PLAN

- Presentation of CIRAD and the Guadeloupe team
- Two « projects » coordinated by CIRAD in animal health
  - Surveillance Network
  - Research Network
- Adequation between my background and my missions in the Caribbean
A research organization with agriculture at the heart of global issues

National public institution status, EPIC, created in 1984.

- Research in tropical agronomy, based on 50 years' experience in the field.
- Global mission: targeted research for development of South regions.
- CIRAD generates knowledge and helps build capacity, in support of agricultural and rural development

« Working together for tomorrow’s agriculture »
Fruit and vegetables
Sugarcane
Cocoa
Coffee
Rice
Cotton
Banana and plantain
Oil palm

Animal production & animal health
Rubber
Forest species

CIRAD worldwide
12 regional offices in the French overseas regions and abroad
A scientific hub in Montpellier – world capital of agricultural research*

A staff of 1800, including 850 researchers
~ 700 staff members based outside metropolitan France (40 countries)
One main operating principle: research in partnership

- Working together to establish and implement priorities
- Working in the field, in the South, where our partners are, in their laboratories with and for the partners.
- Building our partners’ institutional and scientific capacity

Collaborative projects with 90 countries
Research platforms in the French overseas

Training the talents of the future:
The need to link research and higher education

- More than 300 PhD students supervised each year, 60% of them from the South
- International Masters courses run with grandes écoles and universities
- 800 researchers and technicians received and trained each year
Three research fields on appropriate scales

37 Research units

- **Biological systems (BIOS)**
  Understanding biological systems, from molecule to ecosystem

- **Tropical production and processing systems (PERSYST)**
  Analysing farming practices and farming system performance, from plot to farm level

- **Environments and societies (ES)**
  Supporting players in rural areas, from a local to a global scale

CIRAD’s six priority lines of research

1. Ecological intensification
2. Biomass energy and societies in the South
3. Safe, diversified food
4. Animal health and emerging diseases
5. Public policy, poverty and inequality
6. Agriculture, environment, nature and societies
- Line 4 -

Animal health and emerging diseases

Forecasting and managing infectious disease risks linked to domestic animals and wildlife

- Studying disease emergence and spread
- Risk modelling and management
- Drafting appropriate sanitary policies

2 Research units specifically working in Animal health

UMR 15 – « Exotic & Emerging Diseases Control Unit » (CMAEE)

CIRAD in Guadeloupe, Exotic & Emerging Diseases Control Unit – Caribbean team

September 2011: 20
- 4 searchers CIRAD + 1 searcher INRA coming soon
- 4 lab technicians, 2 animal technicians
- 3 PhD students, 1 post-doc
- 1 assistant et 1 project manager
- 1 informaticien webmaster (contrat)
+ 3 Masters 1 & 2

+ Arriving in 2011-2012
- 2 searchers
- 1 technician
- 2 young epidemiologists
A REGIONAL CARIBBEAN LABORATORY - Diagnostic and research -

OIE Reference laboratory for Heartwater and the Tropical Bont tick
Diagnostic for the Caribbean region: AI, WN and tick-borne diseases

- **Laboratories (300m2)**
  - Diagnostic: molecular biology & serology
  - Immunology and parasitology
  - Genomics
  - BSL2: infectious material & cell culture

- **Biological resources centre**
  (with INRA – URZ)

- **COFRAC 17025 accreditation**

Animal house / goats & rabbits (200m2)  
Ticks insectarium

**Main study model and general strategy**
*Tropical Bont Tick / Bacteria responsible of Heartwater in ruminants.*

- **Host – bacteria interactions**
- **Tick – bacteria interactions**
- **Acarology**
  - Bio-ecology
  - Population genetics
- **Epidemiology Modelling**
  - Population dynamics
  - Areas at risk
  - Transmission

- **Vaccination Control Vector**

Laboratory – Field – Networks
Genetics
Activities of the lab - Animal health and emerging diseases

- Understanding **diseases transmission cycles**
  - West Nile virus, Heartwater

- Monitoring the **evolution of pathogens, vectors** (Heartwater) and infected animals (West Nile virus)

- **Designing new vaccines**
  - Heartwater in the caribbean and Africa

- **Developing new research questions**
  - Interactions between 2 Amblyomma ticks

- **Developing surveillance networks**
  - Heartwater surveillance in Guadeloupe

- Developing **higher education and distance learning** in epidemiology

**PRESENTATION OF 2 PROJECTS COORDINATED BY CIRAD**

- **CARIBVET**, Caribbean animal health network

- **EDEN**, European research network on vector borne and zoonotic diseases
The Caribbean Animal Health Network

