

EU-China collaboration on pig disease research with a particular focus on African Swine Fever (ASF).

Report of the meeting co-organised by Delegation of the European Union to China, Beijing, the Chinese Academy of Agricultural Sciences (CAAS) and STAR-IDAZ International Research Consortium (STAR-IDAZ IRC¹)

Beijing, 12 March 2019

Being the two biggest food producers in the world, China and the European Union (EU) share a common goal to join forces for addressing challenges related to food security, healthy diets, animal health and sustainable agriculture.

Cooperation on research and innovation in Food, Agriculture and Biotechnology (FAB) can make a major contribution to these important challenges. In this context a dedicated EU-China Task Force on FAB was established in 2013 with the aim of defining priorities of common interest and exploring possible instruments to be implemented through H2020 and relevant Chinese research programmes.

The workshop, which was jointly opened by Professor Li Jinxiang, Vice President, CAAS and Dr Gudrun Gallhaff, Minister Counsellor, Delegation of the European Union to China, brought together policy officials and scientists to review and discuss latest developments on pig health, particularly relating to African swine fever (ASF) control and supporting research programmes. . The programme was split into four sessions: research collaboration and funding mechanisms; latest ASF situation in EU/China and research priorities; and two sessions to update on current research programmes.

Session 1 (research collaboration and funding mechanisms)

An update was provided on 15 active H2020 research projects (€120million budget) bringing together EU and Chinese scientists to collaborate in the framework of the EU-China FAB Task Force. There are 86 different Chinese partners involved in those projects. They cover a range of topics, including animal health and production, with further topics to be considered in future years, including those funded through the future EU Framework Programme for Research, 'Horizon Europe'.

An overview of EU research programmes and mechanisms was provided, noting that 90-95% of research in Europe is funded directly through the Member States. Under the current EU Framework Programme for Research and Innovation, 'Horizon 2020', animal health research is supported mainly under Societal Challenge 2, with approximately €180 million funding planned until the end of Horizon 2020 (21 transnational projects on-going so far). Within this, there are a number of projects that address pig health research and ASF directly, including: epidemiology, host-pathogen interaction (e.g. PIGS² project), diagnostics, and vaccinology for various pig diseases including ASF (e.g. SAPHIR³ and DEFEND⁴ projects); AMR and animal production (e.g. Healthylivestock project); a European Joint Programme co-fund for (mainly food-borne) zoonoses and AMR (One health EJP⁵); a topic in the 2019 Work Programme to develop a vaccine against ASF where the successful project will soon be selected (international cooperation recommended); and a planned ERA-NET co-fund for international coordination of research on infectious animal diseases, with particular focus on ASF, animal influenza and vaccinology (for which non-EU countries are welcome to join).

¹ <https://www.star-idaz.net/organisation/>

² <https://cordis.europa.eu/project/rcn/210504/factsheet/en>

³ <https://www.h2020-saphir.eu/>

⁴ <https://defend2020.eu/>

⁵ <https://onehealthjp.eu/>

An overview of Chinese research programme on animal health was provided which noted that the Ministry of Science and Technology (MOST) is a significant funder of research, next to which is the National Natural Science Foundation of China (NSFC), mainly for fundamental research, and the Ministry of Agriculture and Rural Affairs (MARA). CAAS delivers research programmes on animal health, mainly through the veterinary institutes at Harbin, Shanghai and Lanzhou.

Updates were provided of 2 current research projects, from EU and China; 'HealthyLivestock', a FAB related project addressing health and welfare of pigs and poultry to promote reduced use of antimicrobials, and a Chinese project which applied gene-editing technology to develop CSF resistant pigs.

Session 2 (ASF in EU and China)

In China, up to 10 March 2019, there had been 112 reported cases of ASF in livestock holdings (small-holder and large-scale farms), across 28 provinces, with over 2 million pigs culled and losses of several billion RMB. The main routes of disease transmission that were noted involved the movement of vehicles and people over long distances, and swill feeding. Contingency plans are in place that include disease control policies supported by detection, surveillance, movement control and swill feed control.

