Better lives through livestock

Updates on activities on African swine fever at the International Livestock Research Institute (ILRI)

Anna Lacasta
ILRI Senior Scientist
HEALTH Program

4th ASF Coordination Meeting for South-East Asia
26-28th November 2024, Hanoi, Vietnam

ILRI
INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

CGIAR

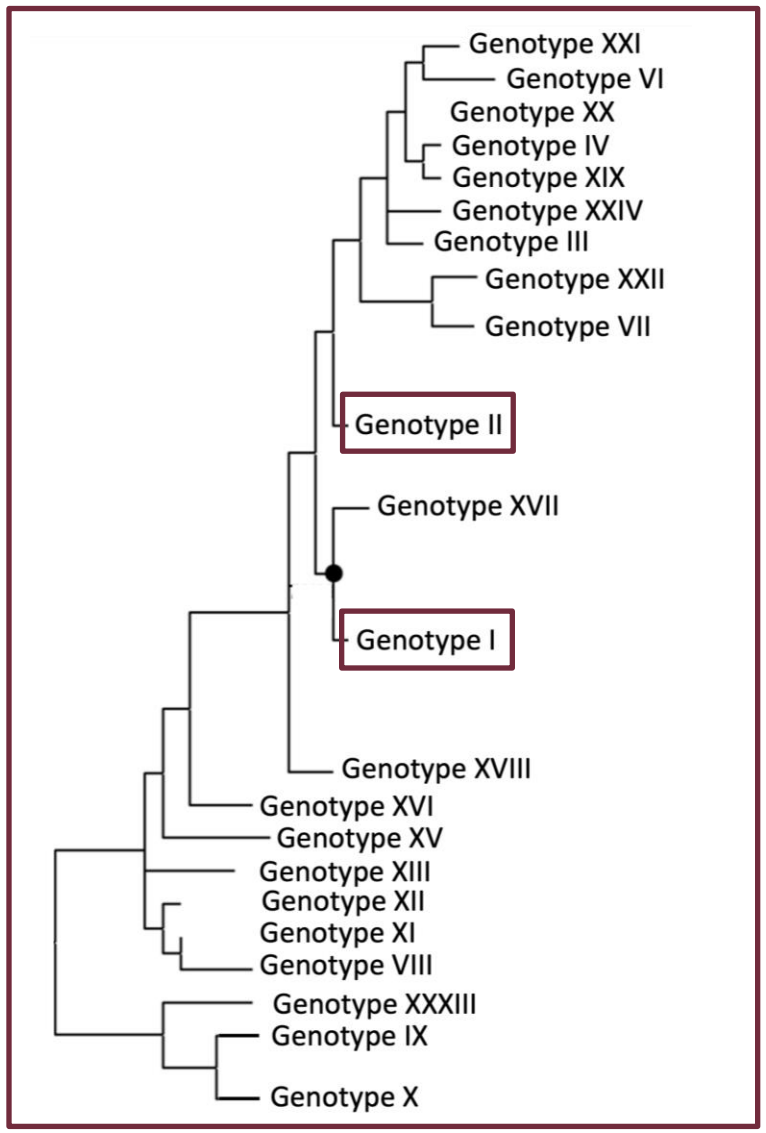
ASF areas of expertise at ILRI

- Development of challenge models for the different ASFV isolates of interest for the research community.
- Development of recombinant live attenuated vaccines (LAV) based on African genotypes.
- Development of subunit vaccines against ASF: antibodies and CTL.
- *In vitro* assessment of immunological parameters.
- Assessing performance of diagnostic test for ASF.

