Project no. SSPE-CT-2003-502329

PANDA

Permanent network to strengthen expertise on infectious diseases of aquaculture species and scientific advice to EU policy

Coordination Action

Scientific support to policies

Deliverable 6 - Epidemiological data base

Due date of deliverable: Month 18
Actual submission date: Month 44

Start date of project:01/01/04 Duration:44 months

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Revision [1.0]

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Dissemination Level		
PU	Public	
PP	Restricted to other programme participants (including the Commission Services)	PP
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

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1. Executive summary

The data base is a prototype on how an epidemiological data base may be constructed and what functionality is needed to attract target experts within epidemiology and risk assessments. In a scientific world continuously generating new knowledge old truth may quickly become out-dated. This means that a data base needs to live in order to play a role as a reliable source of information. In order to make this data base sustainable, we therefore propose to establish the data base as an electronic journal with scientific bodies guaranteeing its scientific content. Further, we invite users to actively participate in developing the data base to fulfil the users need. This will sustain a unique and informative database. Constructing a data base is a time consuming exercise demanding experience and skills in scientific and technical disciplines. The task force acknowledge the constraints in the prototype and the necessity for improvements.

2. Introduction

The PANDA work package 2 (WP2) was charged with identifying the most significant exotic, emerging and re-emerging disease hazards to EU and assessing their potential impact on aquaculture and aquatic wildlife in the EU (see report WP2).

For aquatic animal diseases, a lot of epidemiologic information is often non-existent. Even for pathogens for which such information exists, it may be dispersed among several studies, observations (published or unpublished) and media, so that it cannot be accessed easily in its entirety, especially at times of crisis, when the need for information is urgent and time restricted.

To alleviate this problem, work package 3 (WP 3) was given the task of designing a database of the current epidemiologic knowledge on serious infectious diseases that can impact (or can play a role in the future of) EU aquaculture and aquatic wildlife. The list of diseases was taken from WP2. The database was intended to include information on the epidemiology of each pathogen and the respective infections, in such detail that it could be used as the scientific basis for risk analysis and the framework for designing surveillance schemes.

The deliverable for WP 3 was defined to be

- a database (prototype) of the epidemiological characteristics of the diseases of most hazard to European aquaculture and aquatic wildlife

The members of WP3 were;
Edgar Brun, Section of Epidemiology, National Veterinary Institute, Norway (WP3 leader)
Marios Georgiadis, Faculty of veterinary medicine, Aristotle University of Thessaloniki, Greece
Vlasta Jencic, Veterinary faculty, University of Ljubljana, Slovenia
Nacho de Blas, Laboratory of Fish Pathology, University of Zaragoza
Chris Rodgers,
Kenton Morgan, Department of Veterinary Clinical Science, University of Liverpool

The task force met five times: San Carlos, Barcelona, Ljubljana, Lelystadt, Cairns and Weymouth. A sixth meeting with a reduced task force was held in Thessaloniki for a final technical discussion.

3. Methods

The design of the database was guided by its purpose: to provide the basis for risk analysis, design of surveillance systems and epidemiologic surveys. The members of the WP 3 discussed and decided on the structure of the database during an initial 2-day meeting, in April of 2004. From these initial discussions, it became evident that the task at hand was three-fold: first, the group would need to design the structure of the database and include all relevant and necessary fields for insertion of information. Second, the data base needed to have an advanced level of functionality to be useful and attractive. Third, a database would be of no use amongst scientific colleagues unless it was kept continuously up-dated through a designated supporting system.

Even though, the original PANDA task was to focus on exotic diseases, a decision was made to extend the database so that it could include information on many diseases that may be of interest in any area of the world. Furthermore, it was decided that a broader range of tasks should be supported by the database, so its fields were designed in a way that the information that would be included in the database would be useful for other epidemiologic activities, surveys to assess freedom from disease as well as design and implementation of disease prevention and control schemes. It is anticipated that such a database would be very useful in supporting actions in emergency situations.

During the initial meetings, the requirements that the database should fulfil were specified as:

A: it should have a focus on epidemiologic information. This meant that the database would not have a "classical" appearance and organization of information that might be found in other disease/pathogen databases, but it would be created having in mind the epidemiologist and risk analyst and their needs. Other databases of aquatic animal pathogens exist like the OIE (Manual of Diagnostic Tests for Aquatic Animals) and the AAPIQS database (http://www.aapqis.org/main/path/pathogen.asp?pages=Pathogens) but none of these properly covers the needs requested by risk analysts.

B; the information contained in the database should be easily accessible, cross-linked, and searchable

C; the information that would be included in the database should be of the highest quality and reliability. This meant that a peer-review system should be established and the capability of easy entry of information by different people should be ascertained.

D. the database should be designed and constructed so that it would be easy to enter information in the database and update relevant fields.

As a prototype, it was conveniently decided that the database would be built using Microsoft® Access (Microsoft Corporation, Redmond, WA, USA).

