

Epidemiosurveillance

Epidemiology training
Animal health cooperation platform
Embassy of France to the OECS States

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Definition

- Epidemiosurveillance may be defined as
 - the process of on-going systematic collection,
 - #surveys ≠ epidemiologic research
 - orderly consolidation
 - and analysis of data
 - with timely dissemination and feedback of the results to those who need to know
 - particularly those who are in a position to take *action*
 - Actors of the network: farmers, vets
 - Stakeholders, policymakers

Objectives and uses of surveillance

- Detect the occurrence of disease
- Determine trends over time
- Set goals and targets based on information regarding prevalence and trends in order to design control measures
- Assess whether animal health goals and targets are being reached

Objectives and uses of surveillance

- Another purpose of surveillance is the early detection and control of animal diseases of importance to national economy, food security and trade
 - Early warning → Early reaction
 - Outbreak investigation
 - Monitoring of progress in control and eradication programmes

Passive and Active Surveillance

- **Passive (Scanned) surveillance:** accompanying the health disease status, basically relying on farmers' communication and visual observations
- **Active (Targeted) surveillance :** frequent and regular effort to determine the animal health status in a given sub-population

Surveillance vs. survey

- **Surveillance** is usually based on information collected **as part of routine health system**
 - although it may sometimes be based on repeated structured surveys
- A **survey** may be defined as an **investigation in which information is systematically collected**
- The term survey is sometimes used in a narrow sense to refer specifically to a "field survey"

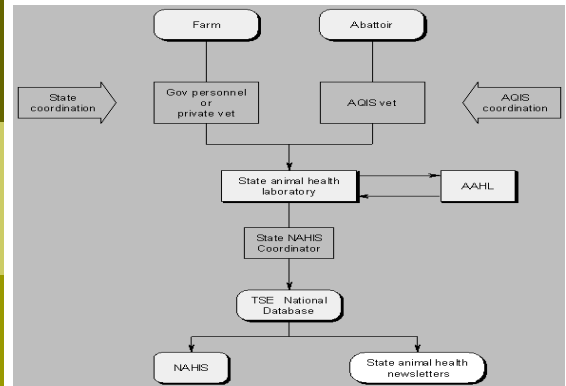
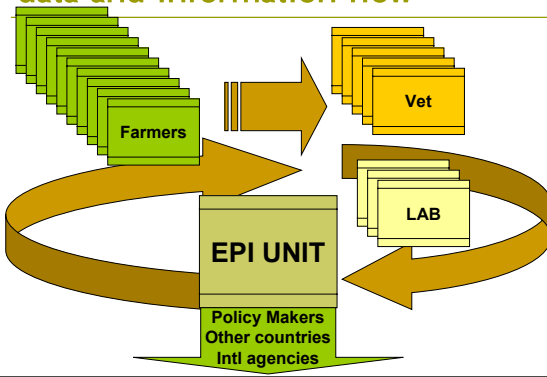
Surveillance vs. Monitoring

- **Surveillance:** the continuous collection of data in a given population to assess the impact of an infectious disease
- **Monitoring:** the continuous collection of data in a given population to measure the effect of control programmes → implies a constant adjustment of performance
- **MOSS: Monitoring and Surveillance Systems**

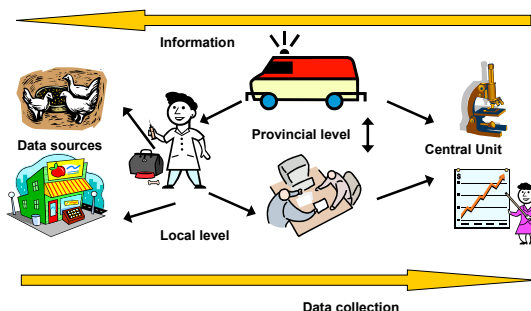
Actors - partners

- Field
 - Farmers and animal breeders (communication, participatory appraisals)
- Private sector (abattoirs, meat industry, private vets...)
- Provincial, district veterinary staff
- Laboratories
 - regional, national, reference labs
- National veterinary authorities
 - Central EPI Unit
- International organisms
 - sanitary legislation and policies, trade exigencies

Surveillance: data and information flow



Surveillance network: general structure



Evaluation of AHSS

- Well defined objectives
 - Pertinent and precise
- Good sampling
 - Exact and precise
- Adapted tools
 - Pertinent & standardised measurement tools with regards to objectives
 - Adapted laboratory diagnostic techniques, quality control and standardisation of laboratories

Evaluation of AHSS (cont)

- Data collection and circulation
 - Standardised collection
 - Quality & timeliness of data circulating
- Animation
 - Adapted to objectives
 - Pertinent use of time
- Data analysis and interpretation
 - Quality & scientific validation
- Information dissemination
 - Frequency
 - Range of distribution

Data analyses and management

- Data collection and transfer
- Data management and analysis
 - adapted software (Access, EpiInfo...)
 - spatial analysis- GIS
- Data/Information communication
 - Bulletin
 - Network: Information systems, Databases (TADInfo, Web...)