You!  Me

Caribbean Sea

Atlantic Ocean

Political communities

- CARICOM
- CARICOM Associate
- Non-CARICOM

Languages

ENG – SP – NL – FR
Collaboration NETWORK of Veterinary Services, diagnostic labs, regional/international organisations, research centres

A complex region with variety of:
- Socio-economic development level
- Animal productions
- Legal/illegal movements
- Organisation of health policies and authority

Islands sharing similar constraints
- Natural disasters
- Demographic and environmental changes

Regional approach to improve animal health & promote trade

CaribVET in 2011
32 countries/territories members

CaribVET organisation

Steering committee
Coordination Unit

Epidemiology
Avian Influenza & Newcastle
Ticks & Tick-borne diseases
Swine diseases
Veterinary Public Health
Laboratory Quality Assurance & diagnosis

Working groups

National level
Veterinary services
Private sector
Diagnostic laboratories
Research institutes & Universities
Regional & International organisations

VEP project: 2008-2011
Interreg: 2009 – 2012
Key activities conducted within caribVET

- **Technical & scientific support** for Caribbean members
- **Reinforcement** of national surveillance activities / networks
  - Evaluation of surveillance activities → towards country assistance
  - Evaluation of laboratories → towards a Caribbean Laboratory Network
- **Capacity building**
  - VEP Project – training of Caribbean professionals in epidemiology
  - Trainings in diagnosis, simulation exercises, GIS, …
- **Research applications**: increase knowledge of diseases epidemiology in the Caribbean (WN virus, heartwater & TBT distribution,…)

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**SNAT: evaluation tool**

**Regional RA Framework**

**Scientific &technical documents**

**Risk assessments conducted in technical WG**

- AI and fighting cocks AI WG
  - Caribbean
- CSF, Teschen and swines Swine WG
  - Cuba & Hispaniola
- FMD and imported meat Epigroup
  - CARICOM countries and Brazil

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**Communication and information management**

- **CaribVET Website**
  - Internal and external communication
  - Health information
  - Harbor databases:
    - Surveillance (TickINFO, Declavet)
    - Laboratoires (Caribbean, America)

- **Information bulletin**
  - 3–4 issues a year
  - Editorial committee: Reporters from all over the Caribbean

- **CaribVET Charter**

[www-old.caribvet.net](http://www-old.caribvet.net)
[www.caribvet.net](http://www.caribvet.net)
Supporting Research and Capacity Building

Epidemiology project in the Caribbean

- Factor associated to TBT presence in farms
- Anaplasma Ovis seroprevalence in small ruminants
- Descriptive epidemiology of Teschen in Haitian swine

Master

Heartwater surveillance in Guadeloupe

Julie SEVILA

phD student

Distribution of Amblyomma ticks

Laure BOURNEZ

- Research questions relevant for the countries
- Improve disease knowledge in the Caribbean
- Cost benefit ratio of improved surveillance & control

Health networks and the spirit of our Unit

- Regional approach
  - Access to field and biological resources
  - Partnership with the South and area of potential diseases emergence, co-building
  - Impact regional and global methods and tools
- Teams & infrastructures: linking surveillance networks together and with research
Emerging, vector-borne diseases in a changing European Environment

**Aim:** European ecosystems & environmental conditions linked to global change, which can influence the distribution & dynamics of pathogenic agents.

**Strategy:** Coordinated European approach to provide predictive emergence and spread models including global and regional prevention, early warning, surveillance, and monitoring tools and scenarios.

**With International organisation and developing countries**

**Key Words:** emerging disease, vector-borne disease, environment, climate change, ecosystem, ecology, modelling, mosquito, tick, sandfly, rodent, Europe

EDEN Project, fact sheet

**Instrument:** FP6, Integrated Project. Total

**Total Cost:** 28 million US $, **EC Contribution:** 16.1 million US$

- **Dates:** November 2004 – May 2010
- **Consortium:** 49 partners from 24 countries
- **Project Coordinator:** CIRAD, [Renaud.Lancelot@cirad.fr](mailto:Renaud.Lancelot@cirad.fr)
- **Scientific production:** More than 175 papers, involving authors from some 270 institutions, have been published in international journals, and 60 PhD theses have been supported through funding, data provision, and training.

http://www.eden-fp6project.net/
EDEN integrated project

- 24 countries
- 49 partners,
- 80 scientific teams,
- 120 field sites,
- 60 PhD Students,
- 200 research years

Importance of vector-borne diseases

Highly sensitive to environmental changes

Intensification of commercial exchanges, international travels
Changes in land-cover & land uses, due to:
- Socio-economic factors
- Climatic factors

Significant and increasing part of emerging infectious diseases (EID)

Relative importance of VBD in decade EID occurrence

Interactions between actors of VBD cycle

VBD cycle

Reservoir/Amplifier host
Amplification cycle
VECTOR
Transmission
Dead-end host

Hatched areas: countries involved in the project.