One of the main tasks of our group was to try to identify possible questions or pieces of information that would be needed by somebody who designs and conducts an epidemiological survey or a risk analysis for an aquatic pathogen. At the initial meeting the main information

needs were identified and the first lists of database fields were compiled. In order to refine that the database answered its intentions, a coordination meeting was held between wp2 and wp3 in order to see to what degree the database contained information asked for it the WP2 questionnaire.

As information needs were continuously identified, the organization of the database expanded and the relevant information fields were created. This process has been ongoing during the entire project.

The group was fortunate to include Nacho de Blas who was competent in technical programming of the database. This work was done partly during and partly in-between meetings. There were no extra resources relocated to the task force to do this essential and specialized work. Compiling information on pathogens and diseases from experts and the manual in-put of data into the database were all done by Vlasta Jencic This work could only be done between meetings and no extra resources were available to support or compensate for this difficult and laborious work.

After the database was in operational form, it was tested using information on specific pathogens. By doing this, we could evaluate the organization of the database, ease of use, the need for addition of new fields or changes in the description of existing ones or even the need for changes in the grouping of information presented. The functionality of the structure was also tested during a workshop at the annual CRL meeting in Århus 2005. Comments were appreciated.

The database was orally presented at an international epidemiological conference in 2006 (ISVEE XI – The eleventh International Symposium on Veterinary Epidemiology and Economics). After the presentation there was an open meeting for more in depth discussion. The intention for this presentation was to inform this global epidemiological society about the database and discuss its structure and usefulness, encourage word-wide contribution of scientific information as most experts of exotic diseases are not located in Europe, and make links to parallel data sources on other continents.

4. Results

Presentation of the basic information is in tabular form, however, hyperlinks that lead to other pages or databases are used extensively in many database fields. A lot of the studies, which have produced information on the epidemiology of specific diseases, are observational. Therefore, it is not only important to list their findings but also the conditions under which the studies were conducted, any alternative explanations of the findings or any reservations about the applicability of the results that the authors of the studies might have presented in the original papers. Such information is difficult to include in formal database fields, however, it can be preserved in the database through the use of hyperlinks.

The information is organized by pathological agent. An important distinction made in the database is that between infection and disease. It is understood that disease causation is multifactorial and a pathogen is just one of the component causes of each disease. Based on this principle, information is listed separately for each agent and for the clinical disease(s) in the aetiology of which it is implicated.

In its current form, the database is designed to include information within 7 sections:

1. Properties of infectious *agent*

Information listed in this section includes:

- scientific name and synonyms for the agent,
- taxonomic information,
- whether it is listed by OIE and EU,
- geographical distribution,
- existence of strains and their implication in the epidemiology of the resulting infection,
- methods to differentiate strains and
- sensitivity of the agents to various physical conditions and biological and chemical products. Information regarding biological and chemical compounds is compiled by WP5.

2. Host susceptibility and pathogenicity

This section lists all hosts known to be susceptible to the specific pathogen. For each of them there are fields that list:

- susceptible hosts
- host characteristics that can affect susceptibility to infection and susceptibility to disease given that the host becomes infected
- whether host strains with genetic resistance exist, and
- expected morbidity, mortality, infective period and incubation period of the specific pathogen on the given host under specified conditions
- known risk factors for infection.

3. Related diseases

This section lists all diseases in the aetiology of which the specific agent is implicated. More specifically, special fields exist for

- name and synonyms of the disease,
- case definition,
- clinical signs and pathological features,
- pathognomonic signs or lesions,
- existence of sub-clinical infections and carrier states,
- treatment,
- availability of vaccines,
- biological control or other prevention methods.

In this section there exist fields that list names of experts and researchers on the specific diseases

4. Transmission

This section focuses on known methods of transmission and presents epidemiologic information on available descriptions of field observations of occurrences of transmission. Database fields include:

- range of infective periods,
- direct transmission (vertical, horizontal, survival off-host and relevant environmental conditions),
- indirect transmission (biological and mechanical vectors, the role of fish products, intermediate hosts and their geographical distributions (hyperlink to OIE)
- existence of reservoirs,

- risk factors associated with transmission
- historical evidence of establishment of infection in a population

7. Diagnostic tests

This section details information on diagnostic methods that are used to detect infection or exposure in live aquatic animals or to detect infection in aquatic animal products. For each diagnostic test a hyper-linked page details the following information:

- what exactly does the test detect,
- description of the testing methodology,
- whether the test is a gold standard and
- whether it is a method included in the OIE manual
- sensitivity and specificity of the test
- how, under what conditions and in what populations was the test evaluation conducted?

Information in this section is compiled by WP4.

8. Sanitary policies

This section is concerned with the existence of regulatory policies for prevention, monitoring and detection of infection in EU member countries

10. Bibliography

List of relevant bibliographic sources.

The data base is available at the PANDA web site http://www.europanda.net/EpiDB

5. Discussion

This is a prototype of the first database of aquatic pathogens that focuses on information on the epidemiology of the agent and the resulting infection. As such, it is supplementary to the international database on aquatic animal diseases accessed via the OIE web site, and additional features could be included in the future.

