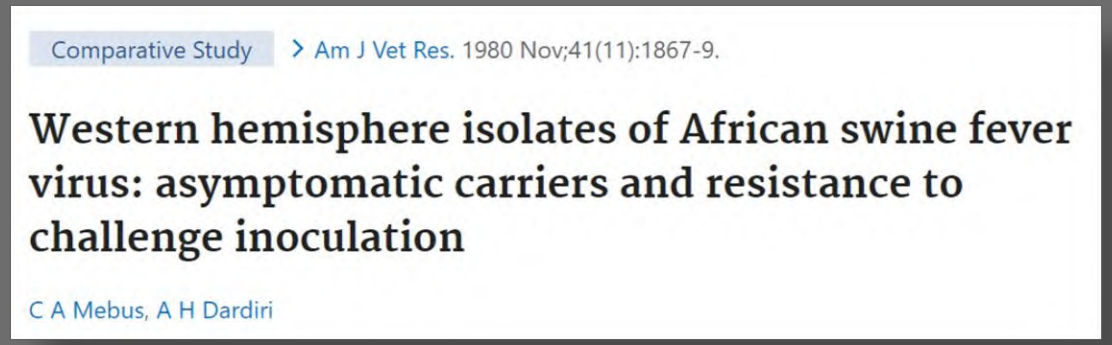
ASFV Vaccine Overview in 2023

Dr. Douglas Gladue

Live attenuated vaccines (LAV) are effective preventing homologous challenge

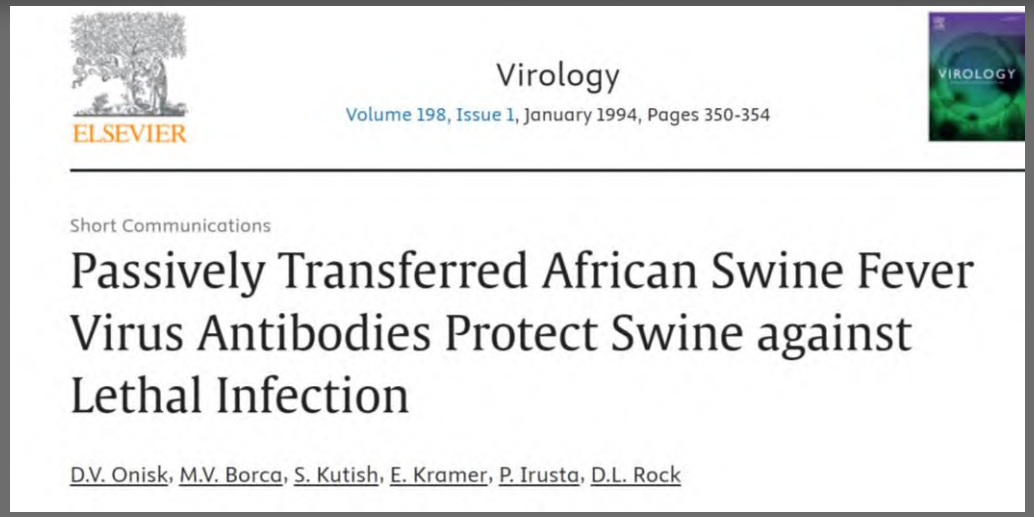
Low virulence field isolate based vaccines



Comparative Study > Am J Vet Res. 1980 Nov;41(11):1867-9.

Western hemisphere isolates of African swine fever virus: asymptomatic carriers and resistance to challenge inoculation

C A Mebus, A H Dardiri



ELSEVIER

Virology

Volume 198, Issue 1, January 1994, Pages 350-354

Short Communications

Passively Transferred African Swine Fever Virus Antibodies Protect Swine against Lethal Infection

D.V. Onisk, M.V. Borca, S. Kutish, E. Kramer, P. Irusta, D.L. Rock

A Vaccine for ASFV is not a new idea

1980: Asymptomatic carriers

resistance to homologous challenge

1994: Passive transferred antibodies to protect against ASFV

USDA

Global African Swine Fever Research Alliance

https://www.ars.usda.gov/GARA/

5th GARA Scientific Conference, Punta Cana, Dominican Republic May 2022

Webinar: ASFV vaccines May 2021 : GARA Scientific Communications - YouTube
Webinar : ASFV Genomic Sequencing: GARA Scientific Communications - YouTube

ASFV Vaccine Gaps:

