

EU-China animal health collaboration: the LinkTADs project and other activities conducted by CIRAD

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Abstract

Today, China is the largest producer of animal-based products, and the surveillance of animal and zoonotic diseases is therefore an international challenge for the country. In order to strengthen collaborations with China in this area, a coordination initiative, known as the LinkTADs project, has been launched by the European Union. This project, coordinated by FAO, has already enabled identification of the main research needs for those diseases considered to be a main priority by both the Chinese and European partners. This project was built on previous collaborations between Europe and China, in particular collaborations involving CIRAD in China and Southeast Asia. The medium-term goal of the project is to facilitate the integration of the Chinese partners into a network-based system, and one based on regional and international research, and in so doing to reinforce the management of cross-border animal and zoonotic diseases.

Keywords

Europe, China, Zoonosis, LinkTADs

Résumé

Collaborations sino-européennes en santé animale : le projet LinkTADs et autres activités menées par le Cirad

La Chine est aujourd'hui le premier producteur mondial de produits animaux et la surveillance des maladies animales et zoonotiques y est donc un enjeu mondial. Afin de renforcer les collaborations avec la Chine dans ce domaine, une action de coordination a été lancée par l'Union européenne, le projet LinkTADs. Ce projet, coordonné par la FAO, a d'ores et déjà permis d'identifier les principaux besoins de recherche sur des maladies jugées prioritaires par les partenaires chinois et européens. Ce projet a été construit sur des collaborations développées depuis dix ans entre la Chine et l'Europe, notamment celles portées par le Cirad en Chine et en Asie du Sud-Est. L'objectif à moyen terme est de faciliter l'insertion des partenaires chinois dans une logique de réseau et de projets de recherche régionaux et internationaux et de renforcer ainsi la gestion des maladies animales et zoonotiques transfrontalières.

Mots-clés

Europe, Chine, maladies animales, zoonoses, LinkTADs

Today, China is the world's largest producer of animal-based products, with over 6.5 billion poultry and more than 500 million cattle, sheep and goats produced each year, as well as half the world's production of pigs with over 500 million a year. These levels of production imply very high animal densities that favour the appearance and the spread of pathogens. The surveillance and management of animal and zoonotic diseases is therefore a key issue in food security on an international scale. Although most animal production is sold in the internal market, the emergence and the spread of pathogenic agents in China, such as the different strains of avian influenza that have emerged in recent years (Peyre *et al.*, 2015), present a risk on a global scale, especially for neighbouring countries such as the developing countries of Southeast Asia. But there is also a risk for Europe, despite its more advanced surveillance systems, as was illustrated in 2005 by the way the highly pathogenic avian influenza H5N1 that originated in the south of China spread *via* poultry trade and the migration of wild waterfowl.

In order to strengthen collaboration between the European Union and China, a coordination project was launched at the end of 2013 within the 7th European Union framework programme on technological research and development. The LinkTADs project (Linking Epidemiology and Laboratory Research on Transboundary Animal Diseases and Zoonoses in China and Europe, www.linktads.com), has brought together a Sino-European consortium of eleven institutes whose main goal is to help in coordinating European and Chinese research projects in the field of animal diseases and zoonoses, and in particular to coordinate projects that associate epidemiology and laboratory science.

LinkTADs is a three-year project led by the FAO (the United Nations Food and Agriculture Organisation). CIRAD (Centre de coopération internationale en recherche agronomique pour le développement - Centre for international cooperation in agronomic research for development, www.cirad.fr/en) and its research unit AGIRs (Animal et gestion intégrée des risques - Animal and integrated risk management unit, <http://ur-agirs.cirad.fr/en>), which is present in Southeast Asia,

coordinate the epidemiological workpackage of the LinkTADs project in partnership with the CAHEC (China Animal Health and Epidemiology Centre). At the midway point (April 2015), the LinkTADs project was able to organise meetings and coordination workshops between Chinese and European partners and to identify those animal diseases and zoonoses considered as a main priority in Europe and China by consulting Chinese and European experts and reviewing recent scientific publications in this field.