PANDA provided the technical infrastructure for the project. The database has the potential to become a valuable tool for people working in risk analysis, prevention and control of fish diseases. However, the complexity of making a modern attractive database has proven beyond the limit of the resources (available working hours and fiscal resources) provided within the frames of the WP3. For example, a necessary searchable function is not yet provided. A dynamic function for visualizing the distribution of diseases, risk factors and susceptible species in time and space, should also be linked to the database to increase its usefulness.

The database was designed and implemented as a tool to support epidemiologic surveys and risk assessments concerning aquatic animal diseases in the EU. However, it could be easily expanded to include diseases that are of particular interest in other parts of the world. Disease control efforts in the present day of worldwide trade of aquatic animals and related products should consider the disease situation globally and cannot just focus on specific geographical areas. It is expected that as this database evolves it can compile all the available epidemiologic information for aquatic animal diseases from different areas of the world. We

believe that the database will also be a valuable tool for training in aquatic animal epidemiology.

With the contribution of experts in the field, it can become a very useful tool for everybody working with aquatic animal disease. Not only it will provide a complete account of available epidemiologic knowledge, but it will also help identify knowledge gaps and future needs for research. Furthermore, it will help to uphold the primary intention of PANDA to maintain and widen its network of experts in aquatic animal disease.

Besides functionality, for such a database to be of interest it is essential that it is easily accessible and it is kept as complete as possible, continuously improved and up-dated. The WP 3 members believe that this can be done by inviting submission of database entries from experts in the form of pathogen reviews. Further, to make it accessible to as wide an audience as possible, we suggest to launch the database as a free-access, peer-reviewed electronic journal (proposed name: AQUATIC DISEASE RISK REVIEW) with an editorial board appointed by the PANDA standing committee. This board should establish a protocol for regular publishing, invite authors for in-put of new diseases and taking a temporary responsibility for up-dating existing information. The peer-review process will guarantee the quality of the information in the database, and credit responsible authors for their submission.

6. Recommendations

The task force of WP3 would emphasise that for the database to survive, there need to be

1. a mechanism to guarantee the insertion of information up to date
2. a mechanism to keep improving the database structure and functionality (e.g. make it more searchable, add new fields if necessary, molecular information etc)
3. a proactive interaction between the management of the data base and its users.

7. Conclusions

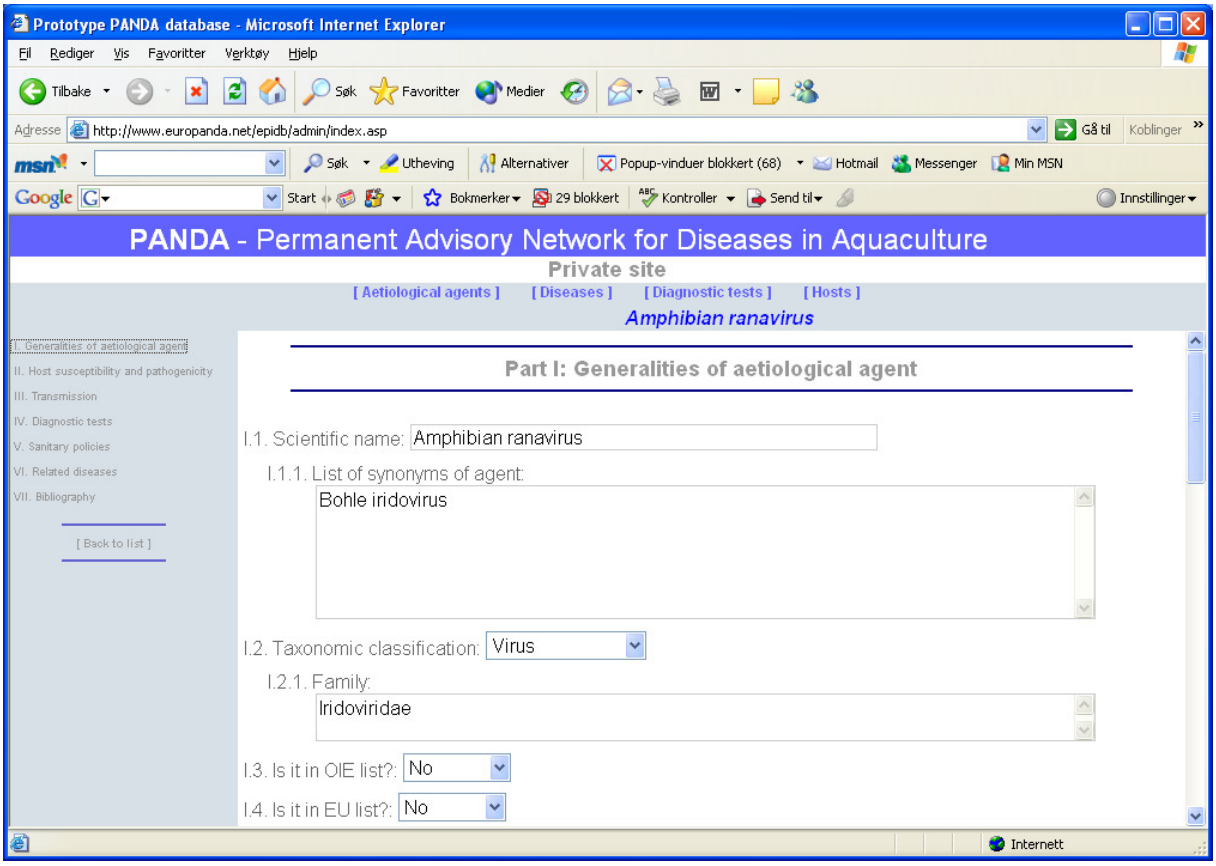
The lack of information in the data base, illustrate the need for more research. As new information is made available and existing information of today is out-dated, a data base is easily made useless or unreliable if it is not continuously up-dated.