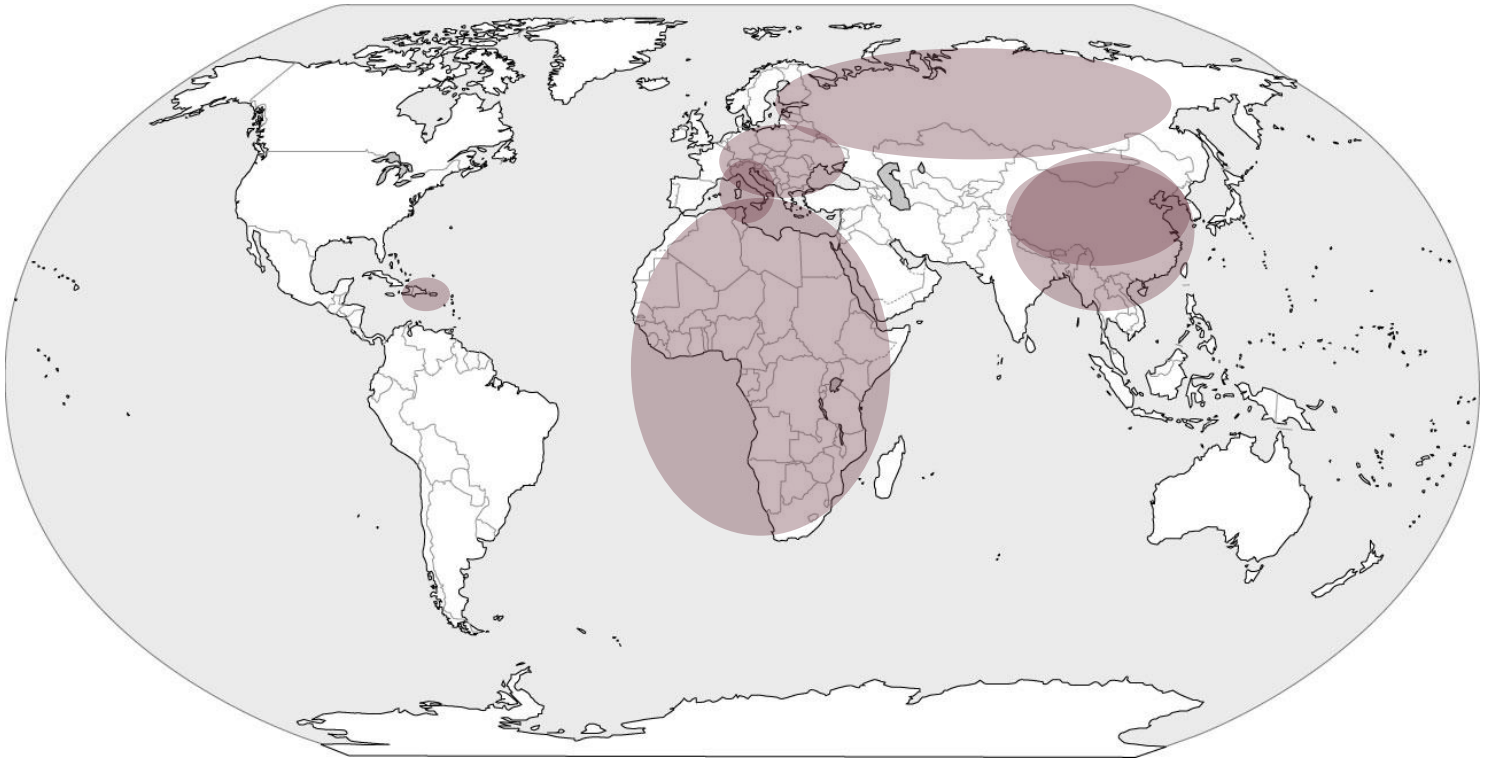
ASF areas of expertise at ILRI

- Development of challenge models for the different ASFV isolates of interest for the research community.
- Development of recombinant live attenuated vaccines (LAV) based on African genotypes.
- Development of subunit vaccines against ASF: antibodies and CTL.
- *In vitro* assessment of immunological parameters.
- Assessing performance of diagnostic test for ASF.

ASFV genotypes distribution



Adapted from Lee *et al.*, 2022



Need for robust and reliable challenge models for vaccine cross-protection experiments

TAHSSL ILRI INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE CGIAR

In vivo ASFV challenge experiments

x5/group

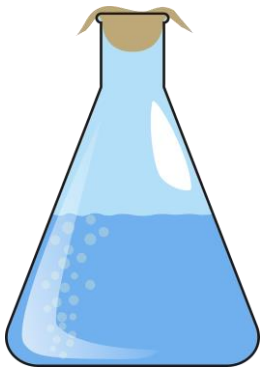
-21 Quarantine

Day 0 Challenge

Samplings

Day 21 End of experiment

Georgia 07 G-II (10^2 HAD_{50})
Kenya1033 G-IX (10^2 HAD_{50})
Benin97/1 G-I (10^3 HAD_{50})
Ghana2014 G-I (10^2 HAD_{50})
Malawi Lil20 G-VIII (10^2 HAD_{50})
Ken05 G-X (10^2 HAD_{50})