Data/Information communication

- Internal communication: Actors of the Network
 - Dynamic link among the actors
 - Demonstrate the usefulness of the network
 - To the farmers:
 - Through official services
 - Private vets
 - NGOs
 - ...
 - Thus, less reluctance to give information?

Data/Information communication

- External communication: Partners
 - National, Regional, International Levels
 - Information for the policymakers
 - Demonstrate to regional and international partners the dynamics of the network
 - Certification for free zones
 - Trade...

Data/Information communication

- Epidemiological bulletin
 - Epi Unit Team
- Technical reports
- Web site

- Communication to the farmers
 - Meetings
 - Role of the Vets and paravets
 - Cf. Participative epidemiology

EMPRES Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases

Livestock component

EMPRES Information System (EMPRES-I)

What is EMPRES-I

EMPRES-I EMPRES INFORMATION SYSTEM

The EMPRES Global Animal Disease Information System (EMPRES-I) has been designed to support national veterinary epidemiologists and facilitate regional and global information sharing and collaboration on the progressive control and eradication of major TADs.

EMPRES-I provides five different modules with updated information on global disease distribution, current threats and response to emergencies. It also provides access to training material and resources for veterinary epidemiologists.

EMPRES Information System Modules



Foot-and-mouth disease virus type C reported in Brazil

Official laboratory results of an outbreak of FMD reported in Brazil indicated FMD serotype C, which had not been reported in South America for almost ten years. The outbreak affected bovines on an island in the Amazon River where animal movement is performed exclusively by river boat, and which is separated from the World Organisation for Animal Health-recognized FMD-free zone with vaccination by more than 500 km. The Brazilian authorities quarantined the affected premises and curtailed animal movement.

Application of sensitivity and specificity to surveillance

- Surveillance generally uses methods distinguished by their practicality, uniformity and rapidity rather than by accuracy or completeness
- **In an ideal surveillance system**
 - all cases in the population would be detected
 - and all those that the surveillance system identified as having the disease would indeed have the disease.

Application of sensitivity and specificity to surveillance

- In practice, depending on the case definition used
 - Some of those who have the disease will not be included as cases (lack of sensitivity)
 - and some of those that are tested as positive will not have the disease (low specificity).
- Additionally, not all of those who meet the case-definition will actually have the disease (*positive predictive value*).

Application of sensitivity and specificity to surveillance

□ **Sensitivity** =
$$\frac{\text{cases detected by surveillance}}{\text{all animals with the disease}}$$

□ **Specificity** =
$$\frac{\text{Animal w/o disease and negative on surveillance}}{\text{All animals w/o the disease}}$$

□ **Positive predictive Value** =
$$\frac{\text{Animal with the disease detected by surveillance}}{\text{All the animal meeting the case definition}}$$



Application of sensitivity and specificity to surveillance

- **Positive predictive value** is important if the surveillance system may trigger the further investigation of individual cases or of outbreaks
 - if the positive predictive value is low, resources will be wasted chasing problems that do not exist
- Using a broad case definition to improve sensitivity will increase the rate of false positives and decrease specificity
 - Similarly, increasing the criteria required to make a diagnosis will increase specificity, but sensitivity will decline

Application of sensitivity and specificity to surveillance

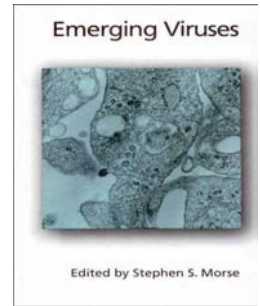
- In surveillance, the two most important values are sensitivity and positive predictive value. **Sensitivity** is affected by:
 - Whether farmers are in contact with vets and paravets
 - Whether the disease is diagnosed
 - Whether the disease is reported
- To evaluate sensitivity, you need external evaluation through a mechanism such as a survey
- **Recall that sensitivity does not have to be high in order to monitor trends, as long as sensitivity remains relatively constant**