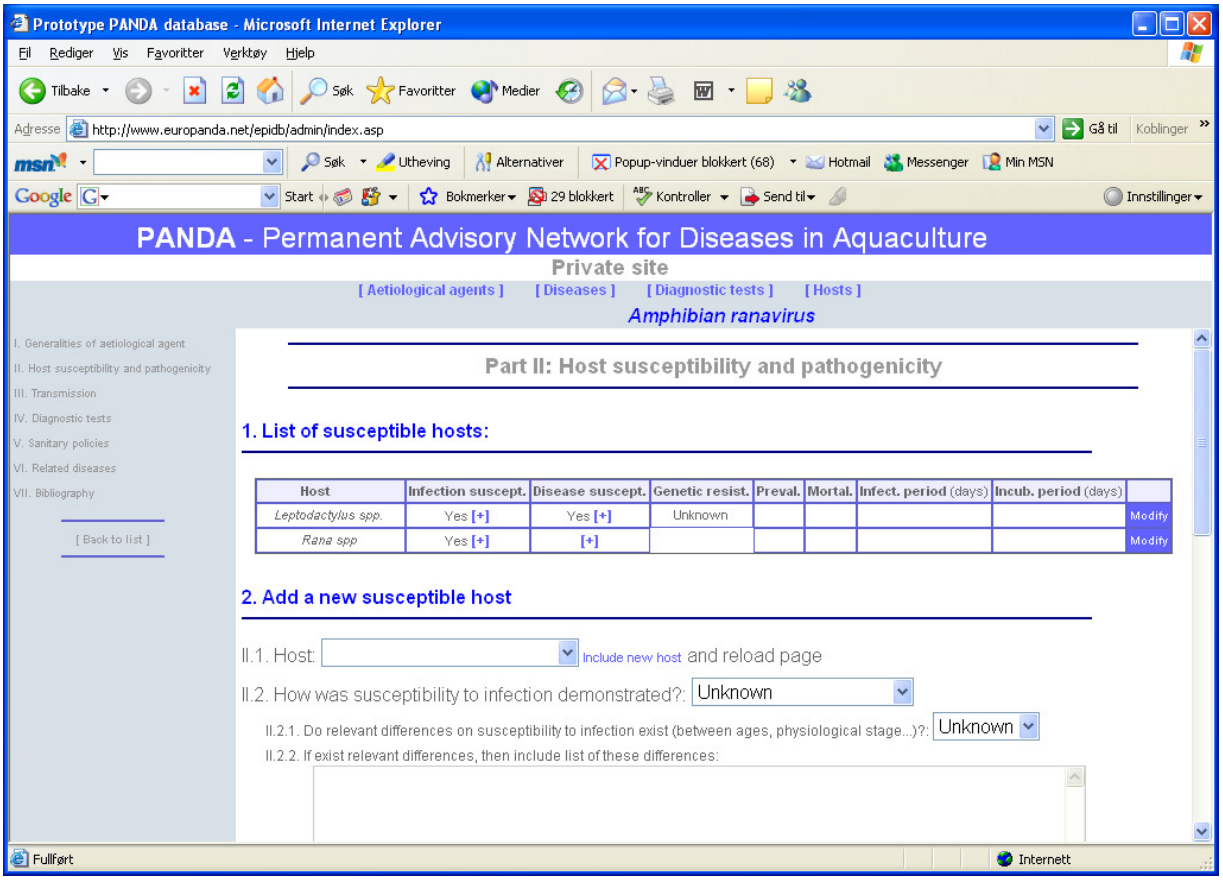
On the other hand, a living data base with a consistent system for up-dating will be extremely useful and its sustainability should be encouraged. Not only for the EU, but as we are living on a blue planet with a high global trade activity, we may all be in need for a rapid available source of epidemiological information regarding aquatic animals and their diseases.

