



Joint FAO/IAEA Programme
Nuclear Techniques in Food and Agriculture

R&D and Capacity Building Activities of the Joint FAO/IAEA Centre on ASF Diagnosis and Surveillance Through the VETLAB Network

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The Animal Production and Health Laboratory (APHL)

APHL is a WOAHA Collaborating Centre for ELISA and Molecular Techniques in Animal Disease Diagnosis.

- We maintain good collaboration with several WOAHA collaborating centers and Reference laboratories
- Trainers for all VETLAB training courses on disease diagnosis are mostly from WOAHA collaborating centers and WOAHA reference laboratories
- We support laboratories in implementing validated protocols to facilitate disease reporting and information sharing



APHL's Activities in Animal Disease Control

Research and Innovation (nuclear, nuclear-related, and molecular techniques)

- Molecular and serological assays;
- Sequencing and next-generation sequencing
- Molecular epidemiological studies

Capacity building and technology transfer

- VETLAB Network
- TCPs
- CRPs
- On-site training
- Fellowship training
- Group trainings

Networking, data sharing and services

- The VETLAB Network
- Service (ring trials, shipment, calibration)



Capacity Building: The VETLAB Network

Information, Knowledge, and Experience Exchange



Fifth joint coordination meeting for Africa and Asia (November 2021), Virtual meeting

Third joint coordination meeting for Africa and Asia (August 2018)

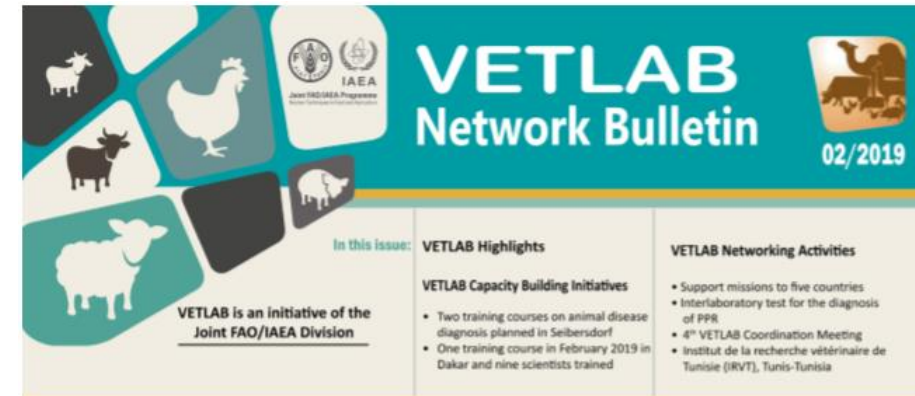


Fourth joint coordination meeting for Africa and Asia (August 2019)



Sixth joint coordination meeting for Africa and Asia (August 2022)

Proficiency testing
PT 2020 finalized (PPR)
PT 2021 ongoing



Countries' Contribution to the VETLAB Bulletin

QAVOC

Date

Short description

Performing reason

Issued document

Attach Documents

Status

Reviewed by

Approved by

Comment

iVetNet – Information platform of APH
Support the implementation of ISO 17025

Increasing Awareness during VETLAB Director's Annual Meetings

- June 2015: During the Second coordination meeting for Africa, the directors were informed about the ongoing activities of APH on ASF and offered support for laboratory preparedness.
- August 2016: A session was dedicated to Supporting bioinformatics capacity and molecular epidemiology in MS laboratories, which included the molecular characterization of ASF.
- August 2017: A session focused on Laboratory preparedness for handling outbreaks and emergency situations.
- August 2018: A session was dedicated to Trends in pathogen detection and characterization, including ASF.

Increasing Awareness during VETLAB Director's Annual Meetings

- August 2019: A session was dedicated to Transboundary animal diseases on ASF, LSD (Capripox), and Equine diseases.
- November 2021: Another session dedicated to APHL R&D and initiatives for animal and zoonotic disease surveillance and control covered ASF.
- August 2022: A session was dedicated to APHL R&D and initiatives to support animal and zoonotic disease surveillance and control, covered on ASF.

Capacity Building and Technology Transfer



ASF-related Field Support Missions

- 6 in Asia between 2015 and 2020
- 13 in Africa between 2013 and 2019
- Direct detection and differential diagnosis tools and or sequence analysis methods were transferred



Ethiopia 2013



Senegal 2019

Capacity Building and Technology Transfer

10 courses between 2012 and 2022 (including 8 for Africa)