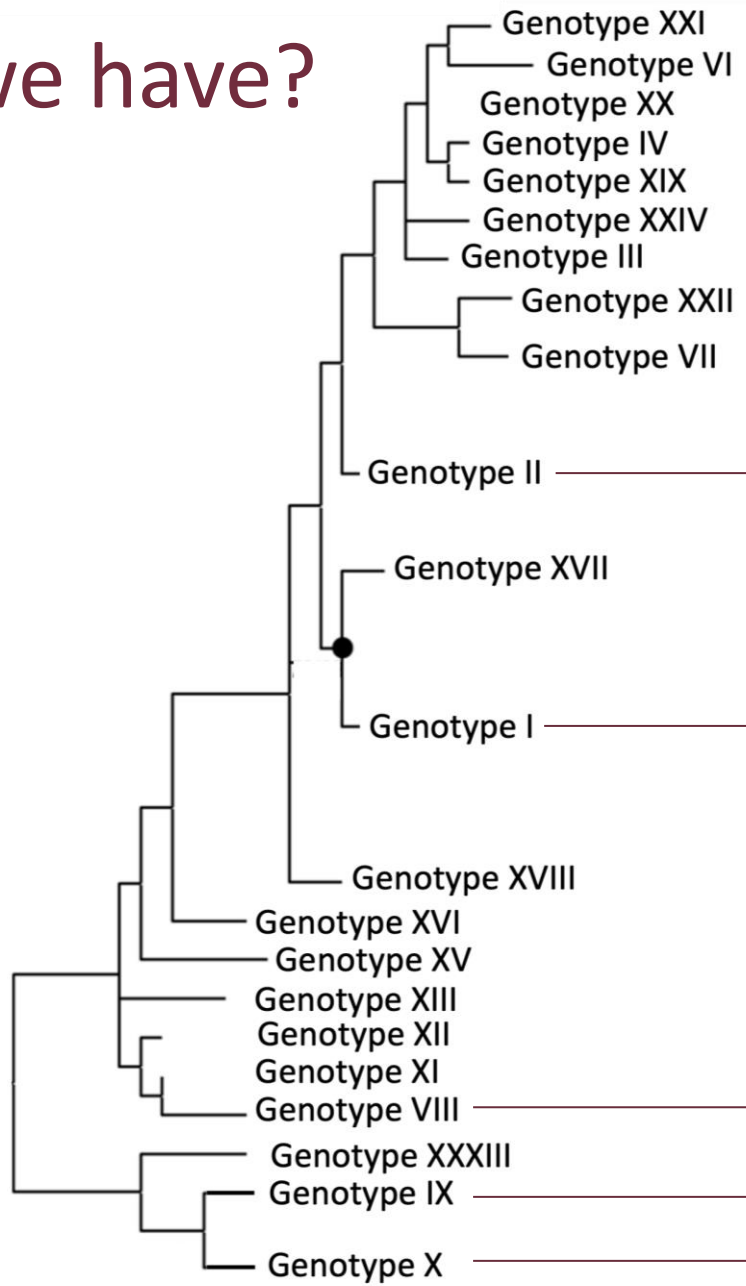
Data capturing and *ex vivo* analysis:

- Survival curves
- Clinical scoring (King et al., 2011)
- Viremia (blood)
- Post-mortem evaluation
- Antibody titers (ELISA)
- Cellular response (ELISPOT)

TAHSSL

ILRI INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE CGIAR

What else we have?



ASFV BOTP1/99	genotype III
ASFV CHZT90/1	genotype IV
ASFV MOZ/79	genotype V
ASFV MOZ94/1	genotype VI
ASFV RSA85/1 genotype VII	
ASFV RSA/1/92	genotype XIX

ASFV LUS 93/1	genotype II
ASFV Georgia 07	genotype II
ASFV Georgia 10	genotype II

ASFV Benin97/1	genotype I
ASFV Lisbon 57	genotype I serogroup 1
ASFV VIC T90/1	genotype I
ASFV LIV13/33	genotype I serogroup 4
ASFV Ghana2014	genotype I
ASFV BA71	genotype I

ASFV KAB6/2	genotype XI
ASFV MFUE6/1	genotype XII
ASFV SUM14/11	genotype XIII
ASFV NYA1/2	genotype XIV
ASFV ZIM92/1	genotype XVII