Thus, avian influenza (Cappelle *et al.*, 2014), African swine fever (CIRAD, 2010), rabies and brucellosis are considered as top priorities in both Europe and China, and as well as antimicrobial resistance which both parties consider to be of importance. Bovine tuberculosis, foot and mouth disease and bluetongue are considered of primary importance in Europe but less so in China. In contrast to this, porcine reproductive and respiratory syndrome (Wang *et al.*, 2015), Newcastle's disease, classical swine fever and Aujeszky's disease are a top priority in China but less so in Europe. In addition, peste-des petits-ruminants and Japanese encephalitis (Tarantola *et al.*, 2014) are of growing importance in China.

After having reviewed 720 recent scientific publications (360 for China and 360 for Europe), the initial results of the LinkTADs project show that the majority of European research into animal health is focused on bovines while Chinese research concentrates on pigs and poultry. Nearly three quarters of Chinese animal health research is carried out in the laboratory, while the division between laboratory science and epidemiology is more balanced in Europe. Chinese scientific laboratories are on the whole very competent in the fields of biotechnologies and molecular biology. However, they require additional training in epidemiology, especially applied epidemiology, in order to improve their capacity for surveillance, intervention in the field and risk analysis.

In order to boost collaboration between Europe and China by mixing epidemiology and research in laboratory science, a workshop was organised in Qingdao in April 2015 in the framework of the LinkTADs

project in order to identify the main research needs on these major diseases. The LinkTADs project partners have set up participatory methods in order to reach an agreement on research projects to be set up in partnership. Concept notes from this meeting are being drawn up. These will serve as a basis for the construction of projects which should, at least: 1) associate one Chinese partner and one European partner, and 2) involve epidemiology and laboratory science.

In order to bolster the China – Europe collaborative network on animal diseases and zoonoses, these projects are open to international partners other than members of the LinkTADs consortium. This initiative has already enabled the setting up and the financing, by the Chinese ministry of science and technology, of a research project on Japanese encephalitis which associates two laboratories, the Chinese Shanghai Veterinary Research Institute (SHVRI) and the Swedish National Veterinary Institute (SVA) with CIRAD on the epidemiological component.

Along with this work on prioritising and coordinating research, the LinkTADs project is also helping to coordinate training in epidemiology, basing its work on previous initiatives, such as the FETPV programme (Field Epidemiology Training Program for Veterinarians), which have arisen from the American CDC. Between 2010 and 2012 CIRAD took part in the first FETPV programme workshops in association with the FAO and the Royal Veterinary College (RVC, University of London) before the LinkTADs project was launched.

The activities of the LinkTADs project, and especially CIRAD in France, therefore have a role in continuing the earlier collaborations between Europe and China in the field of animal and zoonotic diseases. Thus, in response to the crisis sparked by the highly pathogenic flu virus H5N1, CIRAD researchers were involved in workshops financed by the FAO on the epidemiology of the disease and its surveillance, either on a regional level (in 2005 in Qingdao) or for local veterinary services in different Chinese provinces (2009-2010). An expert survey on the vaccination strategy to combat the H5N1 virus was carried out for the FAO ECTAD China in 2009. A training programme in risk analysis for medical doctors and public health specialists was set up at the request of the WHO (CIRAD, 2013).

More recently, a Chinese student from the Jiangsu Institute of Parasitic Diseases attended a "One Health" master class (Project FP7 SEA-EU-NET) organised by CIRAD and the organisation of a second regional master class in China and Southeast Asia is planned in the framework of the LinkTADs project.

Since 2009, CIRAD has been cooperating with the University of Hong Kong (HKU, School of Public Health) and its Pasteur Research Pole (HKU-PRP) in the fields of avian and porcine influenza viruses, in collaboration with partners in Vietnam (National Institute of Veterinary Research, NIVR) and Laos (National University of Lao PDR) (Trevenec *et al.*, 2011; Baudon *et al.*, 2014; Baudon *et al.*, 2015), in particular through joint supervision of university theses. More recently, international cooperation on MERS-CoV (Middle-East Respiratory Syndrome-Coronavirus) and its potential animal reservoirs has been set up between HKU-PRP, CIRAD and several Asian and African partners.

Moreover, the joint IRD-Cirad InterTryp research unit and its team based in Thailand are working together on surra (*Trypanosoma evansi*) with the Sun Yat-Sen University in Guangzhou (Canton), in the province of Guangdong (Carnes *et al.*, 2015).