- Protective immunity from viral proteins unknown
- Hard to make subunit vaccine
    - Any attempts have failed or give only a modest protection rate
    - Successful subunit vaccines have been to low-virulence strains
    - Required large doses – commercially unviable
- Inactivation of ASFV does not offer protection even at high doses
    - Inactivated vaccine not possible
- Live Attenuated Vaccine only current option

USDA

GARA
Global African Swine Fever
Research Alliance

GARA Scientific Conference Manila

Update Vaccine Gaps and Concerns Specifically for ASIA

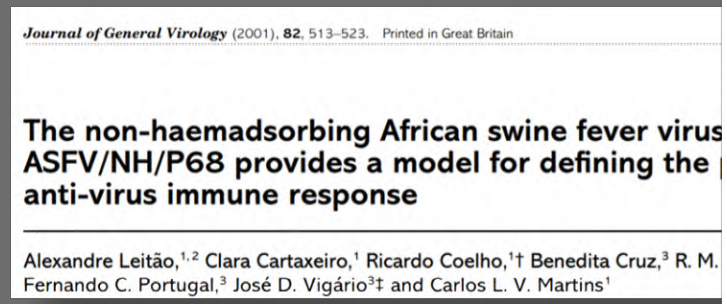
Live attenuated vaccines (LAV) are effective preventing homologous challenge

Attenuated isolates were produced by:

- Low virulence field isolates
- Viruses attenuated by tissue culture passages
- Viruses with genetically engineered deletions

Live attenuated vaccines (LAV) are effective preventing homologous challenge

Low virulence field isolate based vaccines



Journal of General Virology (2001), **82**, 513–523. Printed in Great Britain

The non-haemadsorbing African swine fever virus ASFV/NH/P68 provides a model for defining the anti-virus immune response

Alexandre Leitão,[1,2] Clara Cartaxeiro,[1] Ricardo Coelho,[1†] Benedita Cruz,[3] R. M. Fernando C. Portugal,[3] José D. Vigário[3‡] and Carlos L. V. Martins[1]

Vaccine 36 (2018) 2694–2704

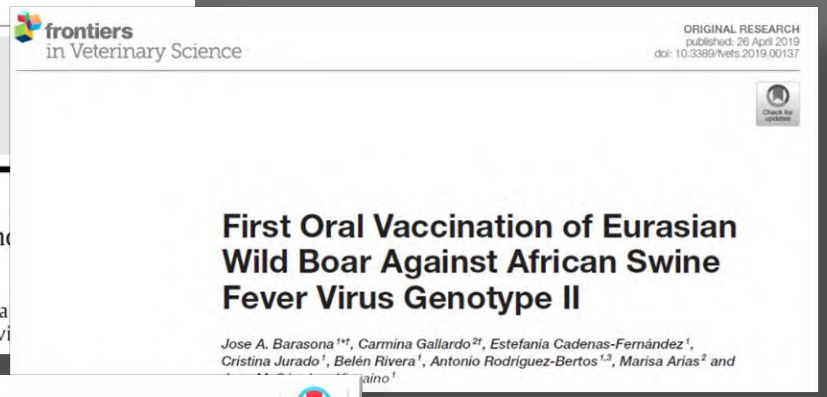
Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

African swine fever virus (ASFV) protection mediated by NH/P68 and NH/P68 recombinant live-attenuated viruses

Carmina Gallardo[b,1], Elena G. Sánchez[a,1], Daniel Pérez-Núñez[a], Marisa Nogal[a], Patricia Ángel L. Carrascosa[a], Raquel Nieto[b], Alejandro Soler[b], María Luisa Arias[b], Yolanda Revi



frontiers in Veterinary Science

ORIGINAL RESEARCH
published: 26 April 2019
doi: 10.3389/fvets.2019.00137

First Oral Vaccination of Eurasian Wild Boar Against African Swine Fever Virus Genotype II

Jose A. Barasona[1†], Carmina Gallardo[2†], Estefanía Cadenas-Fernández[1], Cristina Jurado[1], Belén Rivera[1], Antonio Rodríguez-Bertos[1,3], Marisa Arias[2] and*

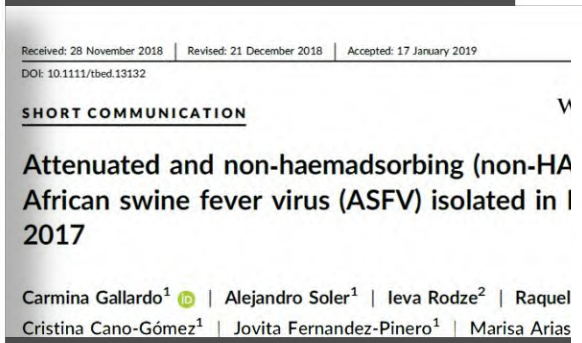
Contents lists available at ScienceDirect