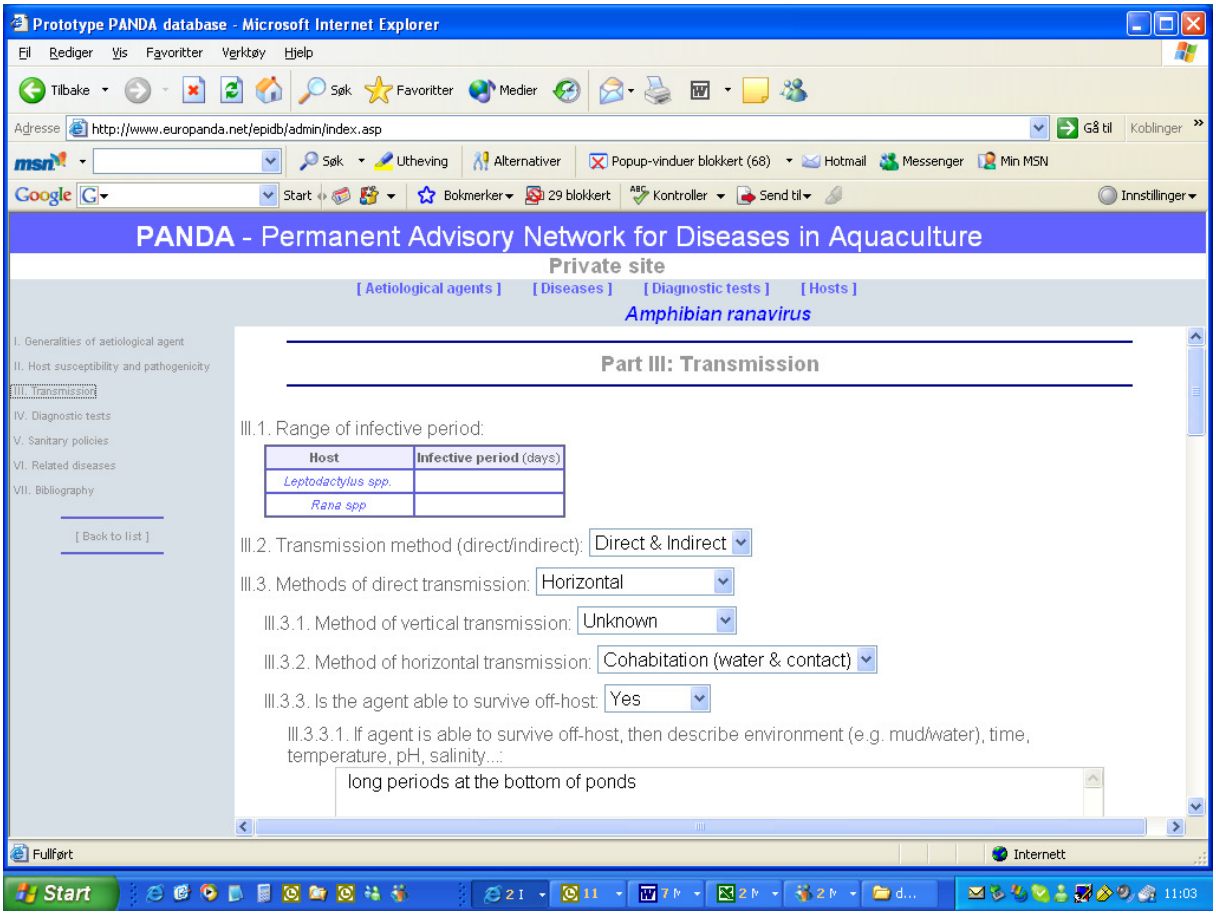
8. Acknowledgments

Contributors to the information given in the database are Dr. Isabelle Arzul and Dr. Jean-Pierre Jolly for mollusc diseases and Dr. Inger Dalsgaard for *Lactococus garviae.*

