Research Gaps and Priorities

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Presentation Outline

• Global African Swine Fever Research Alliance
• Research Gaps and Priorities
• Update on ASF Vaccine Research
• Questions
Global African Swine Fever Research Alliance

Fighting African Swine Fever Together

https://www.ars.usda.gov/GARA/
1st GARA Scientific Conference, Plum Island Animal Disease Center, Orient Point, New York, United States of America, April 6-8, 2013
3rd GARA Scientific Conference, ANSES, Ploufragan, France, September 6-8, 2016
4th GARA Scientific Conference, Istituto Zooprofilattico Sperimentale, Cagliari, Sardinia, Italy, April 11-13, 2018
GARA Vision

A coordinated global research alliance enabling the progressive control and eradication of ASF

Fighting African Swine Fever Together
GARA Mission

To establish sustainable global research partnerships that will generate scientific knowledge and tools to contribute to the successful prevention, control, and where feasible, eradication of African swine fever (ASF).

Fighting African Swine Fever Together
Strategic Goals of GARA

- **Goal 1.** Identify research opportunities and facilitate collaborations within the Alliance
- **Goal 2.** Conduct strategic and multi-disciplinary research to better understand ASF
- **Goal 3.** Determine social and economic drivers and impact of ASF
- **Goal 4.** Develop novel and improved tools to support the prevention and control of ASF
- **Goal 5.** Determine the impact of ASF prevention and control tools
- **Goal 6.** Serve as a communication and technology sharing gateway for the global ASF research community and stakeholders
GARA Partners

USDA ARS Foreign Animal Disease Research, Plum Island Laboratory

Agricultural Research Council (ARC-LNR)

Centre de Biotechnologie Moléculaire Séveco, Olbia (CNRC-LAM)

National Research Institute for Veterinary Virology and Microbiology of Russia (NIVVM ARM)

Harbin Veterinary Research Institute, CAAS, China

Biorepository Research Institute (BRI)

The Royal Veterinary College

INSTITUTE OF MOLECULAR BIOLOGY

GALVmed (Global Alliance for Livestock Veterinary Medicine)

National Livestock Resources Research Institute, Uganda

Facultad de Medicina Veterinaria

Universidad Complutense UCM, Madrid, Spain

Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria

Centro de Recerca en Santitat Animal (CREA)

Central Veterinary Institute - part of Wageningen UR

China Animal Health and Epidemiology Centre

CSIRO - Australian Animal Health Laboratory (AAHL) - Australia

Instituto Zooprofilattico Sperimentale di Bologna e Marche, Forlì

College of Veterinary Medicine, Animal Resources & Biosecurity (CVMAB) at Murdoch University, Karratha, Australia

ANSES - French Agency for Food, Environmental and Occupational Health & Safety, France

The Pirbright Institute

National Veterinary Research Institute, Warsaw

Friedrich-Ludwig-Instut - Federal Research Institute for Animal Health

Centre de coopération internationale en recherche agronomique pour le développement (CIRAD), France

International Livestock Research Institute (ILRI) of Nairobi, Kenya

National Veterinary Research Institute

Gulbenkian Institute, Portugal

Food and Agriculture Organization of the United Nations

Laboratory of the Ministry of Agriculture (LMA)

Sokhna University of Agriculture

National Scientific Centre - Institute of Environmental and Clinical Veterinary Medicine
Fighting African Swine Fever Together

GARA: A Network of Research Collaborations
GARA Communication

• Website:  https://www.ars.usda.gov/GARA/
  – Links to all member institutes web sites
  – Lists of collaborations and scientists’
  – Other resources, publications, presentations
  – Announcements
  – Meeting reports (gap analysis)

Fighting African Swine Fever Together
The next GARA Scientific Conference
Kampala, Uganda
April 14-16, 2020
Presentation Outline

• Global African Swine Fever Research Alliance
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• Questions
African Swine Fever

Gap Analysis Report

November 2018

Global African Swine Fever Research Alliance
RECOMMENDATIONS

RESEARCH
The GARA recommends the implementation of the following research priorities to advance our ability to rapidly detect, control and respond to an ASF outbreak, including the progressive control and eradication of ASF in endemic settings.
Gap Analysis and Research Priorities