Antiviral Research

journal homepage: www.elsevier.com/locate/antiviral

Different routes and doses influence protection in pigs immunised with the naturally attenuated African swine fever virus isolate OURT88/3

Pedro J. Sánchez-Cordón[*,1], Dave Chapman[1], Tamara Jabbar, Ana L. Reis, Lynnette Goatley, Christopher L. Netherton, Geraldine Taylor, Maria Montoya, Linda Dixon



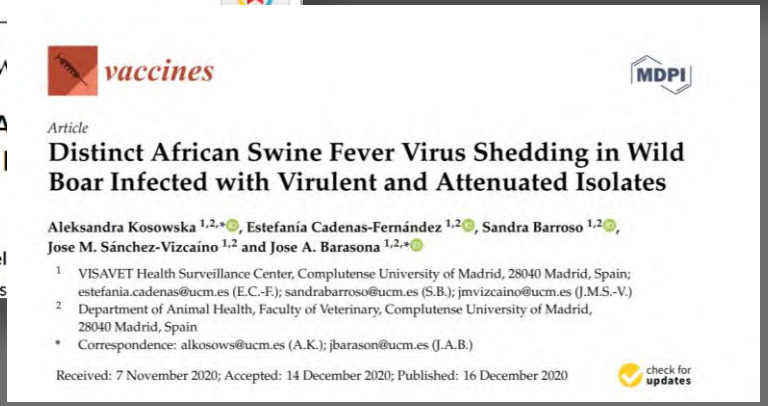
Received: 28 November 2018 | Revised: 21 December 2018 | Accepted: 17 January 2019

DOI: 10.1111/tbed.13132

SHORT COMMUNICATION

Attenuated and non-haemadsorbing (non-HA African swine fever virus (ASFV) isolated in 2017

Carmina Gallardo[1] | Alejandro Soler[1] | Ieva Rodze[2] | Raquel Cristina Cano-Gómez[1] | Jovita Fernandez-Pinero[1] | Marisa Arias



vaccines

MDPI

Article

Distinct African Swine Fever Virus Shedding in Wild Boar Infected with Virulent and Attenuated Isolates

Aleksandra Kosowska[1,2,*], Estefanía Cadenas-Fernández[1,2], Sandra Barroso[1,2], Jose M. Sánchez-Vizcaíno[1,2] and Jose A. Barasona[1,2,*]

[1] VISAVET Health Surveillance Center, Complutense University of Madrid, 28040 Madrid, Spain; estefania.cadenas@ucm.es (E.C.-F.); sandrabarroso@ucm.es (S.B.); jmvizcaino@ucm.es (J.M.S.-V.)
[2] Department of Animal Health, Faculty of Veterinary, Complutense University of Madrid, 28040 Madrid, Spain
* Correspondence: alkosows@ucm.es (A.K.); jbarason@ucm.es (J.-A.B.)

Received: 7 November 2020; Accepted: 14 December 2020; Published: 16 December 2020

check for updates

All Low virulent field isolates retain residual virulence

Vaccines based on low virulent field isolates

Need further attenuation / safety measures

USDA

Live attenuated vaccines (LAV) are effective preventing homologous challenge

Attenuated isolates were produced by:

- ~~Low virulence field isolates~~
- Viruses attenuated by tissue culture passages
- Viruses with genetically engineered deletions

Live attenuated vaccines (LAV) are effective preventing homologous challenge

ASFV attenuated by cell culture passage

Journal of Virology February 2015 Volume 89 Number 4

JVI Journals.ASM.org

The Progressive Adaptation of a Georgian Isolate of African Swine Fever Virus to Vero Cells Leads to a Gradual Attenuation of Virulence in Swine Corresponding to Major Modifications of the Viral Genome

