New tools and a combined approach: sleeping sickness, food security & the challenges of bringing new tools to the people who need them

GV Bingham, OB Tramparulo, J Sumbu, PT Khoa, H Pates Jamet
32nd ISCTRC, Khartoum
8th-12th September 2013
European company founded in 1957, specialising in disease-control products.

Structured around a humanitarian entrepreneurship business model where *doing good is good business*.

Dedicated to alleviating devastating global health challenges faced by people at the base of the pyramid.

United Nations Millennium Development Goals (MDGs) drive business objectives and provide impetus for continued focus on creating a healthier planet.

Strive to develop innovative disease-control textiles, which when implemented with our dedicated partners, contribute to the realisation of the MDGs.
Farmers Drive Food Security

- 500 million smallholder farmers support 2 billion people, producing most of the food for people in developing countries.
- Official statistics tend to under-value livestock, underestimating or ignoring the multipurpose contributions farm animals make to agricultural production.
Vestergaard’s ZeroFly® branded products target both farmers and countries: Attractive tools for farmers, governments, aid agencies, the UN and the private sector.

Promoting prosperity & food security: Protection that removes need for repeat intervention and provides a reduced residue defence against insect pests for livestock and crop protection throughout the whole value chain.

ZeroFly® contributes to **MDG 1** and **MDG 7**

**ZeroFly® Livestock** is an advanced insecticide-incorporated screen that helps farmers protect their livestock from flies in a more sustained and effective way.

**ZeroFly® Storage Bag** is the first available insecticide-incorporated storage bag for preventing damaging pest infestations.
ZeroFly® Livestock: Minimize Flies, Maximize Protection

Flies are attracted to odors of animals in pens.

Insecticide-incorporated screen is attached to pen perimeter.

Flies don’t see open mesh and land on barrier. Flies killed by insecticide in fibres of screen.

Studies show flies travel at low levels and will land on the fabric when approaching the animal shelters.
ZeroFly® Livestock: Global Field Trials

- Holstein + local diakore: G. palpalis gambiensis
- Local Zebu: G. palpalis, G. nashi, G. morsitans
- Friesian: G. pallidipes
- Pigs: G. fuscipes quanzensis
- Local Zebu: G. swynnertoni, G. pallidipes
- Buffalo + cattle: Stomoxys sp.
- Friesian Nuisance flies
- Holstein: Stomoxys calcitrans
ZeroFly® Livestock: Conclusions from Field Trials

- The field trials successfully covered a wide range of climatic Zones in Sub Saharan Africa.
- ZeroFly® Livestock Screen provided a significant reduction of local Tsetse and biting fly populations.
- Interim data show significant increase in milk yield & weight gain.
- Initial trends of impact on reproductive traits and a decrease in AAT incidence.
- The physical and chemical durability of ZeroFly® remained stable under local climatic conditions supported the product lifetime claims of min. one year in field conditions.
Vector Control and the “Tool Box Approach”

Providing service & support with multiple quality tools for varied settings

→ Tools can be selected to fit the specific programmatic requirements on a case by case basis:

- Traps
- Livestock screen
- Animal spray/pour on
- Habitat management
- Targets
- Arial spraying
- Sterile insect technique
- Other ...

BUT this requires that the entire armament of proven tools is available for integrated and timely deployment
“Tool Box Approach”: Lessons from malaria

Lessons learned from Long-Lasting Insecticidal Net (LLIN) scale-up:

PRODUCT PERFORMANCE STANDARDS ARE ESSENTIAL FOR:

- **Innovation**: impels development of new products through IP protection and allows portfolio alignment across commercial products

- **Improved quality and pricing**: creates competition with new innovations and old tools therefore cost reductions, increased willingness to pay increases demand

- **Improved scale and availability**: standardisation facilitates market predictions and optimisation of global production capacity

- **Sustained investment**: decreases perceived risks and increases benefits for traders/investors and allows creation of aligned portfolio across commercial products

**e.g. Netmark: Center for Private Sector Health Initiatives**: [pshi@fhi360.org](mailto:pshi@fhi360.org)
“Tool Box Approach”: What are the barriers?