Title	Year	Venue	Audience
Major Transboundary and Zoonotic Animal Diseases: Early Detection, Surveillance and Epidemiology	2012	Cameroon	Africa
Practical Approaches for Introducing New Assays for Routine Use in Veterinary Diagnostics Laboratories	2014	Austria	Africa
Transboundary Animal Diseases Diagnosis: Sequencing and Bioinformatics Analysis of Animal Pathogen Genomes (VETLAB)	2015	Austria	Africa and Asia
Transboundary Animal Diseases Diagnosis: Sequencing and bioinformatics analysis of animal pathogen genomes (VETLAB)	2018	Austria	Africa and Asia
Detection of Multiple Pathogens for the Differential Diagnosis and Syndromic Surveillance of Transboundary Animal Diseases: focus on PPR, Capripox, and ASF (VETLAB)	2019	Austria	Africa and Asia
Transboundary Animal Disease Diagnoses: Validation, Implementation, Monitoring and Quality Control for Molecular Assays	2019	Austria	Africa and Asia
Virtual Training Course on Sequencing and Bioinformatics	2021	Online	Africa and Asia
Early Diagnosis and Pathogen Characterization with a focus on Next-generation sequencing technology	2022	Austria	Africa and Asia



Austria 2018



Austria 2019



Cameroon, 2012



Austria 2014



Austria 2018



Austria 2022



Capacity Building and Technology Transfer

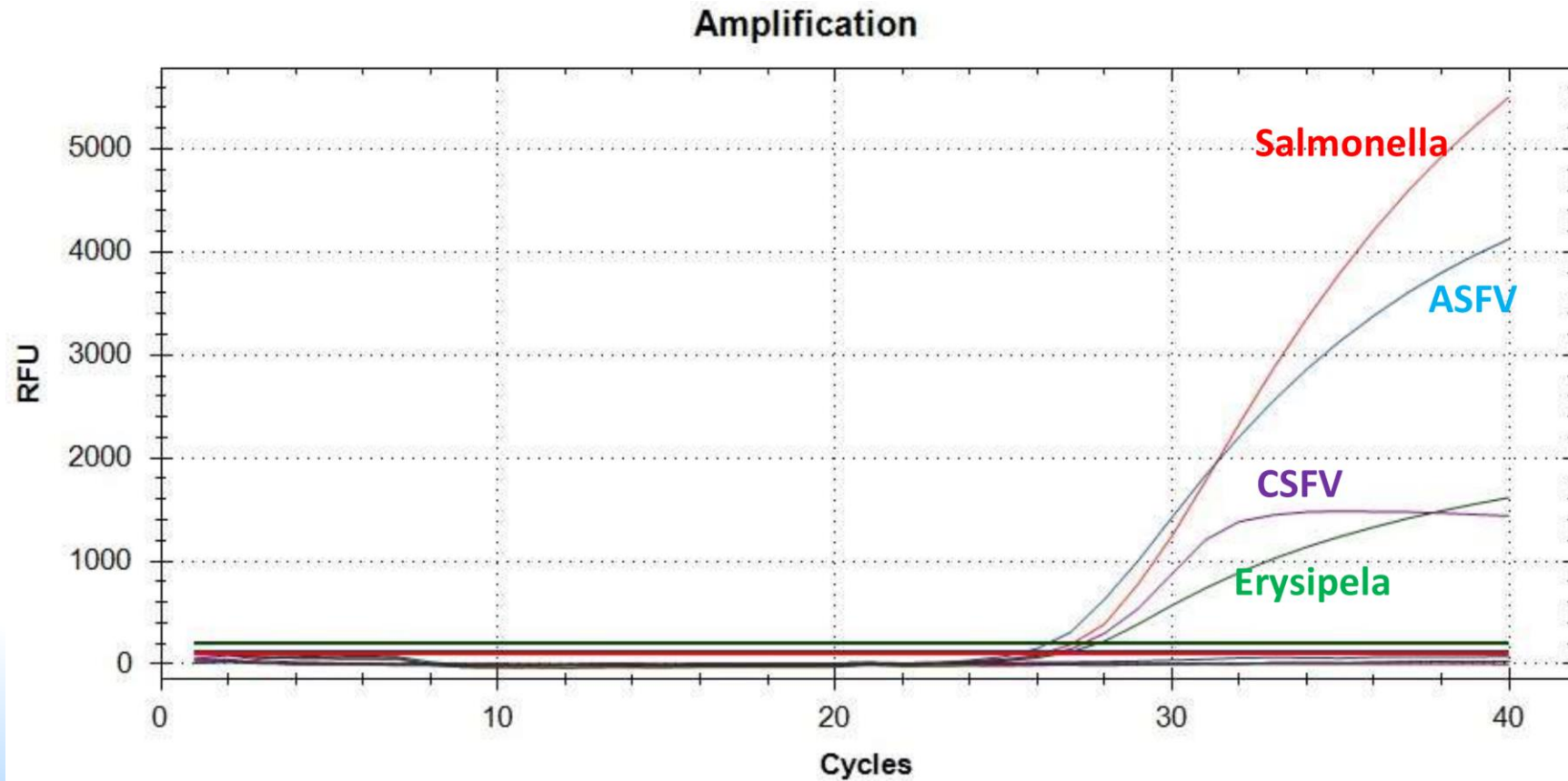
Fellowship and long-term training

- Several fellows trained for 1 to 3 months on molecular diagnosis and sequencing
 - Zambia
 - Ethiopia
 - Senegal
 - Tunisia
 - DRC
 - Lesotho
 - Botswana
 - Indonesia
 - Lao PDR
 - Cambodia
 - Vietnam
- One PhDs completed in Cameroon.
- Supported two PhD (Burkina and Mongolia)