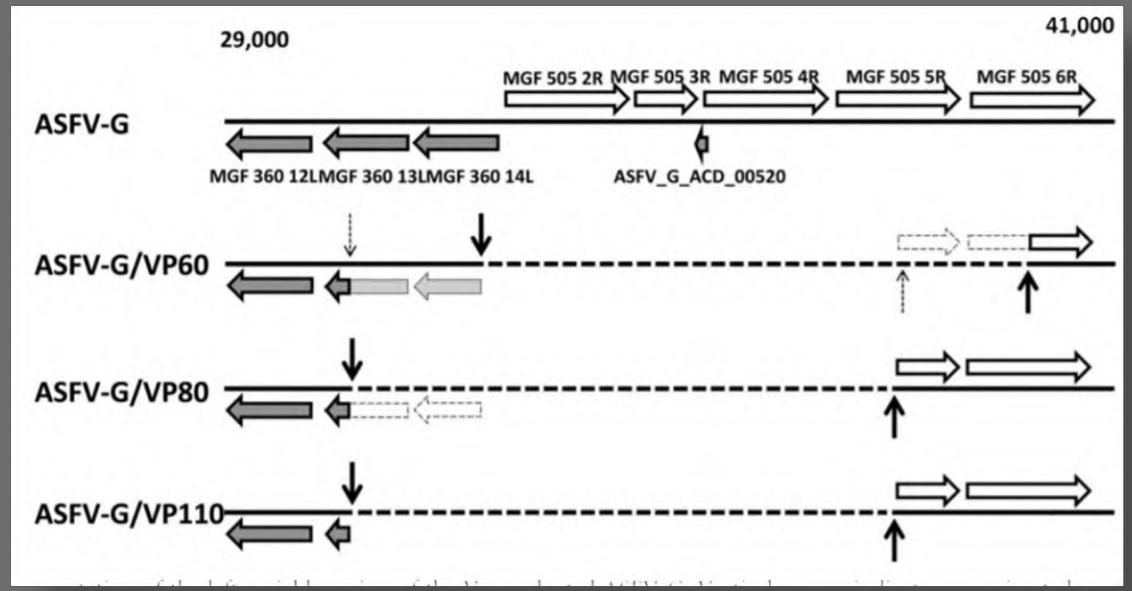
Peter W. Krug,[a] Lauren G. Holinka,[a] Vivian O'Donnell,[a,b] Bo Reese,[c] Brenton Sanford,[a] Ignacio Fernandez-Sainz,[a,b] Douglas P. Gladue,[a,b] Jonathan Arzt,[a] Luis Rodriguez,[a] Guillermo R. Risatti,[b] Manuel V. Borca[a]

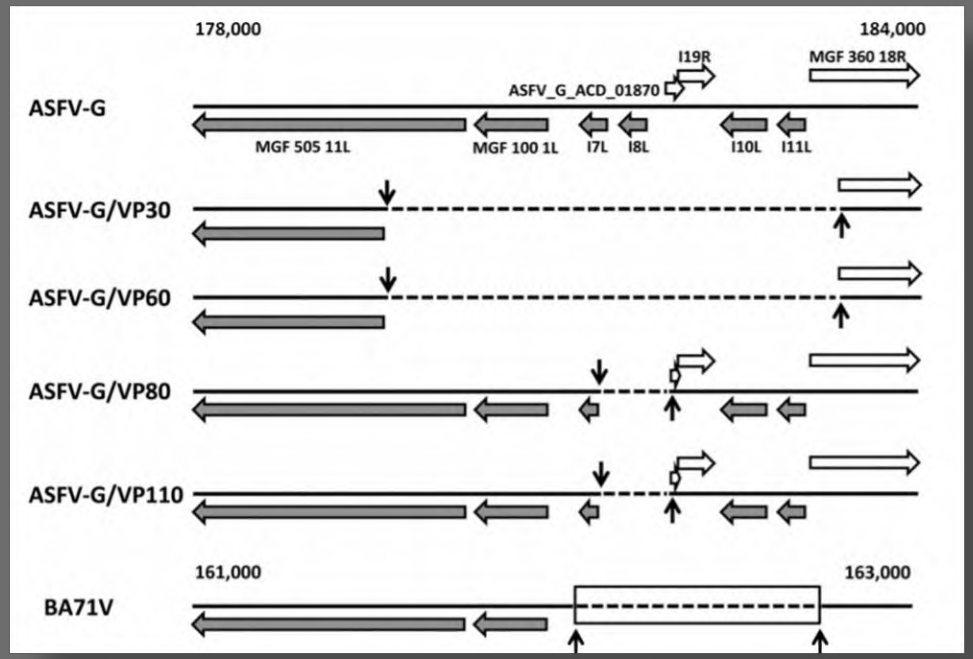
Agricultural Research Service, U.S. Department of Agriculture, Plum Island Animal Disease Center, Greenport, New York, USA[a]; Department of Pathobiology and Veterinary Science, CANR, University of Connecticut, Storrs, Connecticut, USA[b]; Center for Applied Genetics and Technology, University of Connecticut, Storrs, Connecticut, USA[c]