- Standardised testing procedures/guidelines
- Established product standards
- Distinct categories for products
- 3rd party recommendation/approval mechanism
- Optimised procurement processes
- Timely and informed product deployment
“Tool Box Approach”: 3-tiered proposal

1. Product Samples & Specification Evaluation
2. Product Recommendation/Approval
3. Product Deployment
4. Product Field Performance Monitoring
“Tool Box Approach”: Lessons from malaria

PARTNERSHIPS ARE ESSENTIAL

NGOs & Donors
- Provide an environment where all information is defined = expected standards
- Who takes the lead role?
- Who supports & how?

NEED TO OPTIMALLY UTILISE/ENHANCE CURRENT PLATFORMS
- FAO: Usage guidelines & recommendations
- Insecticide regulations/ registration
- Donor/ NGO/ Government led programmes; PATTEC, PAAT etc.
- Insecticide treated dyed fabrics: Limited requirements and control on imports and copies
- Few international companies in the market
The entire “tool box” of proven tools needs to be available for integrated & timely deployment

This critically requires:

- Clear product performance standards
- A recognised approval/recommendation mechanism
- Prioritisation of demand creation
- Strong partnerships and optimal leveraging of current platforms
- Further enhancement of procurement procedures
  - Internationally recognised independent quality standard testing agency
  - Import/export specifications to include clear quality parameters/standards
  - Programmes know which products and suppliers are reliable

An approach has been proposed in order to:

- Create trust in products
- Reduced investor/donor risk
- Promote demand creation and competition
Summary:
Towards Sustainable Agriculture & Rural Development

• Collaborators & Partners:
  - LSTM
  - CIRDES/IRD
  - CIRAD Senegal
  - Tsetse Control Unit Accra & FAO/IFAD
  - Kenya Agricultural Research Institute (KARI)
  - Edinburgh University
  - USDA Gainesville & Nebraska
  - Tropical Pesticides Research Institute (TPRI) Arusha
  - Association de promotion pour la lutte contre les parasitoses (APLP) Cameroon
  - Central Veterinary Laboratory Kinshasa (Ministry of Agriculture and Livestock)
  - Initiated for “Rethink DRC” Clinton Foundation
  - United State Agriculture
  - NIMPE Hanoi Vietnam
  - Agricultural and Livestock Ministry Indonesia
The entire “tool box” of proven tools needs to be available for integrated & timely deployment

This critically requires:

- Clear product performance standards
- A recognised approval/recommendation mechanism
- Prioritisation of demand creation
- Strong partnerships and optimal leveraging of current platforms
- Further enhancement of procurement procedures
  - Internationally recognised independent quality standard testing agency
  - Import/ export specifications to include clear quality parameters/ standards
  - Programmes know which products and suppliers are reliable

An approach has been proposed in order to:

- Create trust in products
- Reduced investor/donor risk
- Promote demand creation and competition
Proposal for Recommendation

• Large Targets:
  – Change Black Solid Central Fabric to Screen Fabric
THANK YOU!

ZeroFly®
by VESTERGAARD

VESTERGAARD®
IMPACTING PEOPLE
ZeroFly® Livestock: Cattle in Cameroon & Ethiopia

- ZeroFly® Livestock Screen vs. control, zero grazing
  - Lower odds of catching tsetse flies
  - < 70% deltamethrin retention
  - 100% bioefficacy with stable flies (*Stomoxys calcitrans*) after 6 months

- Ethiopia:
  - Reduced local tsetse fly population
  - Highly significant decreased defensive movements
  - 100% bioefficacy with local tsetse and nuisance flies

Defensive movements = Skin ripples, tail swishes, leg kicks, head and ear movements
ZeroFly® Livestock: Ghana & Cattle in Tanzania

• Pigs in Ghana (ongoing), after 9 months:
  – Reduced tsetse fly population
  – 100% bioefficacy with local tsetse flies
  – Ongoing: Impact on AAT incidence, productivity (birth rate, weight gain) & other economic parameters (sales income, health costs)

• Cattle in Tanzania
  – 6 months of intervention
  – Reduced local tsetse fly population
  – 100% bioefficacy with local tsetse and nuisance flies
Entomological Results from Tanzania:

Impact on Tsetse Population

- **Intervention**
- **Untreated**
- **Pour-on**

**Apparent Density (Flies/trp/day)**

- December: Intervention (3.5), Untreated (2.0), Pour-on (3.0)
- January: Intervention (1.0), Untreated (2.0), Pour-on (0.5)
- February: Intervention (0.5), Untreated (1.5), Pour-on (0.5)
- March: Intervention (0.1), Untreated (1.0), Pour-on (0.1)
- April: Intervention (0.05), Untreated (1.0), Pour-on (0.05)
- May: Intervention (0.01), Untreated (2.0), Pour-on (0.01)
- June: Intervention (0.005), Untreated (1.5), Pour-on (0.005)
ZeroFly® Livestock: Pigs in Democratic Republic of Congo

- 3 months baseline, 2 year trial (ongoing)
- Reduced local tsetse fly population
- 100% bioefficacy with local tsetse flies
- Initial trends: AAT cases & reproductive parameters
- Significant increase in weight gain.

![Graph showing weight gain over months](image-url)
ZeroFly® Livestock: Testimonials from Ghana

Dr. Mark Hansen, Veterinary Services Division of MOFA
Dr. Hansen explained that there exists groups of insects which impact negatively on livestock production. He sighted the example of tsetse flies and the horsefly and said there was a host of others of veterinary importance. As a result, ZeroFly® Livestock is a very relevant product for the livestock sector.

Nana Kwasi Owusu
Wadie jumakase in Ghana
Local chief said ZeroFly® will bring a lot of benefits to my community because even diseases transmitted by flies from animals to humans will be reduced.

Robert Akahu, Farmer
Adjei Kojo – Ghana
“There has been a complete reduction of flies after installation of ZeroFly® Livestock about 3 months ago”. “Sores and other types of skin irritation on the pigs have gone”

George Best from Volta region, Ghana
suggests “The health of our animals has improved a lot after ZFL and there have been no recent cases of still birth, which we used to often experience”
“Tool Box Approach”: 3-tiered proposal

Product Samples & Specification Evaluation

- Product samples and specifications submitted
- Samples sent to GLP/ISO Approved Laboratory
- Analysis following specified protocols
  - Freshly produced samples
  - Accelerated aged samples (200, 500, 1000hrs)
  - Accelerated shelf life evaluation (2 weeks @ 54°C)
- Active ingredient content, Physical characteristics, Colour fastness, Colour spectrum, Bioefficacy

PASS
“Tool Box Approach”: 3-tiered proposal

- Product Samples & Specification Evaluation
- Product Recommendation/Approval
- Product Deployment
- Product Field Performance Monitoring
“Tool Box Approach”: 3-tiered proposal

Product Samples & Specification Evaluation

Product Recommendation/Approval

Product Deployment
“Tool Box Approach”: 3-tiered proposal

Product Samples & Specification Evaluation

Product Recommendation/Approval

Product Deployment

Product Field Performance Monitoring

Random sampling of field-used products

Samples sent to GLP/ ISO Approved Laboratory with specific information

Product type, company name, collection locality information, deployment date, usage conditions, programme responsible, date sampled

Analysis following specified protocols

PASS

Quality Evaluation dialogue with Approval committee

FAIL

Active ingredient content, Physical characteristics, Colour fastness, Colour spectrum, Bioefficacy