ASFV Malawi Lil/20	genotype VIII

ASFV Ken1033 §	genotype IX

ASFV Ken05/TK1	genotype X
ASFV UGA95/3	genotype X
ASFV UGA1965	genotype X

TAHSSL

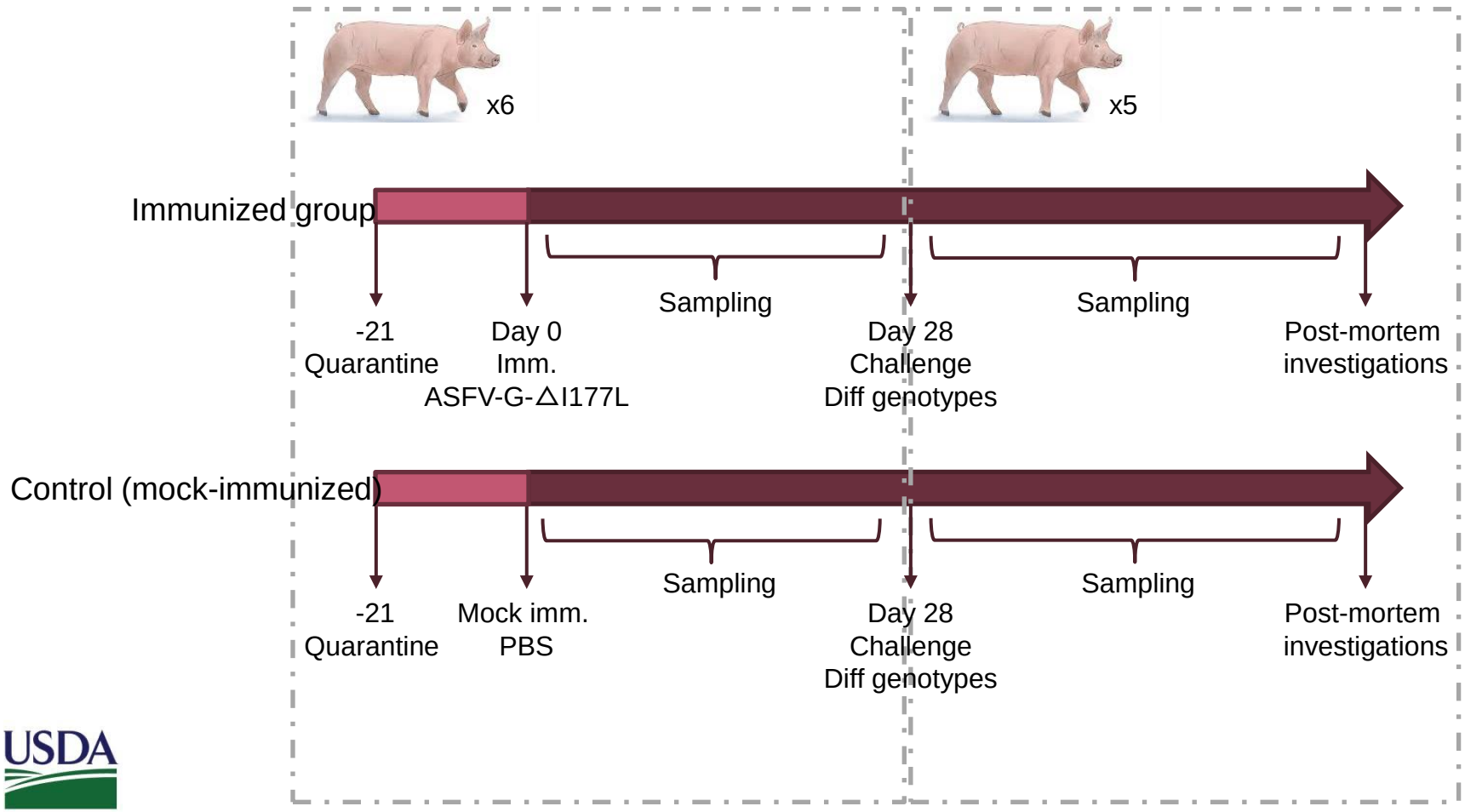
ILRI INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE CGIAR

ASF areas of expertise at ILRI

- Development of challenge models for the different ASFV isolates of interest for the research community.
- Development of recombinant live attenuated vaccines (LAV) based on African genotypes.
- Development of subunit vaccines against ASF: antibodies and CTL.
- *In vitro* assessment of immunological parameters.
- Assessing performance of diagnostic test for ASF.

ASFV-G-△I177L cross-protection experiments

Test the USDA-developed ASFV-G- △ I177L against African isolates.