TABLE 1 Swine survival and fever response following infection with ASFV-G/V viruses and parental ASFV-G virus

Dose and virus	No. of survivors/total	Mean (SD) Time to death (days)	Fever: No. of days to onset	Fever: Duration (days)	Fever: Max daily temp (°F)
10^2 HAD_{50}					
ASFV-G	0/7	8.4 (0.56)	6.14 (1.57)	2.88 (0. 69)	107.1 (0.59)
ASFV-G/VP30	3/5	11.5 (0.7)	8.8 (1.3)	3. 4 (0.89)	105.42 (1.25)
ASFV-G/VP60	5/5				103.72 (0.12)
ASFV-G/VP80	5/5				103.18 (0.86)
ASFV-G/VP110	5/5				102.7 (0.22)
10^4 HAD_{50}					
ASFV-G	0/5	7.32 (1.03)	3.67 (0.52)	3.67 (0.82)	107.4 (0.52)
ASFV-G/VP30	0/5	8 (0.71)	3.6 (0.55)	4.4 (1.14)	106.5 (0.14)
ASFV-G/VP60	0/5	8.75 (0.5)	4 (0.0)	4.25 (0.5)	107.15 (0.34)
ASFV-G/VP80	0/5	9. 5 (0.5)	7 (0.25)	2.25 (0.5)	105.12 (1.06)
ASFV-G/VP110	5/5				102.4 (0.17)

USDA





Virus adaptation to grow in cell lines implies dramatic genomic changes that result in the inability for the attenuated virus to replicate in swine (not vaccines)

USDA

Live attenuated vaccines (LAV) are effective preventing homologous challenge

ASFV attenuated by cell culture passage

viruses

MDPI

Article

A Cell-Adapted Live-Attenuated Vaccine Candidate Protects Pigs against the Homologous Strain VNUA-ASFV-05L1, a Representative Strain of the Contemporary Pandemic African Swine Fever Virus

Quang Lam Truong [1,*,†], Lihua Wang [2,†], Tuan Anh Nguyen [1], Hoa Thi Nguyen [1], Son Danh Tran [1], Anh Thi Vu [1], Anh Dao Le [1], Van Giap Nguyen [3], Phuong Thi Hoang [1], Yen Thi Nguyen [1], Thi Luyen Le [1], Thang Nguyen Van [1], Thi My Le Huynh [3], Huong Thi Lan Lai [1], Rachel Madera [2], Yuzhen Li [2], Jishu Shi [2,*] and Lan Thi Nguyen [1,*]

viruses

MDPI

Article

African Swine Fever Vaccine Candidate ASFV-G-ΔI177L Produced in the Swine Macrophage-Derived Cell Line IPKM Remains Genetically Stable and Protective against Homologous Virulent Challenge

Manuel V. Borca [1,2,*], Ayushi Rai [1,3], Nallely Espinoza [1,2], Elizabeth Ramirez-Medina [1,2], Edward Spinard [1,2], Lauro Velazquez-Salinas [1,2], Alyssa Valladares [1,3], Ediane Silva [2], Leeanna Burton [2], Amanda Meyers [1,3], Cyril G. Gay [4] and Douglas P. Gladue [1,2,*]

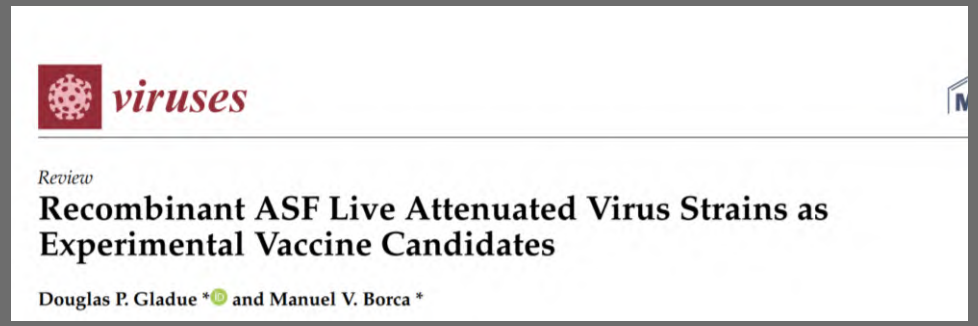
IPKM is first cell line to not induce changes in ASFV