Approval remains
Removing repeat intervention through long lasting products

- Mosquito nets protect against nuisance and disease vectors
- Insecticide treated nets (ITNs) provide significantly higher protection than untreated nets
- Handling & washing of ITNs reduces protective efficacy
  - Nets need re-treating, often not done
  - Retreatment when done, often unreliable with incorrect dosages
  - Net usage declined as insecticide efficacy declined
  - Strategies for integrating re-treatment into distribution programmes were often not successful
- Long lasting insecticidal nets (LLINs) enabled massive scale up of malaria vector control
  - Removed the need to retreat nets
  - Allowed campaign style distributions to achieve high coverage levels
  - Enabling introduction of distribution through existing health services to sustain coverage
<table>
<thead>
<tr>
<th></th>
<th>Entomological</th>
<th>Productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trial design</strong></td>
<td>Control vs. Intervention or Baseline vs. Intervention</td>
<td>Controls vs. Intervention (constructed pig sties) or Baseline vs. Intervention (existing farms - exotic dairy breeds with high fly pressure)</td>
</tr>
<tr>
<td><strong>Climatic zones</strong></td>
<td>Representative zones of SSA (e.g. savannah, riverine)</td>
<td></td>
</tr>
<tr>
<td><strong>Seasons</strong></td>
<td>Wet and dry</td>
<td></td>
</tr>
<tr>
<td><strong>Livestock</strong></td>
<td>Cattle (local and/or exotic breeds)</td>
<td>Exotic dairy cattle, Large White cross pigs</td>
</tr>
<tr>
<td><strong>Data collection</strong></td>
<td>Monthly</td>
<td>Continuous</td>
</tr>
<tr>
<td><strong>Traps</strong></td>
<td>Biconical, NZI, Olson traps</td>
<td>Biconical, Pyramidal, Olson traps</td>
</tr>
<tr>
<td><strong>Flies identified</strong></td>
<td>Tsetse flies (Glossina sp.), biting flies (Stomoxys sp., Haematobia sp., Tabanids), nuisance flies (Musca sp.), mosquitos, etc.</td>
<td>Tsetse flies (Glossina sp.), biting flies (Stomoxys sp.), nuisance flies (Musca sp.), etc.</td>
</tr>
<tr>
<td><strong>Expected outcomes</strong></td>
<td>Impact on local fly population &amp; bioefficacy &amp; product performance under local conditions</td>
<td>Impact on productivity (e.g. milk, weight, reproductive parameters) Epidemiology (e.g. AAT incidence)</td>
</tr>
</tbody>
</table>
# ZeroFly® Livestock: African Field Trials Results

<table>
<thead>
<tr>
<th></th>
<th>Cameroon</th>
<th>Ethiopia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trial type</strong></td>
<td>Entomological – cattle (local Zebu): Zero grazing</td>
<td>Entomological – cattle (local Zebu): Zero grazing</td>
</tr>
<tr>
<td><strong>Trial length</strong></td>
<td>6 months of intervention&lt;br&gt;Heavy rains &amp; dry seasons</td>
<td>3 months of intervention&lt;br&gt;Hot season</td>
</tr>
<tr>
<td><strong>Climatic zone</strong></td>
<td>Riverine thickets</td>
<td>Riverine thickets</td>
</tr>
<tr>
<td><strong>Collaborating institute</strong></td>
<td><strong>Association de promotion pour la lutte contre les parasitoses (APLP) Cameroon</strong></td>
<td><strong>Southern Tsetse Eradication Project (STEP)</strong></td>
</tr>
<tr>
<td><strong>Traps</strong></td>
<td>Biconical, NZI</td>
<td>Biconical</td>
</tr>
<tr>
<td><strong>Identified flies</strong></td>
<td>Tsetse (<em>G. palpalis, G. nashi, G. morsitans</em>), biting flies (<em>Stomoxys sp.</em>, Tabanids), nuisance flies (<em>Musca sp.</em>)</td>
<td>Tsetse (<em>G. pallidipes</em>), biting flies (<em>Stomoxys</em> sp., Tabanids), nuisance flies (<em>Musca</em> sp.)</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td>• Reduced chance of catching Tsetse flies&lt;br&gt;• Physical and chemical durability remained stable : &lt; 70% deltamethrin retention and 100% bioefficacy with stable flies (<em>Stomoxys calcitrans</em>).</td>
<td>• Reduced local Tsetse fly population&lt;br&gt;• Highly significant decreased defensive movements&lt;br&gt;• 100% Bioefficacy with local Tsetse and nuisance flies</td>
</tr>
</tbody>
</table>
Defensive movements = Skin ripples, tail swishes, leg kicks, head & ear movements
## ZeroFly® Livestock: African Field Trials Results