• Virology
• Viral Pathogenesis
• Immunology
• Surveillance
• Epidemiology
• Disinfectants
• Feral Swine and Wild Suidae
• Diagnostics
• Tick Control
• Vaccines
Presentation Outline

• Global African Swine Fever Research Alliance
• Research Gaps and Priorities
• **Update on ASF Vaccine Research**
• Questions
<table>
<thead>
<tr>
<th>Type of Vaccine</th>
<th>Reference</th>
<th>Protection</th>
<th>Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subunit vaccine: Immunization of pigs by DNA and recombinant vaccine virus identify ASFV immunogenic proteins.</td>
<td>J.Virol. 2018 pu: JVI02219-17 9</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>LAV: Protection of pigs with deletion mutant of MGF genes in ASFV Benin by different doses and routes</td>
<td>Vaccine 2018 36:707-715</td>
<td>Yes</td>
<td>Not Tested</td>
</tr>
<tr>
<td>LAV: BA71LACD2: Recombinant Live Attenuated ASFV with Cross-Protective Capabilities</td>
<td>J.Virol. 2017 91(21). pu: e01056-17</td>
<td>Yes</td>
<td>Not Tested</td>
</tr>
<tr>
<td>LAV: Adapted ASFV strain Congo is a LAV protecting against parental virulent virus.</td>
<td>Arch Virol 2017 (10):3081-3088</td>
<td>Yes</td>
<td>Not Tested</td>
</tr>
<tr>
<td>LAV: Naturally attenuated ASFV OUKT88/3 protects against virulent homologous field isolate.</td>
<td>Antiviral Res. 2017 138:1-8</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>LAV: Simultaneous Deletion of the 9GL and UK Genes from the ASFV Georgia 2007 Isolate Increased Safety and Protection against Homologous Challenge</td>
<td>J.Virol. 2016 91(1). pu: e01760-16</td>
<td>Yes</td>
<td>Not Tested</td>
</tr>
<tr>
<td>LAV: Deletion of 9GL in Pret4 strain protects against challenge with virulent parental isolate</td>
<td>Viruses. 2016 8(10). pu: E291</td>
<td>Yes</td>
<td>Not Tested</td>
</tr>
<tr>
<td>LAV: Deletion of MGF genes in ASFV Benin isolate reduces virulence in domestic pigs and induces a protective response.</td>
<td>Vaccine. 2016 34(39):4698-4705</td>
<td>Yes</td>
<td>Not Tested</td>
</tr>
<tr>
<td>LAV: ASFV Georgia isolate harboring deletions of 9GL and MGF360/505 genes is highly attenuated but does not confer protection against parental virus challenge.</td>
<td>Virus Res. 2016 Aug 2:211:8-14</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>LAV: ASFV Georgia 2007 with a Deletion in 9GL gene Leads to Attenuation and Induces an Effective Protection against Homologous Challenge.</td>
<td>J.Virol. 2015 89(16):8556-66</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>LAV: Naturally attenuated ASFV OUKT88/3 Induces Protection Against Challenge with Virulent Strains of Genotype 1.</td>
<td>Transbound Emerg Dis. 2016 63(5):e323-7</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Subunit vaccine: Inactivated virus and use of Modern adjuvants do not enhance the efficacy of an ASFV vaccine.</td>
<td>Vaccine. 2014 Jun 30:32(31):3879-82</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Subunit vaccine: DNA immunization partially protects pigs against sublethal challenge ASFV.</td>
<td>Antiviral Res. 2013 98(1):61-5</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Vaccines

- ASFV virology and functional genomics studies to inform vaccine discovery research.
- Determine safety characteristics associated with experimental live attenuated vaccines.
- Identify alveolar macrophage genes that enable ASF viral growth to inform the development of a cell line for vaccine production.
- Further explore the engineering of gene-deleted ASFV as potential vaccine candidates.
- There is a need for inter-laboratory testing of vaccine candidates.
- Harmonize challenge tests and read-outs.
- Continue to explore the potential for effective subunit vaccines.
- Research potential antigenic vaccine markers to differentiate infected from vaccinated animals (DIVA).
- Develop baits to enable the effective oral vaccination of wild boars.
- Develop and validate effective parenteral routes for live vaccine administration.
- Proof-of-concept testing of needle-free systems for the delivery of new ASF molecular vaccines.
Questions/Comments/Discussion

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