Good for existing vaccine canidates

Live attenuated vaccines (LAV) are effective preventing homologous challenge

Attenuated isolates were produced by:

- ~~Low virulence field isolates~~
- ~~Viruses attenuated by tissue culture passages~~
- Viruses with genetically engineered deletions


viruses

Review

Recombinant ASF Live Attenuated Virus Strains as Experimental Vaccine Candidates

Douglas P. Gladue * and Manuel V. Borca *

USDA

African swine fever virus genome

Virus Research 266 (2019) 25–33

Contents lists available at ScienceDirect

Virus Research

journal homepage: www.elsevier.com/locate/virusres

African swine fever virus evasion of host defences

L.K. Dixon*, M. Islam, R. Nash, A.L. Reis

Table 1
Non-essential genes identified on the African swine fever virus genome.

A Gene Deleted	B Function	C Isolate	D Growth in cells	E Virulence in pigs	F Ref.
DNA repair pathway, genome integrity and nucleotide metabolism					
Q174L	DNA repair polymerase X	BA71 V (a)	Required for efficient macrophage growth	ND	(Redrejo-Rodriguez et al., 2013)
E296R	AP endonuclease	BA71 V (a)	Required for macrophage growth	ND	(Redrejo-Rodriguez et al., 2006)
E165R	dUTPase	BA71 V (a)	Required for macrophage growth	ND	(Oliveros et al., 1999)
A240L	Thymidine kinase	Malawi (v) Haiti (v)	Required for macrophage growth	Attenuated Partial protection	(Sanford et al., 2016)
Type I Interferon Response					
MGF360 MGF 505/530	Type I Interferon Inhibitors	Benin 97/1(v)	No effect	Attenuated Good protection	(Reis et al., 2016)
MGF360 MGF 505/530	Type I Interferon Inhibitors	Pr4 (v)	No effect	Attenuated Good protection	(Zsak et al., 2001)
MGF360 MGF 505/530	Type I Interferon Inhibitors	Georgia (v)	No effect	Attenuated Good protection	(O'Donnell et al. (2015b))
DP96R(UK)	IFN inhibitor	Malawi (v)	No effect	Attenuated Induced protection	(Zsak et al., 1998)
EP402R/CD2v	Binding to red blood cells	BA71 (v)	No effect	Attenuated Good protection	(Monteagudo et al., 2017)
EP402R/CD2v/8-DR	Binding to red blood cells	Malawi LIL20/1(v)	No effect	Delay in clinical signs	(Borca et al., 1998)
B119L(9GL)	morphogenesis	Malawi (v)	Reduced replication	Attenuated Induced protection	(Lewis et al., 2000)
B119L(9GL)	morphogenesis	Georgia (v)	Reduced replication	At low doses attenuated and Induced protection	(O'Donnell et al. (2015c))
DP96R(UK) B119L (9GL)		Georgia (v)	Reduced replication	Attenuated Induced protection	(O'Donnell et al. (2017))
MGF 360 MGF 505/530 9GL	IFN inhibitor morphogenesis	Georgia (v)	Reduced replication	Attenuated No protection	(O'Donnell et al. (2016))
A224 L/4CL	IAP apoptosis inhibitor	Malawi (v)	No effect	No reduction in virulence	(Neilan et al., 1997a; Reis et al., 2017)
DP71 L/NL		Malawi (v) Pr4 (v)			(Afonso et al., 1998a)
DP71 L/NL		E70 (v)		Attenuated Induced protection	(Afonso et al., 1998a)
I83L	IL-1beta binding protein	Georgia (v)	No effect	No reduction in virulence	(Borca et al., 2018)
DP148R		Benin 97/1 (v)	No effect	Attenuated Induced protection	(Reis et al., 2017)
EP153R	C-type lectin	Malawi (v)	No effect	No reduction in virulence	(Neilan et al., 1999)
A238L	Inhibitor of inflammatory responses	Malawi (v)	No effect	No reduction in virulence	(Neilan et al., 1997b)
L11L	Transmembrane	Malawi (v)	No effect	No reduction in virulence	(Kleiboeker et al., 1998)