A summary of the current and historical spread of ASF in Europe was provided, including an overview of the main initiatives to support efforts for disease control: regionalisation; science advice, urgent intervention, guidance to MSs, audits, international cooperation, public awareness, financial support, and research. EFSA is currently assessing the risk of spread and survival of virus in fomites.

The session continued with two updates on research prioritisation exercises: gap analysis from the Global ASF Research Alliance (GARA⁶); and the ASF research roadmaps on vaccine development and on epidemiology and disease control strategies developed by STAR-IDAZ IRC in cooperation with GARA. It was recognised there are many gaps in our knowledge and ability to control ASF and noted that prioritisation of the research needs is required. The research roadmaps provide a mechanism to enable the research funding organisations to prioritise the research areas that they fund.

Sessions 3&4 (ASF research project updates)

The afternoon sessions of the day provided updates on a series of active research projects in respect of ASF. The EU COST action 'ASF-STOP'⁷ brings together 32 countries that are collaborating to develop guidance and strategies to assist disease control measures, especially relating to the disease in wild boar and their role in the spread of infection.

An epidemiological analysis of the ASF outbreak in China was presented, including a discussion on the potential risks of further spread of disease. It was noted that 3 wild boars were found infected by ASFv. One of the virus isolates had a slightly diverging genomic sequence, from which the Chinese scientists concluded that there may have been more than one incursion of ASFv into China. An additional project presented findings of a test programme to assess the risk of transmission of ASF in veterinary biologicals/products.

Insights into the latest developments on ASF research were presented, including host-pathogen interactions (at FLI, Germany), and vaccinology (at Pirbright/Jenner Institute - DEFEND project). It was noted that there are a number of challenges in respect of vaccines candidates for ASF, from safety

⁶ <https://www.ars.usda.gov/GARA/reports.htm>

⁷ <https://www.asf-stop.com/>

concerns surrounding live vaccines to a lack of knowledge on viral gene targets to either modify or delete for a rationally attenuated engineered vaccine.

In addition to vaccines, a wide programme of research is in place in China to support the development of improved diagnostics for ASF and to better understand the potential for ticks to act as vectors (4 of 14 species of soft ticks found in China can act as a vector for ASF). Over 100 million RMB has been committed to support ASF research in China by different funding agencies.

The final presentations at the workshop revisited the theme of vaccination and covered updates on the development of different ASF vaccine candidates (live-attenuated and sub-unit vaccines) at The Pirbright Institute, and an overview of vaccine research options for ASF in China. It was acknowledged that more basic research is required to further our understanding of viral genetics and disease pathogenesis. This would enable and support further research and development of vaccine candidates. Vaccine development is also constrained by the current lack of an appropriate matrix (e.g. cell culture) on which to grow the vaccine strains to the level required for large scale vaccine production.

Concluding remarks:

There is a lot of data coming out of different institutes, some of which can be conflicting. A way should be sought to work together to standardise practise and reduce variability of outputs. There is also an issue of challenge models not being standardised.

Do we have systems in place to support sharing of information between research labs? It was generally supported that all research outputs need to be published (negative findings are valuable, but are hardly ever published), in open access journals where possible. Open research data is a default option in EU projects under H2020, and it will likely be further supported under Horizon Europe. The sharing of information on research activities is also essential if STAR-IDAZ IRC is to be successful in helping coordinate the research efforts of the various groups.

It was noted that as well as sharing information, research organizations should be supporting shared access to samples and data where feasible/appropriate.

The issue of whether an attenuated vaccine would be appropriate for use was raised, including discussion on the circumstance of the use of such a vaccine, the potential impact on trade, and evidence required for proving freedom from disease, with the issue of DIVA tests able to distinguish infected from vaccinated animals.