EDEN integrated project

Vertical Disease Sub-Projects

Horizontal Integration Teams grouped under WP6
- Tick Borne
- Rodent Borne
- Leishmania
- West Nile
- Malaria
- WNV-RVF

Tools and Scenarios - WP7

Data Management & Information Systems (WP6.1)
- For each indicator disease, field studies are conducted to understand patterns and processes:

Low Resolution Remote Sensing & Spatial Modelling (WP6.2)
- WP1 – Landscapes/biotopes
- WP2 – Vectors

High Resolution Remote Sensing & Environmental Change Monitoring (WP6.2)
- WP3 – Public health
- WP4 – Animal hosts/reservoirs

Mathematical Modelling & Disease Establishment and Spread (WP6.3)
- WP5 – Integrated data analysis

Biodiversity & Impact on Disease Spread (WP6.3)

WP8 Training, Dissemination, Management & Coordination

EDEN findings

- Key outcome: many of observed changes in disease occurrence are driven by complex multifactorial causes and can often not simply be linked to a single cause.

- Socio-economic factors often appear to be drivers of change more important than climatic factors.

- This complexity should not be overlooked in disease risk studies and public health policy making!
EDEN… What’s next?

- **Main EDEN assets**: generation of a **pan-EU network of experts**, including an extensive PhD network, in research on vectors and vector-borne diseases = VBD past-present-future.

- **EDEN network**: considered by public-health agencies as ‘**incontournable**’ on the topic of vector-borne diseases.

- Already yielded spin-off projects with ECDC and ESA. The EDEN consortium will also coordinate replies to upcoming FP7 calls. “**EDEN Next**” project

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**ECDC**: European Center for Diseases Control; **ESA**: Entomological Society of America.
I supplemented my veterinary studies with yearly surveillance activities in «Camargue».

Veterinary studies 1998 – 2004, « the Pink city »

2000 – First outbreak of WN virus in horses, near Montpellier (35 years of silence)
2001 – Settlement of the WN surveillance network in South of France

My schedule for the next 3 years (2001 – 2003):
- Octobre to June: veterinary studies
- June to septembre: surveillance activities

Avian surveillance of the West Nile virus in Camargue (ONCFS)

Field coordination of the avian surveillance, South of France. Summers 2001 - 2003
Master degree in epidemiosurveillance and Environment & health: Epidemiology of the WN virus in Guadeloupe

**Background**
- 2002 – first evidence of WN virus in horses in Guadeloupe
- Virus probably introduced by migratory birds, from the USA

2004: Certificat d’étude approfondie vétérinaire - Pathologies animales en Région chaudes (Montpellier/Toulouse)
- 6 months trainee period: to evaluate the level of WN virus circulation & identify the mosquitoes responsible for the transmission

2005: Master Degree in Environment & health (Grenoble)
- Risk factors of WN virus in horses?*
- Why a sudden drop of circulation after 2003?


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**Entomological surveillance (WN virus) in Guadeloupe (1)**
PhD research - mosquitoes, potentially vectors of pathogens in Dombes (Rhone-Alpes region)

**Background**
- WN fever in France does not spread
- Environment putatively favorable for virus cycle establishment
- **Question**: risk of circulation of mosquito borne diseases in Rhone-Alpes with environmental and climatic change?

**Problematic**
How to study the impacts of environmental changes on potential vectors of pathogens, in an area free of diseases?

→ Framework development  
→ Mosquito taxonomy, bio ecology and modelling  
→ Proposition of applications: research and surveillance

- Larvae sampling in any water collection -
What does an epidemiologist do in Cirad Guadeloupe?

Better know the Caribbean environment, organisation & functioning of Veterinary Services and the actors of the Caribbean Animal Health Network.

- **Coordination and animation of the CaribVET network**
  - Technical and scientific support to:
    - Network and **working group activities**
    - The working group **chairs** in the animation of their groups, …
  - Development of internal and external communication
    - CaribVET Charter update
    - **Website** update; Development and coordination of the **information bulletin**, …
    - Identify new **sources of funding**, …

- **Development of research** in link with surveillance activities
  - VEP Project: mentorship of Patricia (Nevis) and support in the mentorship of Rodney (Haiti) and Auria (St Lucia).
  - Encourage scientific communication of CaribVET working groups *
  - Strengthen research activities within the network… towards a Caribbean research Network?

* 1 publication accepted by the Epidemiology WG (Sci. Tech. Rev OIE, 2001)
* Swine Diseases WG activities presented at the Int. Symposium on swine diseases (Barcelona, 2011)
Thank you for your attention