9. Copies of data base web pages




Prototype PANDA database - Microsoft Internet Explorer
PANDA - Permanent Advisory Network for Diseases in Aquaculture
Private site
[Aetiological agents] [Diseases] [Diagnostic tests] [Hosts]
Amphibian ranavirus
I. Generalities of aetiological agent
II. Host susceptibility and pathogenicity
III. Transmission
IV. Diagnostic tests
V. Sanitary policies
VI. Related diseases
VII. Bibliography
[Back to list]
Part II: Host susceptibility and pathogenicity
1. List of susceptible hosts:
Host | Infection suscept. | Disease suscept. | Genetic resist. | Preval. | Mortal. | Infect. period (days) | Incub. period (days)
Leptodactylus spp. | Yes [+] | Yes [+] | Unknown | Modify
Rana spp | Yes [+] | [+] | Modify
2. Add a new susceptible host
II.1. Host: Include new host and reload page
II.2. How was susceptibility to infection demonstrated?: Unknown
II.2.1. Do relevant differences on susceptibility to infection exist (between ages, physiological stage...)?: Unknown
II.2.2. If exist relevant differences, then include list of these differences:
Fullført
Internett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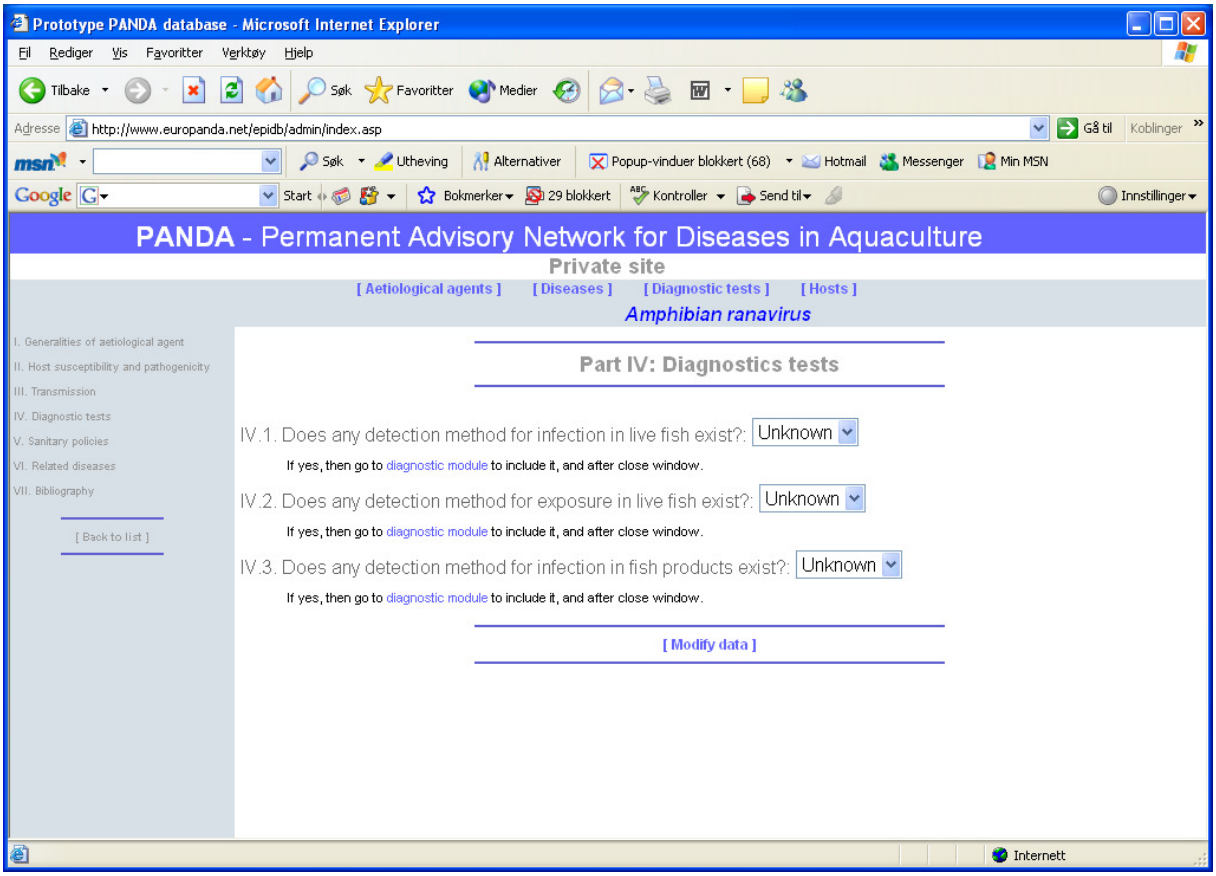
[Back to list]
Part III: Transmission
III.1. Range of infective period:
Host | Infective period (days)
Leptodactylus spp.
Rana spp
III.2. Transmission method (direct/indirect): Direct & Indirect
III.3. Methods of direct transmission: Horizontal
III.3.1. Method of vertical transmission: Unknown
III.3.2. Method of horizontal transmission: Cohabitation (water & contact)
III.3.3. Is the agent able to survive off-host: Yes
III.3.3.1. If agent is able to survive off-host, then describe environment (e.g. mud/water), time, temperature, pH, salinity...:
long periods at the bottom of ponds
Fullført
Internett
Start