Genotype II
Genotype I (x2)
Genotype IX
Genotype X
Genotype XX
Genotype VIII

Do you want
to know more?

Development of recombinant LAV based on African genotypes

Test of our own recombinant viruses based on genotype IX (Kenya1033 strain) backbone

Deletion of the CD2v Gene from the Genome of ASFV-Kenya-IX-1033 Partially Reduces Virulence and Induces Protection in Pigs

by Johanneke D. Hemmink [1,*], Emmanuel M. Khazalwa [1], Hussein M. Abkallo [1], Bernard Oduor [1], Jeremiah Khayumbi [1], Nicholas Svitek [1], Sonal P. Henson [1,2], Sandra Blome [3], Günther Keil [3,†], Richard P. Bishop [4,‡,§] and Lucilla Steinaa [1,*,‡]

Co-Deletion of A238L and EP402R Genes from a Genotype IX African Swine Fever Virus Results in Partial Attenuation and Protection in Swine

by Hussein M. Abkallo [1,*], Johanneke D. Hemmink [1], Bernard Oduor [1], Emmanuel M. Khazalwa [1], Nicholas Svitek [1], Nacyra Assad-Garcia [2], Jeremiah Khayumbi [1], Walter Fuchs [3], Sanjay Vashee [2] and Lucilla Steinaa [1,*]

The African Swine Fever Isolate ASFV-Kenya-IX-1033 Is Highly Virulent and Stable after Propagation in the Wild Boar Cell Line WSL

by Johanneke D. Hemmink [1,*], Hussein M. Abkallo [1], Sonal P. Henson [1,†], Emmanuel M. Khazalwa [1], Bernard Oduor [1], Anna Lacasta [1], Edward Okoth [1], Victor Riitho [1,‡], Walter Fuchs [2], Richard P. Bishop [3,§] and Lucilla Steinaa [1,*]

The advancements, challenges, and future implications of the CRISPR/Cas9 system in swine research

Jinfu Zhang [1], Emmanuel M Khazalwa [2], Hussein M Abkallo [2], Yuan Zhou [1], Xiongwei Nie [1], Jinxue Ruan [1], Changzhi Zhao [1], Jieru Wang [3], Jing Xu [1], Xinyun Li [4], Shuhong Zhao [4], Erwei Zuo [5], Lucilla Steinaa [6], Shengsong Xie [7]

Rapid CRISPR/Cas9 Editing of Genotype IX African Swine Fever Virus Circulating in Eastern and Central Africa

Hussein M. Abkallo[1], Nicholas Svitek[1], Bernard Oduor[1], Elias Awino[1], Sonal P. Henson[1], Samuel O. Oyola[1], Stephen Mwalimu[1], Nacrya Assad-Garcia[2], Walter Fuchs[3], Sanjay Vashee[2] and Lucilla Steinaa[1*]*

TAHSSL

CGIAR INITIATIVE ON Sustainable Animal Productivity

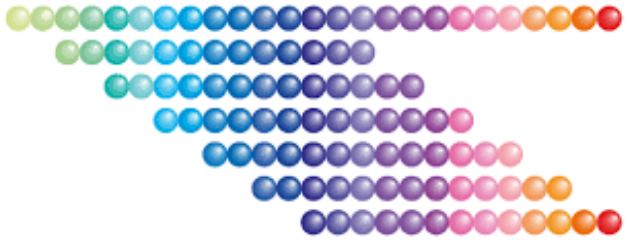
IDRC CRDI

Do you want to know more?

