FAO/China Intensive Training Course on Tilapia Lake Virus (TiLV)
Sun Yat Sen University, Guangzhou, China
18-24 June 2018

TRAINING COURSE SESSION MODULES

SESSION 4
Applied veterinary epidemiology to design and implement surveillance programs

Dr Mona D. Jansen PhD
Researcher
Norwegian Veterinary Institute
Email: mona-dverdal.jansen@vetinst.no

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Dr Fernando O. Mardones PhD
Assistant Professor
School of Veterinary Medicine, Universidad Andres Bello, Chile
Email: fomardones@gmail.com; fernando.mardones@unab.cl

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Introduction

An aquatic animal health surveillance is the ongoing systematic collection, analysis, and interpretation of health data essential to the planning, implementation, and evaluation of aquatic health practice, closely integrated with the timely dissemination of these data to those who need to know. Surveillance underpins several activities, including the rapid detection of disease outbreaks, early identification of disease problems (endemic or non-endemic), assessment of the health status of a defined population, definition of priorities for disease control and prevention, identification of new and emerging diseases, evaluation of disease control programs, provision of information to plan and conduct research, and the confirmation of absence of a specific disease. Overall, surveillance can provide timely information crucial to aquatic health interventions in an evolving situation. Information from carefully designed and implemented surveillance systems can also inform the allocation of resources to aquatic health programs. Epidemiologic data generated through disease surveillance serve as the bases for research and development of drugs, vaccines, and other therapeutic and prophylactic interventions.

There are several types of surveillance, defined by function and method. The methods used for infectious disease surveillance depend on the type of disease. Part of the rationale for this is that there are fundamental differences in etiology, mode of transmission, and control measures between different types of infections. Interventions may also vary greatly, from vector control and environmental interventions to vaccines, antivirals, and biosecurity protections for Tilapia Lake Virus. Despite the fact that much of surveillance is practiced on a disease-specific basis, it is worth remembering that surveillance is a general tool used across all types of infectious and, noninfectious conditions, and, as such, all surveillance methods share certain core elements.

Analysis and interpretation of any surveillance data, including infectious disease surveillance data, faces six fundamental challenges. The first challenge is to understand the purpose and context of the specific surveillance system. The second challenge is to identify a baseline rate of observations and to recognize deviations from that baseline, including trends, clusters, and insignificant changes or surveillance artifacts. The third and fourth challenges are to interpret the meanings conveyed by these observations and to recognize the significance of these interpretations. The fifth challenge is to properly discern the degree of certainty that the available data can support regarding that interpretation. The last challenge is to communicate the observations (and the interpretation of their meanings, significance, and certainty) with clarity to the desired audience on a time table that enables meaningful action to be taken in response to the interpreted data.

Although central to disease prevention programs, aquatic health surveillance infrastructure is inadequate or weak in many parts of the world. The need to strengthen capacity to conduct aquatic health surveillance for infectious diseases is a priority for practitioners and policy makers. Contrary to the misconception that infectious diseases have been conquered by advances in veterinary medicine and technology, established and newly emerging pathogens will likely continue to be threats to aquatic health for the foreseeable future.

Learning objectives
This session will assist workshop participants to understand and gain knowledge on the key elements of veterinary epidemiology and the contribution of this field in the design and implementation of national and/or regional surveillance programs.

Learning outcomes
At the end of the course module, participants will:

- To gain knowledge of fundamental aspects of veterinary epidemiology in the context of aquaculture and its relevance to crucial issues regarding the design of surveillance programs.
- To recognize the detailed 12-point checklist for the design and implementation of an active TiLV surveillance plan
- To understand the steps in an outbreak investigation and in emergency preparedness
- To be able to draft an implementation of an active TiLV surveillance plan at national and/or regional levels.

Module duration
Day 4 (21.6) 08:30-16:30
Day 5 (22.6) 08:30-12:00
Day 6 (23.6) 16:00-17:00
Day 7 (24.6) 08:30-10:15

Working group activity:
- Online exercises for
    - Determination of sample sizes
    - Measurement of disease
    - Evaluation of diagnostic tests
- Outbreak investigation and emergency preparedness simulation exercise

Background documents
- PPT presentations
- Online websites:
    - http://www.winepi.net/
    - http://epitools.ausvet.com.au/content.php?page=home

- Additional references:

Survey toolbox for aquatic animal diseases: a practical manual and software package. Available at https://www.aciar.gov.au/node/7276
Guide for Aquatic Animal Health Surveillance. F. Corsin, M. Georgiadis, K. Larry Hammell, B. Hill; Ed.: 2009. Available at http://www.oie.int/doc/ged/d6714.pdf

FAO Surveillance and zoning for aquatic animal diseases. Available at http://www.fao.org/docrep/007/y5325e/y5325e00.htm

OIE Aquatic Animal Health Code. Available at http://www.oie.int/standard-setting/aquatic-code/

Lectures

Day 4 (21.6)

08:30-10:15: Principles of epidemiology and surveillance and their application to aquaculture

- What is epidemiology
- The epidemiological approach
- Investigating disease outbreaks
- Causality
- Patterns of disease
- Measuring disease frequency (exercises to determine prevalence and incidence)

10:30-12:00: Cont -Principles of epidemiology and surveillance and their application to aquaculture

- Diagnosis and screening (exercises to estimate Se, Sp and PVN/P)
- Sampling populations (exercises using epitools – the basics)
- Data collection and management
- Exploratory data analyses

13:00-15:00: Introduction to surveillance

- What is population health surveillance?
- Terminologies and types of surveillance
- Mechanisms of surveillance
- Collecting surveillance data
- Approaches to surveillance
- Requirements for national and/or regional surveillance programs

15:15-15:45: Design and implementation of an active TiLV surveillance plan (12-point checklist)

- Aims/Purposes of TiLV surveillance program
- Definition of populations
- Clustering of disease
- Case definition
- Sampling
- Diagnostics/tests
- Validation
- Quality assurance: audit and corrective measures
- Human and financial needs
- Surveillance in the bigger picture

15:45-16:30: Analysis of surveillance data

- Statistical aspects

- Methodology
- Data management
- Intro to spatial epidemiology
- Q&A session

Day 5 (22.6)

08:30-10:15: Applied epidemiology (Winepi and epitools)

- Group exercises to define:
  - Epidemiological units
  - Samples sizes and design

10:30-12:00: Implementation of an active TiLV surveillance plan

- Participatory setting
- Country level development of an active TiLV surveillance plan
- Presentation of results
- Q&A session

Day 6 (23.6)

16:00-17:00: Emergency preparedness simulation exercise

- Steps in outbreak investigations
  1. Establish or confirm a provisional diagnosis.
  2. Define a case.
  3. Confirm that an outbreak is actually occurring.
  4. Collect data on cases and non-cases.
  5. Analyze the data:
  6. Exploratory analysis to verify and check the data.
  7. Identify potential patterns of disease in time, space and by animal characteristics.
  8. Descriptive and statistical analysis of any potential risk factors.
  9. Formulate working hypotheses in an attempt to identify the type of epidemic, the possible source and mode of spread.
  10. Implement control and preventive measures.
  11. Undertake intensive follow-up investigations to identify high-risk groups and possible further outbreaks.
  12. Report the findings of the investigation with recommendations for dealing with future possible outbreaks of the same disease.

Day 7 (24.6)

08:30-10:15: Emergency preparedness simulation exercise (and disease outbreak investigation)

- What if scenarios for an index case of TiLV.
- Understanding of determinants for the epidemic size