Prototype PANDA database - Microsoft Internet Explorer
Fil Rediger Vis Favoritter Verktøy Hjelp
Tilbake Søk Favoritter Medier
Adresse http://www.europanda.net/epidb/admin/index.asp
Gå til Koblinger
Søk Utheving Alternativer Popup-vinduer blokkert (68) Hotmail Messenger Min MSN
Start Bokmerker 29 blokkert Kontroller Send til Innstillinger
PANDA - Permanent Advisory Network for Diseases in Aquaculture
Private site
[Aetiological agents] [Diseases] [Diagnostic tests] [Hosts]
Amphibian ranavirus
I. Generalities of aetiological agent
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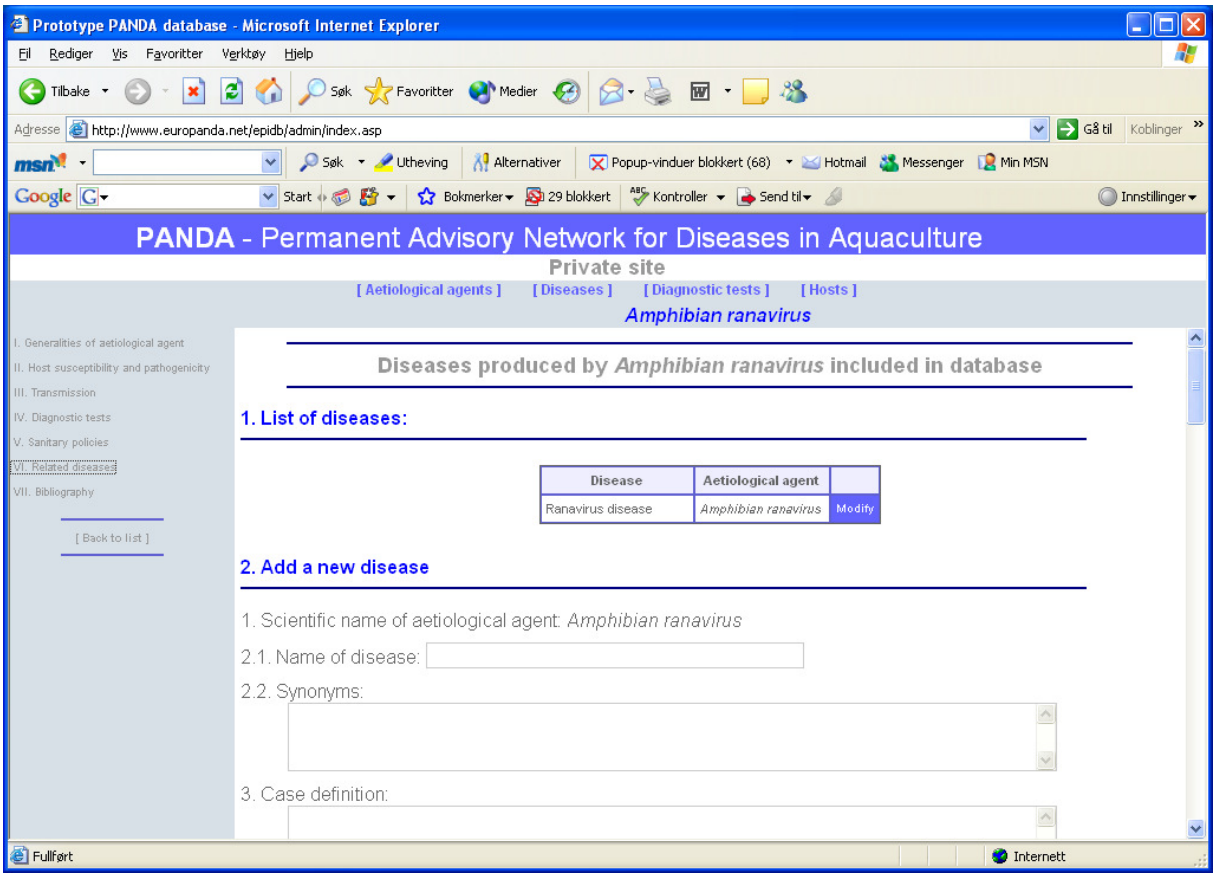
IV. Diagnostic tests
V. Sanitary policies
VI. Related diseases
VII. Bibliography
[Back to list]
Part IV: Diagnostics tests
IV.1. Does any detection method for infection in live fish exist?: Unknown
If yes, then go to diagnostic module to include it, and after close window.
IV.2. Does any detection method for exposure in live fish exist?: Unknown
If yes, then go to diagnostic module to include it, and after close window.
IV.3. Does any detection method for infection in fish products exist?: Unknown
If yes, then go to diagnostic module to include it, and after close window.
[Modify data]
Internett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Tilbake Søk Favoritter Medier
Adresse http://www.europanda.net/epidb/admin/index.asp
Gå til Koblinger
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Start Bokmerker 29 blokkert Kontroller Send til Innstillinger
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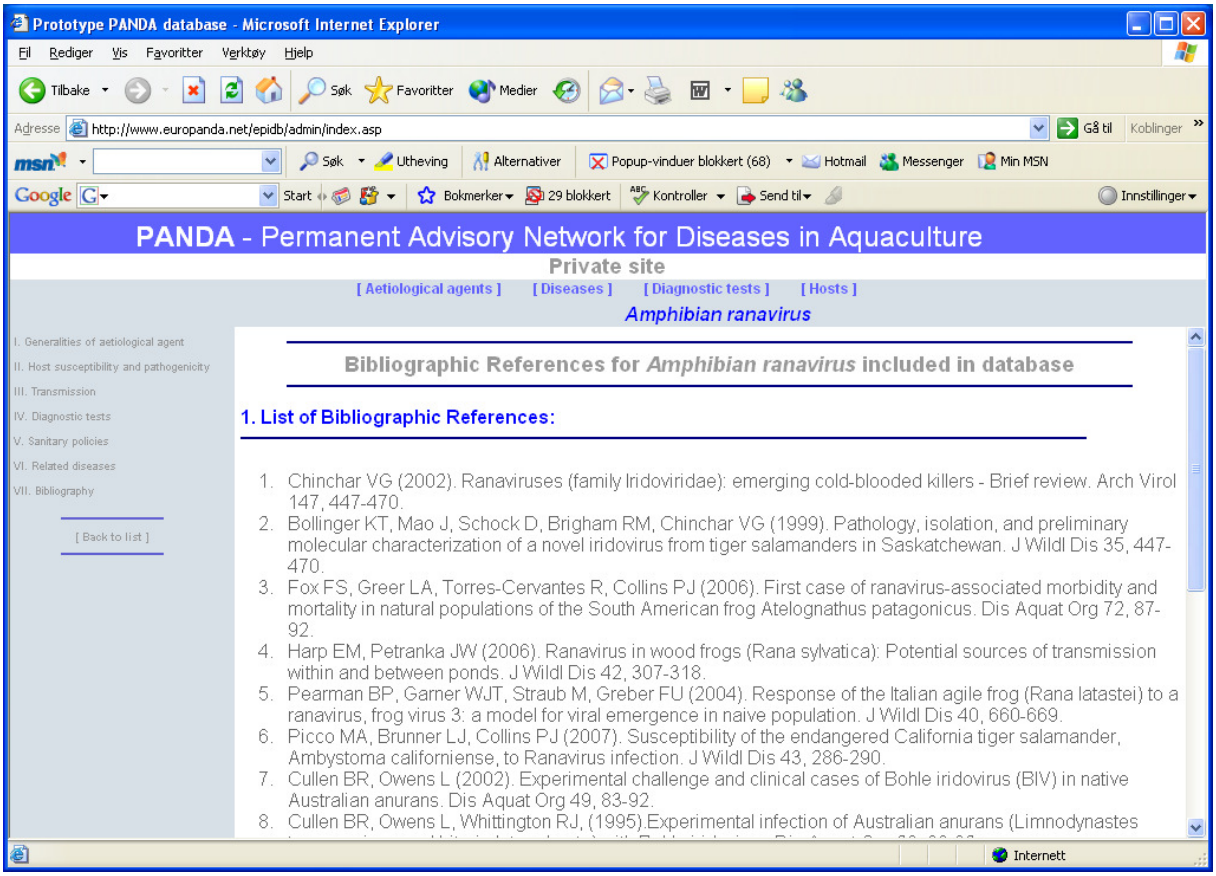
Diseases produced by Amphibian ranavirus included in database
1. List of diseases:
Disease
Aetiological agent
Ranavirus disease
Amphibian ranavirus
Modify
2. Add a new disease