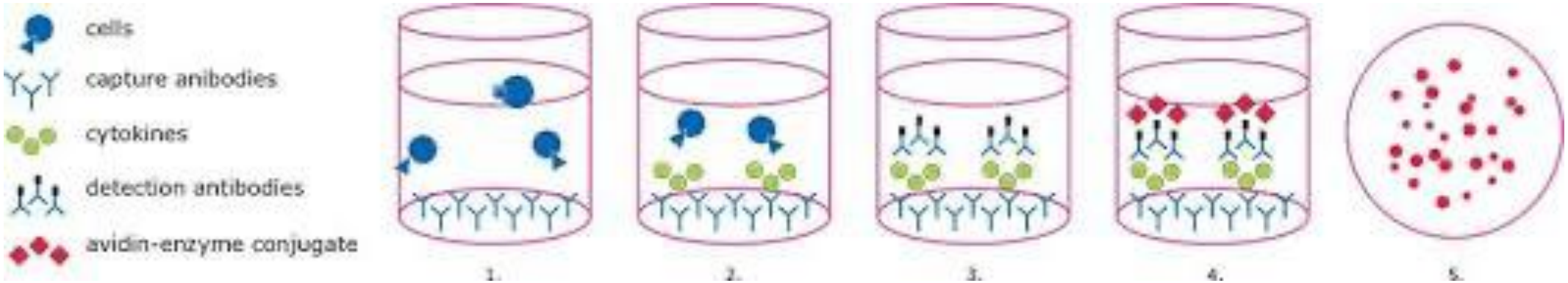
ASF areas of expertise at ILRI

- Development of challenge models for the different ASFV isolates of interest for the research community.
- Development of recombinant live attenuated vaccines (LAV) based on African genotypes.
- Development of subunit vaccines against ASF: antibodies and CTL.
- *In vitro* assessment of immunological parameters.
- Assessing performance of diagnostic test for ASF.

Development of subunit vaccines: CTL response



Cell stimulation using a peptide library

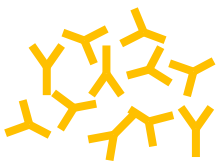


Do you want to know more?

VAX4ASF

Development of subunit vaccines: Antibodies

Naturally resistant wild animals

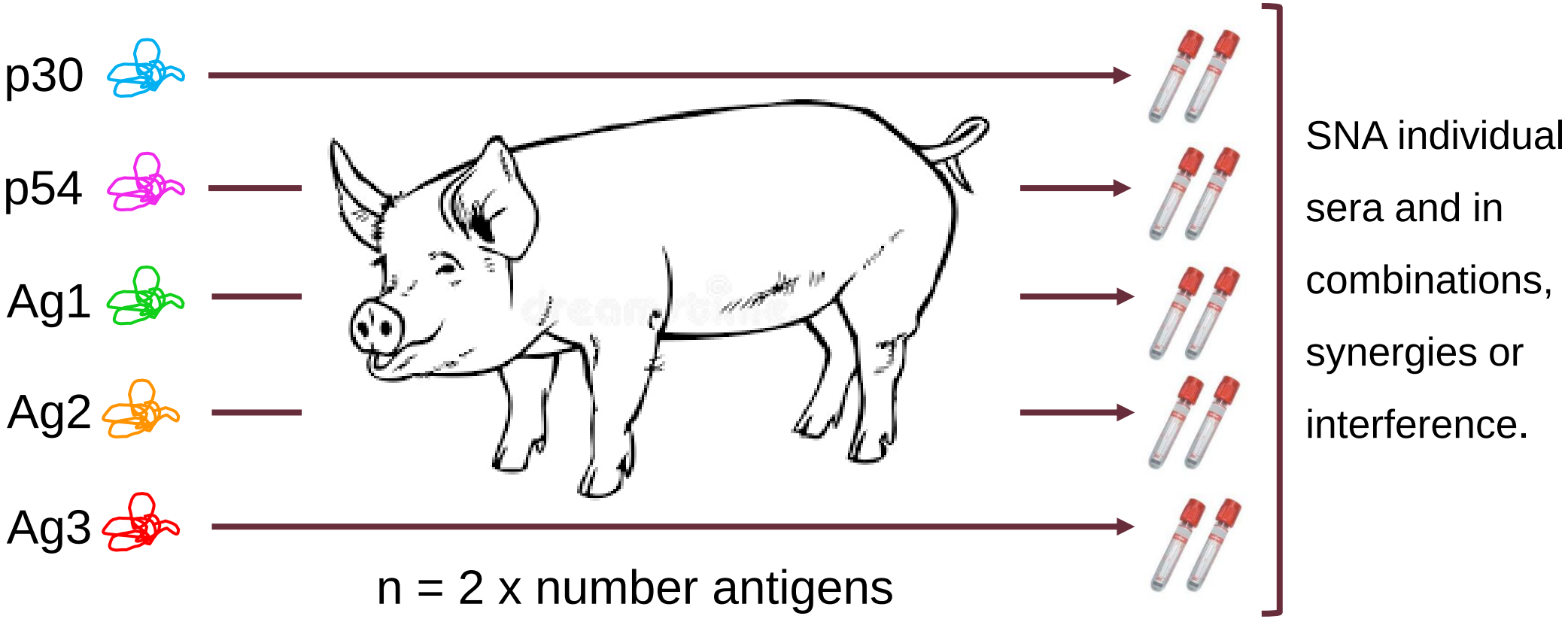


Surviving domestic pigs

Susceptible animals

Do you want to know more?