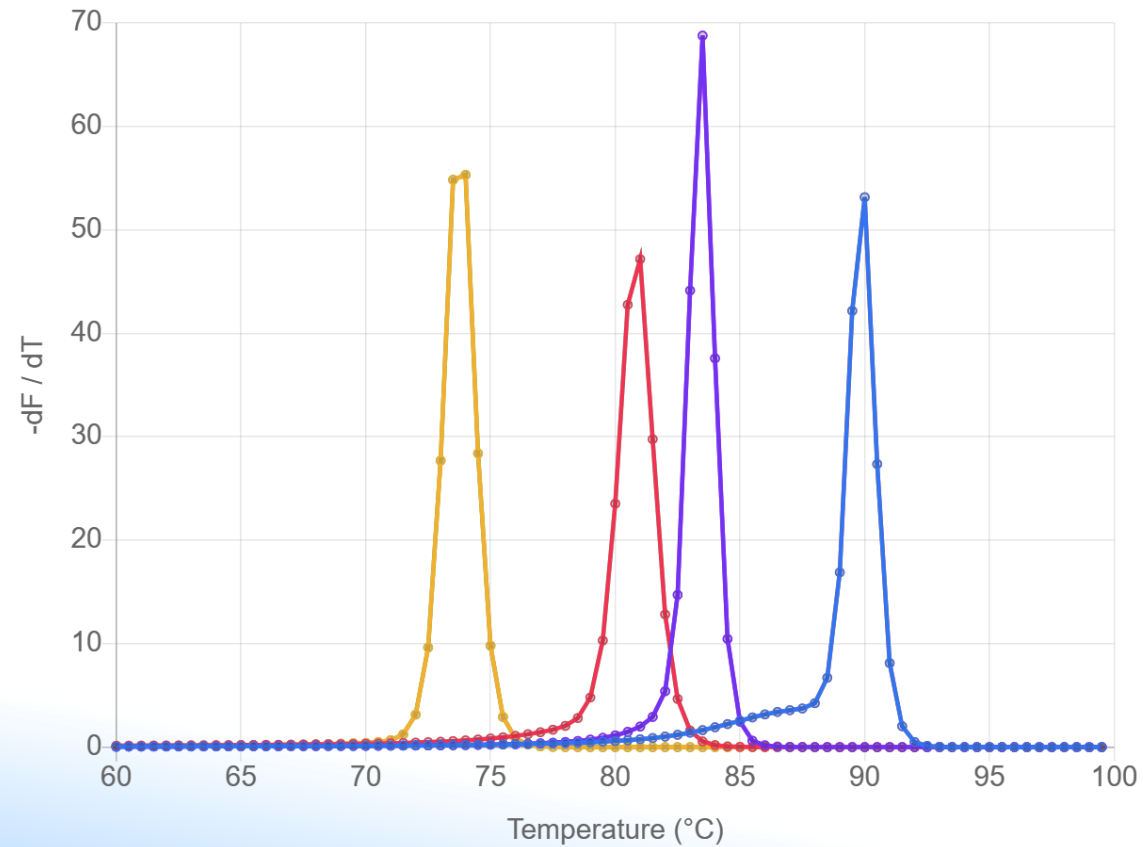
R&D: Assay development

Fourplex real-time PCR (ASFV, CSFV, Erysipelas, and Salmonella)



R&D: Assay development

Fourplex real-time PCR (ASFV, PCV-2, PPV, and Suid Herpesvirus-1)



R&D: Evaluation and Comparison of ASFV Detection Tests

Five qPCR mastermixes and three ad hoc kits were compared

Received: 2 November 2021 | Revised: 7 February 2022 | Accepted: 19 February 2022