In 2019

- Only 16 different genes have been deleted from any ASFV strain.
- 7 genes associated with virulence
  - 9GL, NL, UK, MGF, DP148R, TK, CD2
- 5 genes attenuated field isolates
- 9GL, NL, UK, MGF, DP148R

Single gene deletions in ASFV that resulted in no phenotype

Gene	Isolate	Reference
A224L (4CL)	Malawi	[61]
A859L	Georgia	[62]
C962R	Georgia	[63]
CD2	Georgia	[30]
E165R	Ba71V	[64]
E296R	Ba71V	[65]
H240R	HLJ/2018	[66]
I8L	Georgia	[67]
KP117R (p22)	Georgia	[68]
L11L	Malawi	[69]
L83L	Georgia	[70]
MGF360 13L-14L	Georgia	[71]
MGF100-1R	GZ201801	[72]
MGF110-1L	Georgia	[73]
MGF360-16R	Georgia	[74]
MGF-360-1L	Georgia	[75]
Q174L	Ba71V	[76]
X69R	Georgia	[77]

E165R, E296R, H240R and Q174L were not tested in swi

Gladue & Borca. Viruses. 2022 Apr 23;14(5):878

Many genes can be deleted from ASFV without affecting

- Growth in cell cultures
- Virulence in swine
- Often indistinguishable from WT ASFV

African swine fever virus virulence determinants

- 7 genes historically associated with virulence introduced into ASFV-G
  - 9GL, NL, UK, MGF, DP148R, TK, CD2
-

Table 2. Determinants of virulence that did not fully attenuate ASFV-G.

Gene Deleted	Fully Attenuated	Protection
NL-S	No	-
UK	No	-
TK	Yes	No
9GL	Low doses, higher doses lethal	Yes
DP148R	No	-
CD2	No	-

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  - Clear that new determinants of virulence were needed to attenuate ASFV-G

USDA

Genetic Deletions that Attenuate ASFV-Georgia

Table 5. Genetic deletions in ASFV-Georgia viruses resulting in experimental vaccines.

Gene Deleted	Dose Tested with Full Attenuation	Homologous Protection	Challenge Route and Dose	Reference
9GL	10^2, 10^3	Yes	IM 10^2	[35]
9GI, UK	10^2, 10^4, 10^6	Yes	IM 10^3	[48]
A137	10^4, 10^7	Yes	IM 10^2	[46]
CD2, UK	10^4	Yes	IM 10^2	[49]
DI 177L/DLVR *	10^2, 10^4, 10^6	Yes	IM 10^2	[39]
I177L	10^2, 10^4, 10^6	Yes	IM 10^2	[36–38]
I1226R	10^2	Yes	IM 10^4	[45]
Multiple MGF *	10^2, 10^4	Yes	IM 10^3	[25,51]

* multiple MGF consists of a deletion of 6 MGF genes.

- No standard for testing ASFV genetic deletions for attenuation, different doses for attenuation, different challenge doses/ route of challenge
- Hard to compare studies from different laboratories

Genetic Deletions that Attenuate ASFV-Georgia

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Gene Deleted	Dose Tested with Full Attenuation	Homologous Protection	Challenge Route and Dose	Reference
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CD2, UK	10^4	Yes	IM 10^2	[49]
DI.177L/DLVR *	10^2, 10^4, 10^6	Yes	IM 10^2	[39]
I177L	10^2, 10^4, 10^6	Yes	IM 10^2	[36–38]
I1226R	10^2	Yes	IM 10^4	[45]
Multiple MGF *	10^2, 10^4	Yes	IM 10^3	[25,51]

* multiple MGF consists of a deletion of 6 MGF genes.

Gladue & Borca. Viruses. 2022 Apr 23;14(5):878

NAVETCO Vaccine is based on the ASFV-G-ΔI177L Co-Developed with the USDA

Safe and Effective Vaccine for ASFV

African swine fever virus virulence determinants

Table 3. Determinants of virulence that attenuate ASFV-Georgia-derived viruses.

Gene Deleted	Fully Attenuated	Homologous Protection	Reference
9GL	Low doses, higher doses lethal	Yes	[35]
9Gl, UK	Yes	Yes	[48]
A137	Yes, only low doses tested	Yes	[46]
CD2, UK	Yes	Yes	[49]
E184L	No	Surviving animals	[47]
I177L	Yes	Yes	[36–38]
I226R	Yes	Yes	[45]
I267L	No	-	[43,44]
L7L–L11L *	No	Surviving animals	[50]
MGF-110-9L	Partial at low doses	-	[40]
MGF360-9L	Partial at low doses	-	[42]
MGF-505-7R	Yes, only low doses tested	-	[41]
Multiple MGF #	Yes	Yes	[25,51]
QP509L/QP383R	Yes	No	[52]

* L7L-L11L consists of genes L7L, L8L, L9R, L10L, L11L; # multiple MGF consists of a deletion of 6 MGF genes.