<table>
<thead>
<tr>
<th></th>
<th>Ghana</th>
<th>Tanzania</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trial type</strong></td>
<td>Productivity – pigs (White Large Cross): Zero grazing</td>
<td>Entomological – cattle (local Zebu): Zero grazing</td>
</tr>
<tr>
<td><strong>Trial length</strong></td>
<td>9 months of baseline, 1 year of intervention - <strong>ongoing</strong> All seasons</td>
<td>6 months of intervention Long rains and dry season</td>
</tr>
<tr>
<td><strong>Climatic zone</strong></td>
<td>Transitional rain forest</td>
<td>Low grass savannah</td>
</tr>
<tr>
<td><strong>Collaborating institute</strong></td>
<td><strong>Tsetse Control Unit Accra &amp; FAO/IFAD</strong></td>
<td><strong>Tropical Pesticides Research Institute (TPRI) Arusha</strong></td>
</tr>
<tr>
<td><strong>Traps</strong></td>
<td>Biconical</td>
<td>Biconical</td>
</tr>
<tr>
<td><strong>Identified flies</strong></td>
<td>Tsetse (<em>G. pallidipes</em>)</td>
<td>Tsetse (<em>G. swynnertoni</em>, <em>G. pallidipes</em>), biting flies (<em>Stomoxys</em> sp., <em>Tabanids</em>), nuisance flies (<em>Musca</em> sp.)</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td>• Reduced Tsetse fly population</td>
<td>• Reduced local Tsetse fly population</td>
</tr>
<tr>
<td></td>
<td>• 100% bioefficacy with local Tsetse flies</td>
<td>• 100% bioefficacy with local Tsetse and nuisance flies</td>
</tr>
<tr>
<td></td>
<td>• Ongoing: AAT incidence, Productivity (birth rate, weight gain) and Economic parameters (sales income, health costs)</td>
<td></td>
</tr>
</tbody>
</table>
Tanzania:

Impact on Tsetse Population

- **Intervention**
- **Untreated**
- **Pour-on**

<table>
<thead>
<tr>
<th>Month</th>
<th>Apparent Density (Flies/trp/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>December</td>
<td>4.00</td>
</tr>
<tr>
<td>January</td>
<td>1.00</td>
</tr>
<tr>
<td>February</td>
<td>0.50</td>
</tr>
<tr>
<td>March</td>
<td>0.25</td>
</tr>
<tr>
<td>April</td>
<td>0.50</td>
</tr>
<tr>
<td>May</td>
<td>2.30</td>
</tr>
<tr>
<td>June</td>
<td>1.50</td>
</tr>
<tr>
<td>Trial type</td>
<td>Productivity – pigs (Large White Cross)</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------------------------------</td>
</tr>
<tr>
<td>Trial length</td>
<td>3 months baseline, 2 years of trial - <strong>ongoing</strong> - All seasons</td>
</tr>
<tr>
<td>Climatic zone</td>
<td>Riverine thickets</td>
</tr>
<tr>
<td>Collaborating institute</td>
<td>Central Veterinary Laboratory Kinshasa (Ministry of Agriculture and Livestock)</td>
</tr>
<tr>
<td></td>
<td><strong>Initiated for “Rethink DRC” Clinton Foundation</strong></td>
</tr>
<tr>
<td>Setup</td>
<td>3 pigsties: no protection, screen w/o insecticide, ZeroFly® Livestock screen</td>
</tr>
<tr>
<td></td>
<td>1 km apart, rotation of animals and caretakers every 8 months; Zero grazing</td>
</tr>
<tr>
<td>Traps</td>
<td>Pyramidal</td>
</tr>
<tr>
<td>Identified flies</td>
<td>Tsetse flies (<em>G. fuscipes quanzenis</em>), nuisance flies (<em>Musca</em> sp.)</td>
</tr>
<tr>
<td>Outcomes</td>
<td>- Reduced local Tsetse fly population</td>
</tr>
<tr>
<td></td>
<td>- 100% Bioefficacy with local Tsetse flies</td>
</tr>
<tr>
<td></td>
<td>- AAT incidence, Productivity and Economic parameters</td>
</tr>
</tbody>
</table>

**Weight gain**

![Weight gain chart]

February, March, April, May, June, July,
Nana Kwasi Owusu  
Wadie jumakase in Ghana  
Local chief said ZeroFly® will bring a lot of benefits to my community because even diseases transmitted by flies from animals to humans will be reduced.

Robert Akahu, Farmer  
Adjei Kojo – Ghana  
“There has been a complete reduction of flies after installation of ZeroFly® Livestock about 3 months ago”. “Sores and other types of skin irritation on the pigs have gone”

George Best from Volta region, Ghana suggests “The health of our animals has improved a lot after ZFL and there have been no recent cases of still birth, which we used to often experience”

Dr. Mark Hansen, Veterinary Services Division of MOFA  
Dr. Hansen explained that there exists groups of insects which impact negatively on livestock production. He sighted the example of tsetse flies and the horsefly and said there was a host of others of veterinary importance. As a result, ZeroFly® Livestock is a very relevant product for the livestock sector.