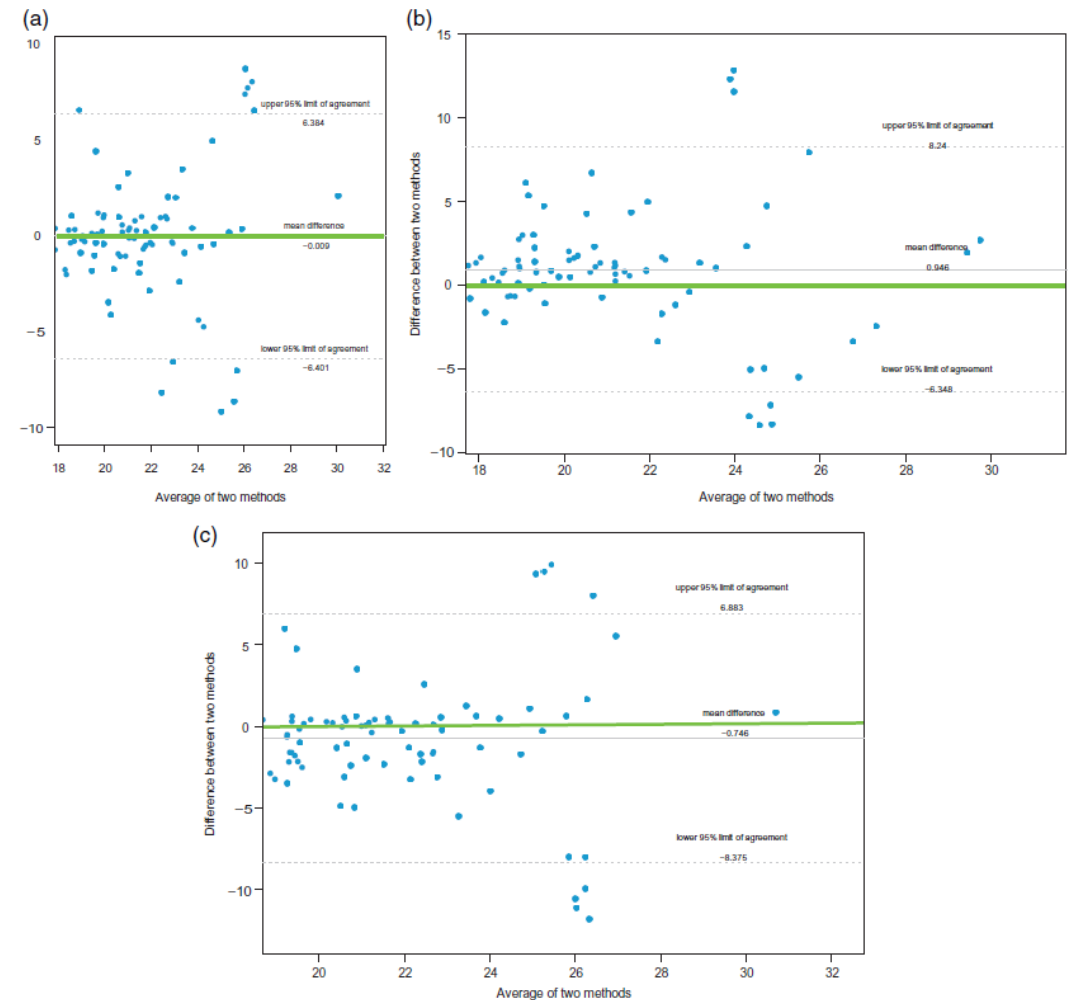
DOI: 10.1111/tbed.14491

SHORT COMMUNICATION

Transboundary and Emerging Diseases WILEY

Comparison of the sensitivity, specificity, correlation and inter-assay agreement of eight diagnostic in vitro assays for the detection of African swine fever virus

Agathe Auer^{1,2} | Tirumala B.K. Settypalli¹ | Beatrice Mouille² | Angelique Angot² | Cristian De Battisti² | Charles E. Lamien¹ | Giovanni Cattoli¹



R&D: Molecular Characterization of ASFV

Support Molecular Characterization of ASFV (2020-2023)

- Senegal (Targeted sequencing)
- Mali (Targeted sequencing)
- DRC (Targeted sequencing and WGS)
- Ethiopia (Targeted sequencing)
- Burkina (Targeted sequencing and WGS)
- Namibia (Targeted sequencing)
- Nigeria (Targeted sequencing)
- Cameroon (Targeted sequencing and WGS)
- Mozambique (Targeted sequencing and WGS)
- Ivory Coast (Targeted sequencing)
- Zambia ((Targeted sequencing and WGS)
- Ethiopia (Targeted sequencing)
- Tanzania (Targeted sequencing)
- Mongolia (Targeted sequencing and WGS)
- Lao PDR (Targeted sequencing)
- Vietnam (Targeted sequencing)
- Indonesia ((Targeted sequencing and WGS)

R&D: Whole Genome Sequencing of ASFV

Various sequencing technologies available at APHL



Ion S5



Minion Nanopore



PacBio (Sequel II instrument)