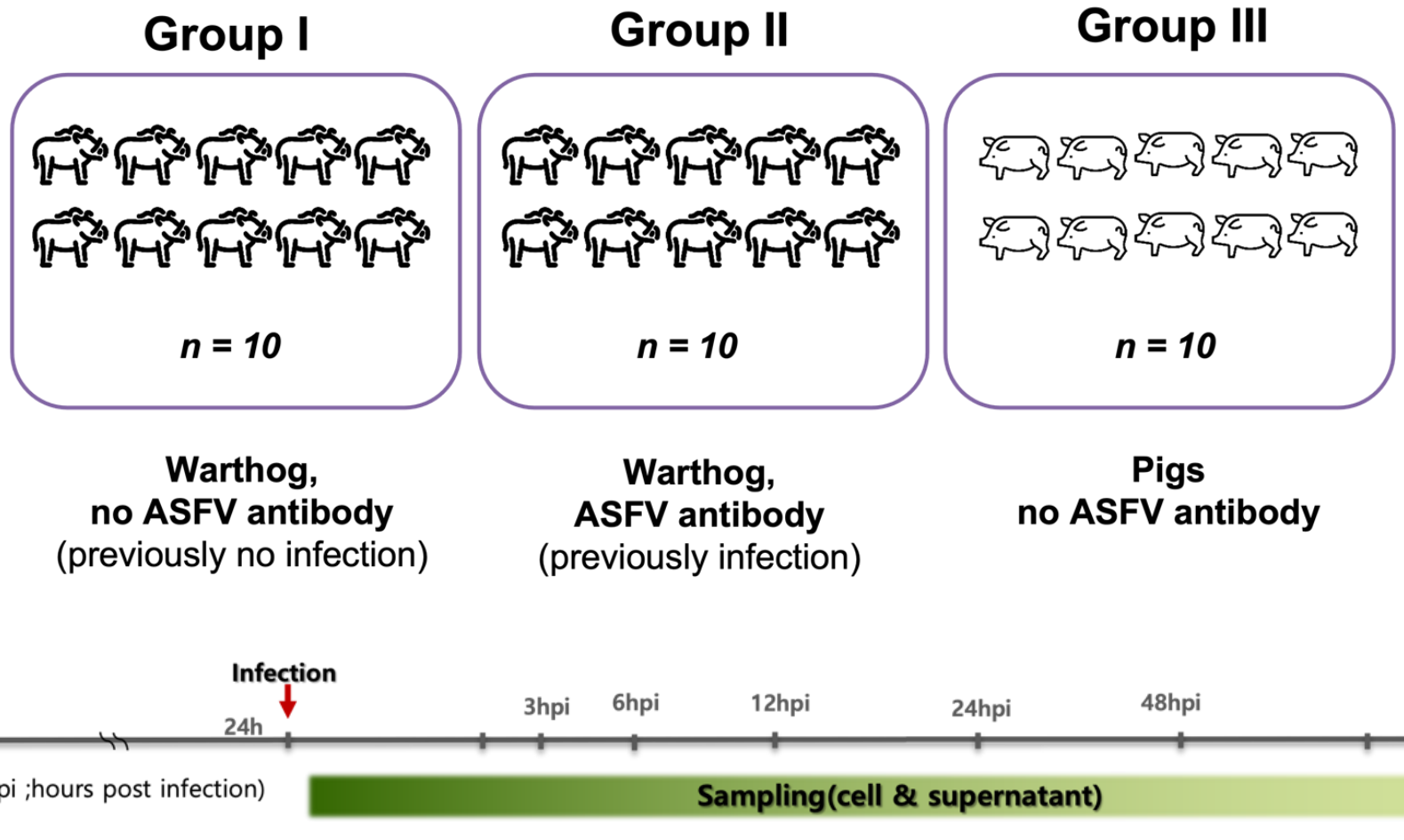
Development of subunit vaccines: Antibodies