By organising events (workshops, master classes, training programmes) and also by inviting different partners, the LinkTADs project is enabling stronger links to be forged on a regional level between the Chinese partners in the project and CIRAD and its partners in Southeast Asia.

China is a key player in food security worldwide, and is a vital partner in development in the southern hemisphere in general, and in Southeast Asia in particular (Desvaux *et al.*, 2014). The GREASE network (Gestion des risques émergents en Asie du Sud-Est, www.grease-network.org), initiated by CIRAD in 2009, is a regional network which aims at supporting research for improving the management of emerging epidemic risks in Southeast Asia. The development of collaborations

with China, and in particular in the southern provinces of Yunnan and Guangxi, is therefore of strategic importance for the GREASE network. The different initiatives mentioned above are in line with this.

Projects such as LinkTADs favour the development of contacts and links with the relevant Chinese universities and research centres. In the medium term this will facilitate the integration of Chinese partners into the network system and into regional research projects. It will also strengthen the management of cross-border animal diseases and zoonoses in Southeast Asia which is one of the main aims of the GREASE network.

These different collaborations facilitate the inclusion of China in the international disease surveillance (Veille sanitaire internationale - VSI) of the French platform for epidemiosurveillance in animal health (Plateforme ESA: http://www.plateforme-esa.fr/index.php?option=com_content&view=article&id=433&Itemid=323) whose mission is to identify, track and analyse health hazard signals (in animal health in the widest sense) which could threaten any part of France's territory, the aim being to produce health information in order to assess risk on the one hand (by the French Agency for Food, Environmental and Occupational Health & Safety – ANSES, <https://www.anses.fr/en>), and risk management on the other hand (by the French Directorate General for Food – DGAL). This surveillance also means that official and unofficial information can be shared on the status of the main animal and zoonotic diseases as well as on the level of information and the surveillance of these diseases (Table 1).

In conclusion, this collaboration has a dual aim which is the improvement of disease prevention on a regional scale (in Southeast Asia in particular) and on the international scale (Europe and France). More French institutions, such as the French Agency for Food,

Table 1. Presence and surveillance of the main animal and zoonotic diseases where there is a health interest, in China and in France. The names in bold type have been prioritised by the LinkTADs project.

Disease	Occurring in China	Surveillance*
<i>B. abortus</i> brucellosis	Yes	Surveillance
<i>B. melitensis</i> brucellosis	Yes	Surveillance
Sheep and goat pox	Yes	Surveillance
Nipah virus encephalitis	No	Vigilance
Venezuelan equine encephalitis (VEE)	No	Not a priority
Japanese encephalitis (JE)	Yes	Surveillance
West Nile encephalitis (WN)	No	Vigilance
Foot and mouth disease (FMD)	Yes	Surveillance
Bluetongue	Yes	Not a priority
Rift Valley fever (RVF)	No	Vigilance
Crimean-Congo haemorrhagic fever (CCHF)	No	No information
Equine influenza	Yes	Surveillance
Highly pathogenic avian flu (HPAI)	Yes	Surveillance
Epizootic haemorrhagic disease (EHD)	Non	Non prioritaire
Swine vesicular diseases (SVD)	No	No information
<i>Cochliomyia hominivorax</i> myiasis	No	No information
Contagieuse bovine pleuropneumonia (CBPP)	No	Vigilance
Peste-des-petits-ruminants (PPR)	Yes	Surveillance
African horse sickness (AHS)	No	Vigilance
African swine fever (ASF)	No	Vigilance
Classical swine fever (CSF)	Yes	Surveillance
Contagious goat pleuropneumonia (CCPP)	Yes	Surveillance
Rabies	Yes	Surveillance
<i>T. evansi</i> (surra) Trypanosomiasis	Yes	No information

*Surveillance = Programme in which surveillance is planned (and/or outbreak surveillance) as well as a possible control programme tracking the situation in the region. Vigilance = Surveillance programme of any events with situation tracking in the region. Not a priority = no surveillance.

Environmental and Occupational Health & Safety (ANSES, <https://www.anses.fr/en>), the French Institute for Agricultural Research (INRA, <http://www.inra.fr/en>), the international network of Pasteur institutes (<http://www.pasteur.fr/en/international>) and the Institute of Research for Development (IRD, <https://en.ird.fr/ird.fr>) could be involved in these collaborations in the future.

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