Some Highlights on the Molecular Surveillance of ASFV

Discovery of ASFV genotype XXIII in Ethiopia

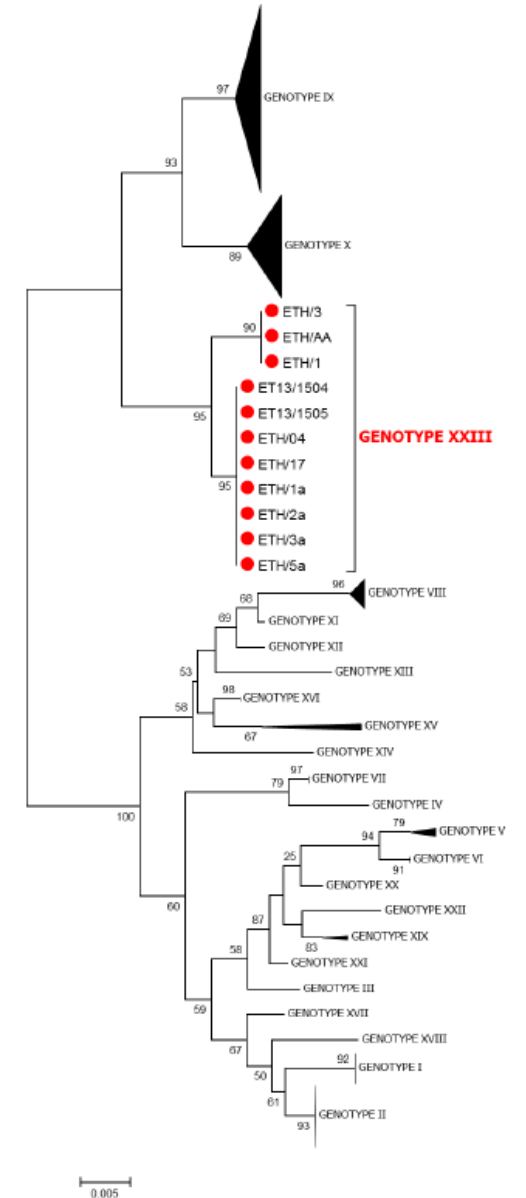
Transboundary and Emerging Diseases

Transboundary and Emerging Diseases

ORIGINAL ARTICLE

Identification of a New Genotype of African Swine Fever Virus in Domestic Pigs from Ethiopia

J. E. Achenbach^{1,*}, C. Gallardo^{2,*}, E. Nieto-Pelegrín^{3,4}, B. Rivera-Arroyo^{3,4}, T. Degefa-Negi⁵, M. Arias², S. Jenberie⁵, D. D. Mulisa⁶, D. Gizaw⁶, E. Gelaye^{1,5}, T. R. Chibssa^{1,6}, A. Belaye⁵, A. Loitsch⁷, M. Forsa⁶, M. Yami⁵, A. Diallo¹, A. Soler², C. E. Lamien¹ and J. M. Sánchez-Vizcaíno^{3,4}



Some Highlights on the Molecular Surveillance of ASFV

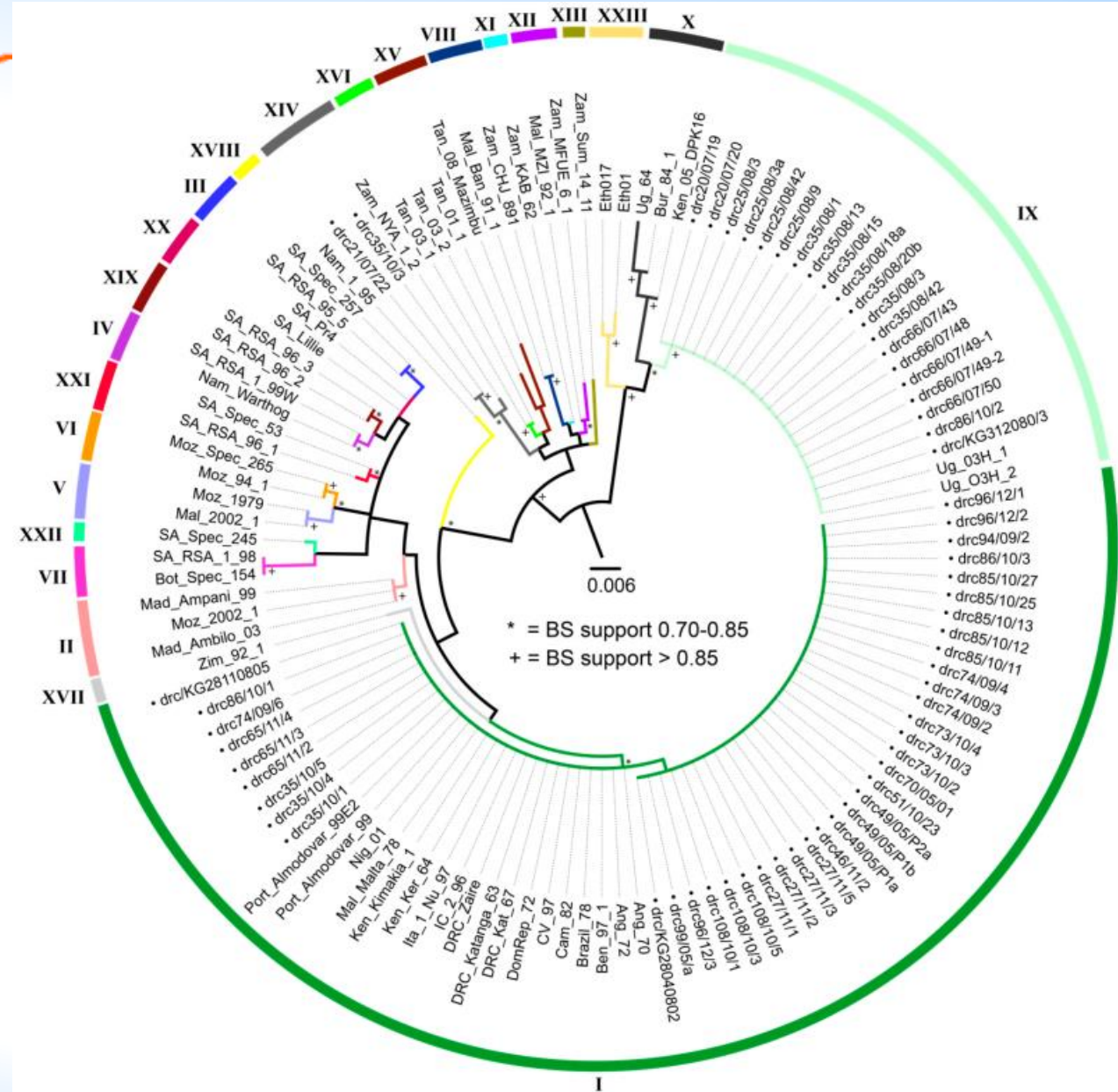
Co-circulation of multiple ASFV genotypes and Variants in DRC



