ADDRESSING CHALLENGES OF ANTIMICROBIAL USE FOR LIVESTOCK IN SUB-SAHARAN AFRICA

GALVMED CONTRIBUTION

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OIE 2013
Layout

- GALVmed Background
- AM in the control of livestock diseases in Africa
- GALVmed interventions on challenges with AM use in Africa:
  - Regulatory process harmonisation
  - CBPP example
  - African Animal Trypanosomosis example
GALVmed - GLOBAL ALLIANCE LIVESTOCK VETERINARY MEDICINES

- An **Animal health Product development & access Partnership** organisation
- A not-for-profit **Public-Private Partnership** – registered charity
- Sponsored by the UK Department for International Development (DFID), and with projects funded by BMGF, DFID and EC.
- **Pro-poor focus**: working with key partners to make a **sustainable** difference in access to animal health products for poor livestock keepers
GALVmed contribution: Challenges to availability & access to appropriate products

Our role is to provide leadership to overcome these challenges by creating partnerships which provide poor livestock keepers with access to animal health products
### Products Portfolio

<table>
<thead>
<tr>
<th>Type</th>
<th>Products</th>
<th>Diseases</th>
<th>Progress on 5 February 2013</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Vaccines</td>
<td>RVF Clone 13</td>
<td>RVF</td>
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<tr>
<td></td>
<td>Combination RVF-LD</td>
<td>RVF, LSD, SP, GP</td>
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<tr>
<td></td>
<td>Recombinant RVF-LSD</td>
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<td></td>
<td>ECF ITM</td>
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<tr>
<td></td>
<td>TSOL18</td>
<td>PC</td>
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<td></td>
<td>ASF virus</td>
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<tr>
<td></td>
<td>ND I-2</td>
<td>ND</td>
<td>Exploratory</td>
</tr>
<tr>
<td></td>
<td>ND D58 pellet</td>
<td>ND</td>
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<td>ND thermostable powder</td>
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<td></td>
<td>ND thermostable tablets</td>
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<td>ND thermostable LaSota</td>
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<td>Thermostable PPR</td>
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<td></td>
<td>CCPP</td>
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<tr>
<td></td>
<td>Irradiated Trypanosoma</td>
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<td>Tryps antitoxin vaccine</td>
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<td>Pharmaceuticals</td>
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<td>CBPP antimicrobials</td>
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<td>Anacor pharmaceuticals</td>
<td>Trypanosomosis</td>
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<tr>
<td></td>
<td>Dundee pharmaceuticals</td>
<td>Trypanosomosis</td>
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<td>STPHI pharmaceuticals</td>
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<td>Diagnosis</td>
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<td>IAEA Tryps assays</td>
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<td>KZN Univ. Tryps penside</td>
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<td>CCPP antigen ELISA</td>
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<tr>
<td></td>
<td></td>
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<td>Completed</td>
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<tr>
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<td>25 products (21 active)</td>
<td>12 diseases</td>
<td>Completed</td>
</tr>
<tr>
<td>Technology</td>
<td>Partner</td>
<td>Current product</td>
<td>Attributes</td>
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<tr>
<td>----------------------------------</td>
<td>--------------------</td>
<td>-----------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Powder vaccine</td>
<td>XstalBio</td>
<td>ND</td>
<td>Foil pack, mix to feed; fowl pox</td>
</tr>
<tr>
<td>Fast dissolving tablet vaccine</td>
<td>PATH</td>
<td>ND</td>
<td>Drinking water; fowl pox</td>
</tr>
<tr>
<td>Pellet vaccine</td>
<td>TANUVAS</td>
<td>ND</td>
<td>Direct feeding of chicken</td>
</tr>
<tr>
<td>Thermostable strains (I-2, D-58)</td>
<td>Deltamune, MCI, TANUVAS</td>
<td>ND</td>
<td>Available in quality &amp; quantity</td>
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<tr>
<td>Liquid live vaccine</td>
<td>Wambura, Deltamune, MCI</td>
<td>ND</td>
<td>No freeze-drying, direct use</td>
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<tr>
<td>Trehalose-based FD</td>
<td>Litamoi, Hester, BVI, KEVEVAPI</td>
<td>ND, PPR</td>
<td>Thermostability of traditional vaccines</td>
</tr>
<tr>
<td>Yeast expression of vaccine antigens</td>
<td>IIL</td>
<td>TSOL18 vaccine</td>
<td>Easier expression, cheaper CoG</td>
</tr>
<tr>
<td>Straw filling</td>
<td>CTTBD</td>
<td>ECF</td>
<td>Applicable to other blood vaccines</td>
</tr>
</tbody>
</table>
Pro-poor technologies

Delivery technologies

- Coldpack for vaccine transport (more than 300 units)
- Solar or gas fridges

Burkina Faso

Tanzania
Products under validation

Under registration

... On the field

Just registered
Antimicrobials in the control of infectious diseases in Africa

- Africa has one of the highest burden of infectious diseases
- Control through vaccination is limited to certain diseases
- Vaccination implementation comes with several challenges
- Pharmaceuticals are extensively used for a number of diseases e.g. oxytetracycline
- Some of the associated challenges:
  - Products poorly regulated leading to misuse
  - Lack of regulation on market authorisation in many countries
  - In many countries, vet medicine registration under ministry different to vet diseases control
  - Poor to lack of enforcement of regulation
Antimicrobials in the control of infectious diseases in Africa