National Epidemiological System

- The science of Epidemiology provides the foundation for Surveillance and Monitoring
- A National Epidemiological System should incorporate agent surveillance and/or monitoring, description of host population characteristics and environmental assessment
- **An effective veterinary infrastructure is necessary to support this epidemiological system**

Challenges of Modern Epidemiology

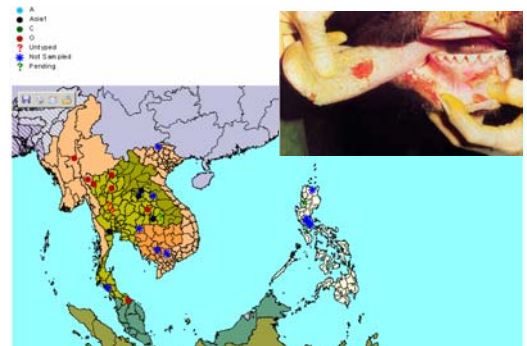
- Animal production
 - Multifactorial diseases
- International trade and movements
 - Transboundary animal diseases
- Ecological and economical changes
 - Emerging diseases
- New diseases, emerging and re-emerging:
 - HPAI, SARS, West Nile Virus, bioterrorism, etc.



Epizootics/epidemics Emerging diseases

- Early warning → Early reaction
- TADs and EIDs, need of:
 - Surveillance systems
 - International cooperation
 - Networking:
 - Meetings
 - Workshops
 - Trainings
 - E-platform
 - Etc.
- Importance of tools such as CaribVET

Regional network: e.g. Southeast Asia and FMD (SEAFMD)



International networks/agencies

- FAO
 - Technical support
 - Regional coordination
 - Worldwide feedback
- OIE
 - Standardized procedures of surveillance
 - Pathways definition for countries to obtain a defined disease status
 - Elaboration of International Animal Health Code

Organisation of the AHSS in France



Central control: Ministry of Agriculture

- 200 agents
- Missions:
 - Take part to the discussion on European legislation (with the help of the Food Safety Agency)
 - Give directives to the departmental veterinary services directions on how to implement the legislative texts
 - In charge of SIGAL (national database)
 - Each farm in relation with the national identification database for cattle (BDNI)
 - Each food producing unit (from slaughterhouse to distribution)
 - Each approved laboratory
 - all DDSV, GDS, and sanitary veterinarians are included and will have access to the database

Food Safety Agency (AFSSA)

- 700 scientists
- Delivers scientific opinions on request from the tutelary ministries on any matter regarding food safety, animal health and welfare and veterinary medicines
- A network of 15 laboratories including reference laboratories for OIE listed diseases
- Examples:
 - Lyon: national laboratory for cattle
 - Ploufragan: national laboratory for poultry and pigs

Departmental Veterinary Services (DDSV)

- Governmental services (1 per department, 99 in whole France)
- Depend on Ministry of Agriculture and Ministry of environment
- 5,300 agents (inspectors of vet public health, technicians...)
- Missions:
 - Food safety
 - Animal health: control of regulated diseases
 - Animal welfare
 - Import-export of live animals and food from animal origin (sanitary certification)
 - Management of captured wild animals
 - Control of environmental legislation regarding farms and food producing units

Veterinary diagnostic laboratories

- Public or private
 - In most departments there is a veterinary laboratory depending from the local public organisation (department)
 - Some may be private
- Missions
 - Perform routine diagnosis in animal health and food safety
 - For each disease, there is a reference laboratory (departmental or included in AFSSA)
 - Almost all engaged in quality assurance (Iso norms)
 - May be included in national networks to better collect information on a particular disease (e.g.: aviary salmonellosis) or to harmonise the methods and the results at a national level

Private veterinarians

- Main incomes come from private care paid by the farmers and customers (system could not function otherwise)
- Sanitary veterinarians (about 5,000) carry out specific actions for the government within the sanitary mandate (sort of accreditation)
- Sanitary mandate:
 - Declaration of regulated diseases (TB, brucellosis, FMD...)
 - Annual sanitary visit
 - Visits of suspected herds
 - Collection of samples
 - Control of injured and dead animals (BSE)

Sanitary Defence groups (GDS)

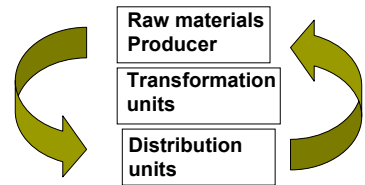
- Farmers associations
- Created in the 1950's because DDSV wished to have a relay between administration and farmers to better implement control measures of regulated diseases
- Budget:
 - 50-80% from farmers subscriptions
 - 30-50% from public local organisations (department)
- Missions:
 - Support farmers for control of regulated diseases
 - Certification for non regulated diseases (a plus for trade)
 - Association for farm animals health certification: IBR, BVD, Johne's...
 - Technical advice to farmers
 - Improvement of sanitary aspects: mastitis, tick-borne diseases