Article

Genetic Assessment of African Swine Fever Isolates Involved in Outbreaks in the Democratic Republic of Congo between 2005 and 2012 Reveals Co-Circulation of p72 Genotypes I, IX and XIV, Including 19 Variants

Leopold K. Mulumba-Mfumu^{1,2}, Jenna E. Achenbach^{3,*}, Matthew R. Mauldin^{4,7}, Linda K. Dixon⁵, Curé Georges Tshilenge¹, Etienne Thiry², Noelia Moreno⁶, Esther Blanco⁶, Claude Saegerman², Charles E. Lamien³ and Adama Diallo³



Some Highlights on the Molecular Surveillance of ASFV

Co-circulation of ASFV Genotypes with Apparently Variable Pathogenicity

Received: 19 March 2019 | Revised: 12 July 2019 | Accepted: 12 July 2019

DOI: 10.1111/tbed.13298

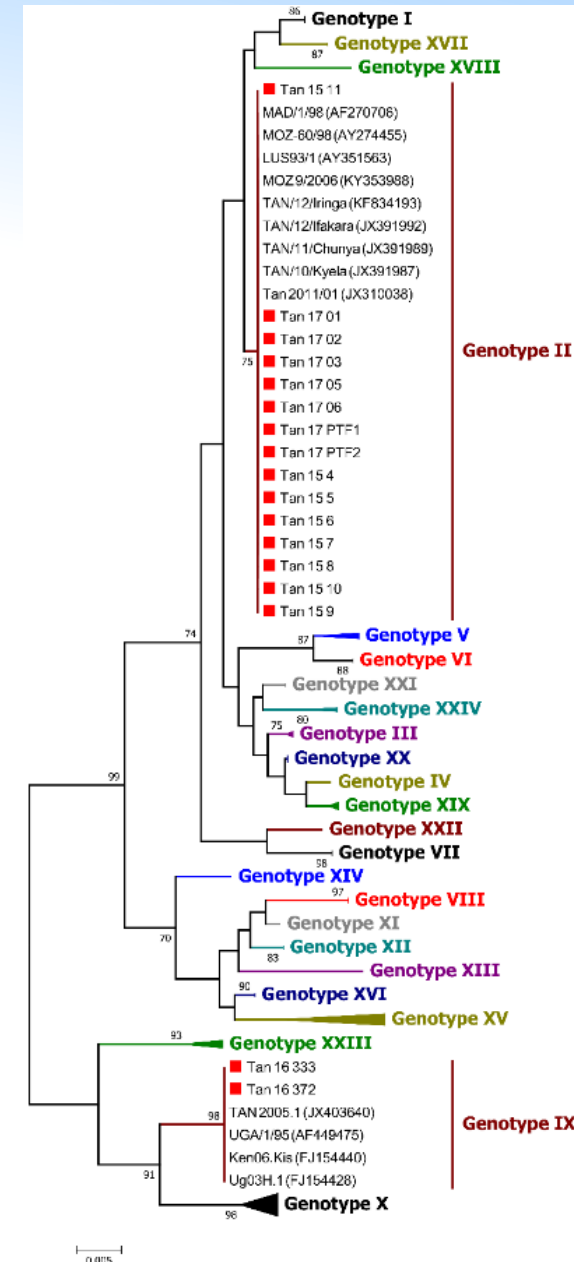
ORIGINAL ARTICLE

Journal of *Transboundary and Emerging Diseases* | WILEY

Symptomatic and asymptomatic cases of African swine fever in Tanzania

Jelly S. Chang^a¹ | Charles Mayenga¹ | Tirumala Bharani K. Settypalli² |
Jenna E. Achenbach³ | Julius J. Mwanandota¹ | Bishop Magidanga¹ | Giovanni Cattoli² |
Mashaka Jeremiah¹ | Aloyce Kamigwe¹ | Shukuru Guo¹ | Denis Kalabi¹ |
Furaha Mramba¹ | Charles E. Lamien²