- Wide variety of farming systems including transhumance
- Poor diagnosis
  - Shortage of field veterinarians
  - Lack of point-of-treatment diagnostics
- Cost constraints
- Limited AM surveillance & monitoring
- Widespread sale of counterfeit, fake, low potency products (vaccines and chemotherapeutics)
  - Favours resistance development
  - Reduces value of vet medicine market
  - Constrains investment
Poorly regulated markets
GALVmed interventions that could contribute

- Work toward **harmonisation of vet medicine regulation and mutual recognition**
- **CBPP** (contagious bovine pleuro pneumonia):
  - Improved vaccines
  - Evaluation of newer antimicrobials (efficacy and resistance potential)
- **TRYPS** (African Animal trypanosomosis)
  - Development of new trypanocides (effective against resistant isolates)
  - Improve quality of trypanocides
    - Joint effort with IFAH and FAO for the establishment of two QC laboratories in SSA, that should cover different sub-regions
  - Point-of-treatment diagnostic
Work toward harmonization & capacity building in regulation of veterinary medicines

GALVmed Regulatory Strategy
Facilitate forums for African regulatory authorities to progress on the harmonisation of vet medicine registration in Africa in conjunction with AU-PANVAC and with the support of OIE.

- Baseline investigation of the situation in Africa through questionnaire & discussed at an OIE-PANVAC-GALVmed meeting in Johannesburg 2010
- Capacity building of regulatory authorities in charge of vaccine registration in Africa; regional fora of regulators established in:
  - Eastern Africa (EAC)
  - Central Africa (ECCAS)
  - Francophone West Africa (UEMOA)
Contagious Bovine Pleuropneumonia (CBPP)

**Epidemic**
Morbidity >90%, Mortality 40-85%
e.g. Zambia (Muuka et al 2013)
Recent epidemic outbreaks in West Africa

**Endemic**
Lower morbidity and mortality
Large economic impact.
e.g. costs of vaccination, testing, quarantine, loss of export markets, testing, stamping out, compensation

CBPP Disease Situation 2007-2010 (OIE and AU-IBAR)

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of countries reported</th>
<th>Number of outbreaks</th>
<th>Number of cases</th>
<th>Number of deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>13</td>
<td>248</td>
<td>5,517</td>
<td>3,033</td>
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<tr>
<td>2008</td>
<td>12</td>
<td>355</td>
<td>47,405</td>
<td>13,928</td>
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<tr>
<td>2009</td>
<td>21</td>
<td>213</td>
<td>15,187</td>
<td>2,355</td>
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<tr>
<td>2010</td>
<td>23</td>
<td>255</td>
<td>24,687</td>
<td>2,866</td>
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</tbody>
</table>
CBPP current control

- Essentially based on vaccine
  - Poor efficacy (65%),
  - Short duration of immunity

- Use of antimicrobials not recommended
  - Based on old data: risk for sequestra

- However widespread use of Oxytetracycllin & Tylosin
  - Used by farmers to ameliorate the clinical effects of CBPP and to reduce mortality in acutely affected cattle
  - Limited efficacy
CBPP: AM use

- FAO Consultative group Meeting in Rome-Italy, 6-8 November, 2006: CBPP Control: Antibiotics to the rescue?

- GALVmed Workshop of experts on the prudent use of antibiotics (Nairobi - January 2012).
GALVmed strategy

• Integrated control strategy: vaccination & antimicrobial therapy

• Current work
  – Evaluation of Macrolide (e.g. Tulathromycin, Gamithromycin)
    • Very high lung concentration >10 days, single injection
    • Efficacy based on pharmacodynamics studies (Mitchell et al. 2012)
  – Evaluation of efficacy
  – Sequestra formation,
  – Risk assessment of resistance development
  – Partners: CVRI (Zambia)

• Development of improved / novel vaccine
African Animal Trypanosomosis

- Most important disease of cattle in Africa
- 3 million cattle mortalities / year
- Major losses in small ruminants too
- Total losses (agricultural GDP) US$ 4.75 billion/year
- Cattle production losses alone: US$ 1 – 1.2 billion/year
- Also impacts South America and SE Asia (PAAT, 2009)
Tryps current control

• Vector control
  – Not sufficient on its own
  – Not effective for T. vivax, & non-tsetse transmitted AT

• No vaccine

• Current drugs:
  – The cheapest & most widespread control tool. Over 100 M doses sold annually.
  – Based on 2 main categories of compounds, developed more than 40 years ago
## Challenges with current Trypanocides

<table>
<thead>
<tr>
<th>Current Trypanocides challenges</th>
<th>GALVmed intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of efficacy/Widespread resistance</td>
<td>New Trypanocides</td>
</tr>
</tbody>
</table>
| Substandard products: counterfeit & low potency     | QA/QC labs  
New technology for identity confirmation  
(eg. Holographic scratch & sms) |
| Overdiagnosis                                       | Point of treatment /penside test                                        |
| Low safety margin/toxic                             | New Trypanocides being developed to modern standards                   |
Establishment of 2 labs for QC of trypanocides

- Collaboration with IFAH and FAO
- **TFDA in Tanzania, and LACOMEV in Senegal** selected:
  - 5 staff from the labs trained at IAEA laboratories in Seibersdorf, Vienna
  - Key equipment purchased, installed and commissioned in the TFDA and LACOMEV laboratories

- Monographs being reviewed to address key issues identified essentially for Diminazene

- Sensitization of countries for the use of these laboratories initiated, in collaboration with AU-PATTEC
New Trypanocidies development

- New classes/new modes of action
- Potential for resistance development evaluation
- Target Product Profile developed
- First compound about to enter full development
- Portfolio approach with multiple international partners
- Clinical capacity developed in Africa
Thank you!