Animal identification

- Cattle
 - Individual identification since 1965: ear tags and passports
 - Passport includes a sanitary green card that may be removed by DDSV if the herd does not comply with sanitary regulation
 - All animals and animal movement included in a national database (BDNI)
 - Control by EDE and DDSV
- Dogs and cats
 - Compulsory only for animals in departments officially infected by rabies, or exhibited in markets, expositions and camping, or who travel out of France
 - Performed by private veterinarians
 - National databases: one for dogs and one for cats
- Horses
 - Compulsory for all horses after 2008
 - Performed by private veterinarians but also by officially recognised identification agents
 - National database

Traceability: from fork to fork

- DDSV control every step of the production channel
- Sanitary alerts



At any point of the food channel, the detection of an anomaly, by the professionals or the control services, leads to remove the product from sale

Conclusion French AHSS

- General surveillance system involving several thousands agents (from scientists, to veterinarians and farmers)
- Tackles specific regulated diseases
- Other diseases are monitored through specific surveillance systems
- Very effective (e.g.: FMD outbreak in 2001)
- Relies on private veterinarians who are paid by private care. System would be too costly if salaries of sanitary veterinarians were paid by government

Presentation of the FSP EPIREG

- Ministry of Foreign Affairs
- Fonds de Solidarité Prioritaire
- Support for regionalisation and harmonisation of animal health surveillance networks
- Caribbean region, Maghreb, Indian Ocean



Context

- Several factors at stake with surveillance and control of animal health
 - Economic development of developing countries
 - RP, BCPP, PPR, ASF,...
 - Public health protection
 - HPAI, rabies, tuberculosis, RVF,...
 - SPS agreements of the WTO
 - Sustainable development at world scale

Context

- Recent sanitary crises
 - HPAI
 - BSE, FMD, bluetongue, RVF, ASF,...
- General strategy
 - Animal disease control → eradication → free zones or countries
 - Reinforced surveillance to maintain disease-free status

Observations

- Efforts to improve surveillance and diagnostic capacities in developing countries
- Objectives to acquire disease-free status for the main contagious diseases listed by the OIE
- Important funds available:
 - EU (PACE), FAO (EMPRES)
 - National agencies (DFID, Italy, France, etc.) in specific countries

Observations

- Developed countries more sensitive to the fact that diseases affecting developing countries can reach their territory or get a worldwide dimension
 - Ex: crises FMD, HPAI, WN, bluetongue,...
- ➡ Need for a global management of animal health
- A transboundary, coordinated approach of national programmes can be successful:
 - Rabies in Western Europe
 - Final phase of RP eradication in Africa

Objectives of FSP EPIREG

- List and reinforce national capacities for sanitary risk analysis and management
- Regionalise and harmonise surveillance networks
- Promote regionalisation of skills and expertise
- Improve communication and information dissemination at the regional level

Institutional aspects

- Steering Committee presided by OIE
 - M of A and M of FA (France),
 - FAO, EU, AU-BIAR
 - Veterinary services of involved countries
 - CIRAD (observatory)
- Technical committees by region
 - Veterinary services
 - Complementary regional and national projects
 - Other partners

Principles

- Anchored on political organisations
 - Indian Ocean: IOC
 - Caribbean: OCS or CARICOM
 - Maghreb: UMA
- Search complementarities
 - EU: PACE, SADC, CaribVET
 - FAO: EMPRES, RADISCON, GFTADs

Fields of Intervention

- Economical-political
 - Analyse sanitary risks at regional level
 - Assess economic impact and develop legislation to facilitate disease surveillance and control
- Institutional
 - Evaluate national surveillance systems
 - Build regional skills networks
 - Involve private veterinarians, community-based animal health workers and farmers in surveillance
 - Strengthen regionalisation of surveillance
 - Regional networks
 - Reference laboratories
 - Training

Fields of Intervention (cont)

- Technical
 - Support for elaboration of emergency preparedness plans
 - Management of sanitary information at the regional and international level

Current status

- Funds available
 - 1.500.000 € for three years
- First steering committee in May 2005 during OIE meeting
- One technical assistant for each region:
 - Pascal Hendrikx based in the Dominican Republic since September 2005
 - Specialist of surveillance systems (PACE)
 - Activities funded by French M of FA