Genotype II appeared to produce higher mortality and morbidity than genotype IX



Some Highlights on the Molecular Surveillance of ASFV

Only ASFV genotype I was reported in West Africa until 2019

Received: 10 April 2018 | Revised: 30 November 2018 | Accepted: 3 December 2018
DOI: 10.1111/tbed.13098

ORIGINAL ARTICLE

WILEY *Transboundary and Emerging Diseases*

Re-emergence of genotype I of African swine fever virus in Ivory Coast

Emmanuel Couacy-Hymann¹ | Kouamé V. Kouakou¹ | Jenna E. Achenbach² |
Léonce Kouadio¹ | Yao M. Koffi¹ | Hugues P. Godji¹ | Kouassi E. Adjé¹ |
Jonas Oulai³ | Henri J. Pell-Minhiand⁴ | Charles E. Lamien⁵

Received: 8 September 2020 | Revised: 12 June 2021 | Accepted: 13 July 2021
DOI: 10.1111/tbed.14240

SPECIAL ISSUE ARTICLE

Transboundary and Emerging Diseases WILEY

Molecular characterization of African Swine fever viruses in Burkina Faso, Mali, and Senegal 1989–2016

Genetic diversity of ASFV in West Africa

Germaine L. Minoungou^{1,2} | Mariame Diop³ | Marthin Dakouo⁴ |
Abdoul Karim Ouattara^{1,5} | Tirumala Bharani K. Settyapalli⁶ | Modou M. Lo³ |
Satigui Sidibe⁴ | Estelle Kanyala⁷ | Yaya Sidi Kone⁴ | Moctar Sidi Diallo^{2,*} |
Anne Ouedraogo² | Kadiatou Coulibaly⁴ | Victorine Ouedraogo² | Ibrahim Sow⁴ |
Mamadou Niang^{4,8} | Jenna Elizabeth Achenbach⁹ | Abel Wade¹⁰ | Hermann Unger¹¹ |
Adama Diallo^{3,12} | Giovanni Cattoli⁶ | Charles Euloge Lamien⁶ | Jacques Simpore^{1,5}

Sidi et al. *BMC Veterinary Research* (2022) 18:69
<https://doi.org/10.1186/s12917-022-03166-y>

