic lab