1. Scientific name of aetiological agent: Amphibian ranavirus
2.1. Name of disease:
2.2. Synonyms:
3. Case definition:
Fullført
Internett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IV. Diagnostic tests
V. Sanitary policies
VI. Related diseases
VII. Bibliography
[Back to list]
Bibliographic References for Amphibian ranavirus included in database
1. List of Bibliographic References:
1. Chinchar VG (2002). Ranaviruses (family Iridoviridae): emerging cold-blooded killers - Brief review. Arch Virol 147, 447-470.
2. Bollinger KT, Mao J, Schock D, Brigham RM, Chinchar VG (1999). Pathology, isolation, and preliminary molecular characterization of a novel iridovirus from tiger salamanders in Saskatchewan. J Wildl Dis 35, 447-470.
3. Fox FS, Greer LA, Torres-Cervantes R, Collins PJ (2006). First case of ranavirus-associated morbidity and mortality in natural populations of the South American frog Atelognathus patagonicus. Dis Aquat Org 72, 87-92.
4. Harp EM, Petranka JW (2006). Ranavirus in wood frogs (Rana sylvatica): Potential sources of transmission within and between ponds. J Wildl Dis 42, 307-318.
5. Pearman BP, Garner WJT, Straub M, Greber FU (2004). Response of the Italian agile frog (Rana latastei) to a ranavirus, frog virus 3: a model for viral emergence in naive population. J Wildl Dis 40, 660-669.
6. Picco MA, Brunner LJ, Collins PJ (2007). Susceptibility of the endangered California tiger salamander, Ambystoma californiense, to Ranavirus infection. J Wildl Dis 43, 286-290.
7. Cullen BR, Owens L (2002). Experimental challenge and clinical cases of Bohle iridovirus (BIV) in native Australian anurans. Dis Aquat Org 49, 83-92.
8. Cullen BR, Owens L, Whittington RJ, (1995).Experimental infection of Australian anurans (Limnodynastes