ASF areas of expertise at ILRI

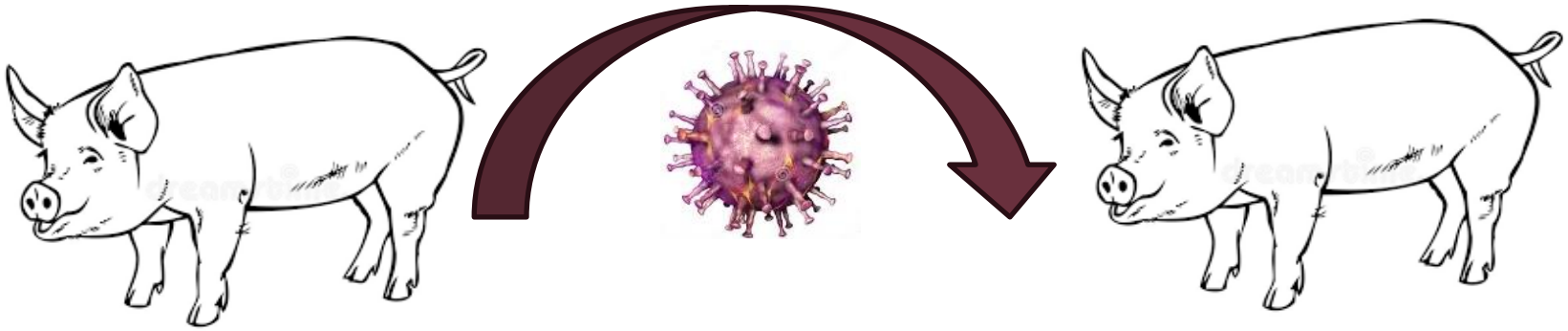
- Development of challenge models for the different ASFV isolates of interest for the research community.
- Development of recombinant live attenuated vaccines (LAV) based on African genotypes.
- Development of subunit vaccines against ASF: antibodies and CTL.
- *In vitro* assessment of immunological parameters.
- Assessing performance of diagnostic test for ASF.

Are the warthogs the key? RDA transcriptomic project



ASFV Transmission experiments and surveillance

- Transmission experiments with Vietnam ASFV isolates (National Institute of Veterinary Research, NIVR, Vietnam)



- Sueveillance through sequencing ASFV isolates from the North of Vietnam. (National Institute of Veterinary Research, Vietnam)

ASF areas of expertise at ILRI

- Development of challenge models for the different ASFV isolates of interest for the research community.
- Development of recombinant live attenuated vaccines (LAV) based on African genotypes.
- Development of subunit vaccines against ASF: antibodies and CTL.
- *In vitro* assessment of immunological parameters.
- Assessing performance of the diagnostic test for ASF.

Evaluation of rapid test for ASF

- Test of virus presence in serum or blood, compared to qPCR
  - RingBio (not known)
  - Gold Standard Diagnostics (p72)
  - Celltrix p72
  - Celltrix p30

  ********Urgent need for improvement*********

- Test of antibody presence, compared to OIE ELISA
  - Biostone
  - Gold Standard Diagnostics
  - GlobalDX

- Dual test antibodies and antigen.

Do you want to know more?

ILRI contacts

Anna Lacasta
a.lacasta@cgiar.org

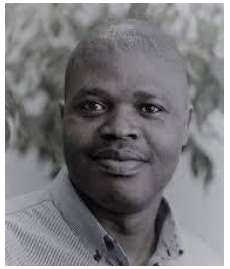
Hanneke Hemmink
h.hemmink@cgiar.org

Hussein Abkallo
h.abkallo@cgiar.org

Edward Okoth
e.okoth@cgiar.org

Vaccines & Diagnostic Team leader:

- Musa Mulongo
m.m.mulongo@cgiar.org



Program Leader for Health Program:

- Hung Nguyen
h.nguyen@cgiar.org

ILRI
INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE
CGIAR

Acknowledgements

- Dr. Musa Mulongo (ILRI)
- Dr. Tore Tollersrud (ILRI)
- Prof. Hu Suk Lee (Chungnam University)
- Prof. Si Oh (Chungnam University)
- Dr. Ara Cho (NIAS, South Korea)
- Dr. Vuong Bui Nghia (NIVR)

ILRI
INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE
CGIAR

ILRI
INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

CGIAR

The International Livestock Research Institute (ILRI) is a non-profit institution helping people in low- and middle-income countries to improve their lives, livelihoods and lands through the animals that remain the backbone of small-scale agriculture and enterprise across the developing world. ILRI belongs to CGIAR, a global research-for-development partnership working for a food-secure future. ILRI's funders, through the CGIAR Trust Fund, and its many partners make ILRI's work possible and its mission a reality. Australian animal scientist and Nobel Laureate Peter Doherty serves as ILRI's patron.

better lives through livestock

ilri.org