BMC Veterinary Research

RESEARCH

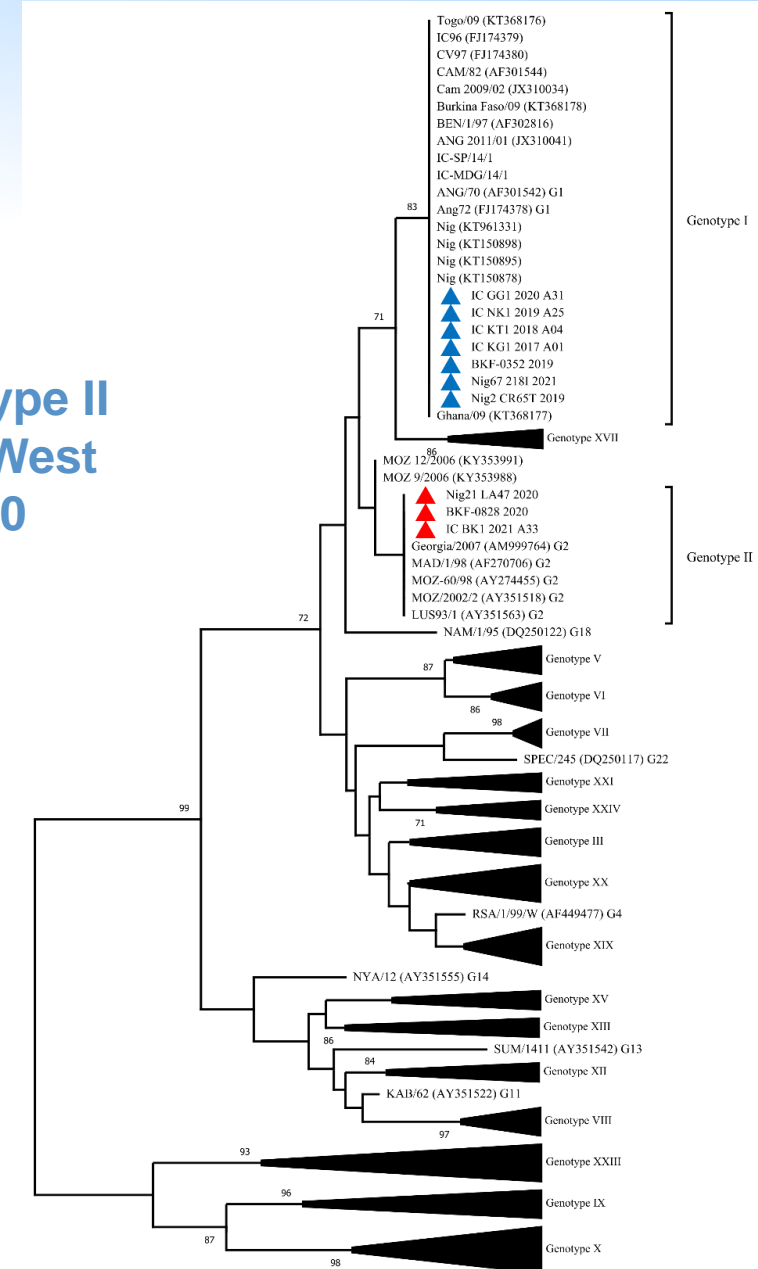
Open Access



Molecular characterization of African swine fever viruses from Burkina Faso, 2018


Moctar Sidi^{1*}, Habibata Lamouni Zerbo^{1*}, Bruno Lalidia Ouoba¹, Tirumala Bharani K. Settyapalli²,
Gregorie Bazimo¹, Hamidou Sandaogo Ouandaogo¹, Boubacar N'paton Sie¹, Ilboudo Sidwatta Guy³,
Drabo Dji-tombo Adama¹, Joseph Savadogo⁴, Anne Kabore-Ouedraogo¹, Marietou Guitti Kindo¹,
Jenna E. Achenbach⁴, Giovanni Cattoli² and Charles E. Lamien²


ASFV genotype II emerged in West Africa in 2020



Lessons learned

- Most VETLAB partner laboratories are undoubtedly capable of diagnosing ASF.
 - Currently, many labs have successfully detected and reported ASF independently.
 - These laboratories typically reach out to APHL (and FAO/WOAH reference laboratories) primarily for confirmation and further characterization.
 - For countries newly affected by ASF, prompt support with SOPs and access to appropriate controls are critical.
 - Additionally, a few labs may require urgent assistance with reagents to implement the tests.
- Continuous genetic monitoring of ASFV isolates circulating within a country or region is essential.
- It is crucial to analyze the correlation between the presence of other porcine pathogens and ASF severity.

 **animals**



Communication

Viral Co-Infections of Warthogs in Namibia with African Swine Fever Virus and Porcine Parvovirus 1

Umberto Molini ^{1,2}, Giovanni Franzo ³, Tirumala B. K. Settypalli ⁴, Maria Y. Hemberger ¹, Siegfried Khaiseb ², Giovanni Cattoli ⁴, William G. Dundon ^{4,*} and Charles E. Lamien ⁴

Archives of Virology
<https://doi.org/10.1007/s00705-021-05312-7>

BRIEF REPORT



Evidence of coinfection of pigs with African swine fever virus and porcine circovirus 2

William G. Dundon ^{1,4}, Giovanni Franzo ³, Tirumala B. K. Settypalli ¹, N.L.P. Indi Dharmayanti ³, Ulaankhuu Ankanbaatar ⁴, Indrawati Sendow ³, Atik Ratnawati ², Tserenchim Sainnokhoi ⁴, Umberto Molini ², Giovanni Cattoli ⁴, Charles E. Lamien ⁴

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Archives of Virology (2022) 167:2715–2722
<https://doi.org/10.1007/s00705-022-05593-6>

BRIEF REPORT



Coinfections of African swine fever virus, porcine circovirus 2 and 3, and porcine parvovirus 1 in swine in Nigeria

Pam Dachung Luka ¹, Adeyinka Jeremy Adedeji ¹, Anvou R. Jambol ¹, Isioma V. Ifende ¹, Helen G. Luka ¹, Nyam D. Choji ¹, Rebecca Weka ¹, Tirumala B.K. Settypalli ², Jenna E. Achenbach ³, Giovanni Cattoli ², Charles E. Lamien ², Umberto Molini ^{4,5}, Giovanni Franzo ⁶, William G. Dundon ^{2,7}

Our NGS Team

Sequencing



Bharani Settypalli

Sequencing



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Epidemiology



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Dundon

Nanopore



Irene Meki

Data Analysis



Sneha Datta

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(Molecular epidemiology)

Molecular
Epidemiology



Charles Lamien

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FAO/IAEA Agriculture and Biotechnology Laboratory



Joint FAO/IAEA Programme
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Thank You



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Animal Production and Health
Subprogramme