Gladue & Borca. Viruses. 2022 Apr 23;14(5):878

MGF: Multigene Family

- Five Family Members: 100, 110, 300, 360, 505
- Varying number and combinations of MGF genes in Sequenced ASFV genomes.

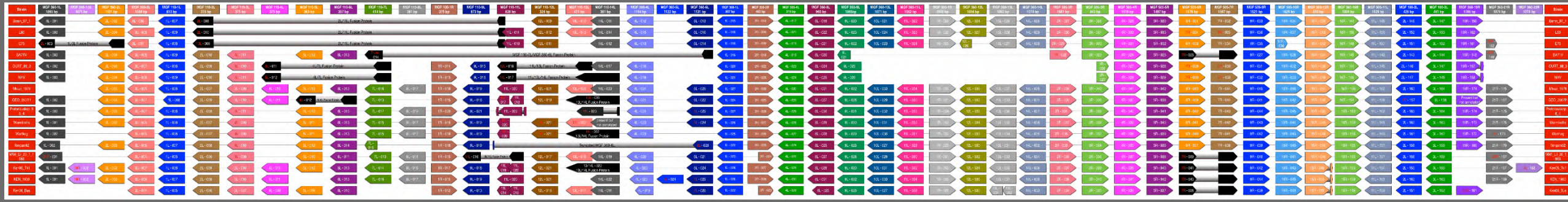

Image : Home - Viral Bioinformatics Research Centre (4virology.net)

Sequence and Organization of the Left Multige
Vero-adapted L60V Strain of African

SANDRA PIRES, GRAÇA RIBEIRO*, &
Laboratory of Molecular Virology, Gulbenkian Institu

Received March 10, 1997; Accepted Jun

JVI
Journals.ASM.org

The Progressive Adap
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in Swine Correspondi

Peter W. Krug,[a] Lauren G. Holinka,[a] Vivia
Douglas P. Gladue,[a,b] Jonathan Arzt,[a] Lui
Agricultural Research Service, U.S. Department of Ag
Science, CANHR, University of Connecticut, Storrs, C

Journal of General Virology (1993), 74, 2125–2130. *Printed in Great Britain*

**Duplicated genes within the variable rig
pathogenic isolate of African swine feve**

**Soopayah Vydelingum,[1] Sally A. Baylis,[2†] Chrissy Br
and Linda K. Dixon[1*]**

JOURNAL OF VIROLOGY, Apr. 2002, p. 3095–3104
0022-538X/02/$04.00+0 DOI: 10.1128/JVI.76.7.3095–3104.2002
Vol. 76, No. 7

Novel Swine Virulence Determinant in the Left Variable Region of the African Swine Fever Virus Genome

J. G. Neilan,* L. Zsak, Z. Lu, G. F. Kutish, C. L. Afonso, and D. L. Rock
Plum Island Animal Disease Center, Agricultural Research Service, United States Department of Agriculture, Greenport, New York 11944-0848

Received 15 October 2001/Accepted 18 December 2001

RESEARCH ARTICLE

Genome Sequence of African S
Virus BA71, the Virulent Parent
the Nonpathogenic and Tissue
Adapted BA71V

**Javier M. Rodríguez[2]*, Leticia Tais Moreno[3na], Alí Alejo[1nb], A
Fernando Rodríguez[4], María L. Salas[1]***

1 Centro de Biología Molecular Severo Ochoa (Consejo Superior de Inve

Arch Virol (1987) 97: 333–346

African swine fever virus D
adaptation to growt

E. Tabarés[1], I. Olivares[1], G. S
and M

JOURNAL OF VIROLOGY, Mar. 2004, p. 2445–2453
0022-538X/04/$08.00+0 DOI: 10.1128/JVI.78.5.2445–2453.2004

African Swine Fever Virus Multigene
Virus Replication and Generaliz
Ornithodoros porcinu

T. G. Burrage, Z. Lu, J. G. Neilan, D. L
*Plum Island Animal Disease Center, Agricultural Research Se
Greenport, New York 11944-0848*

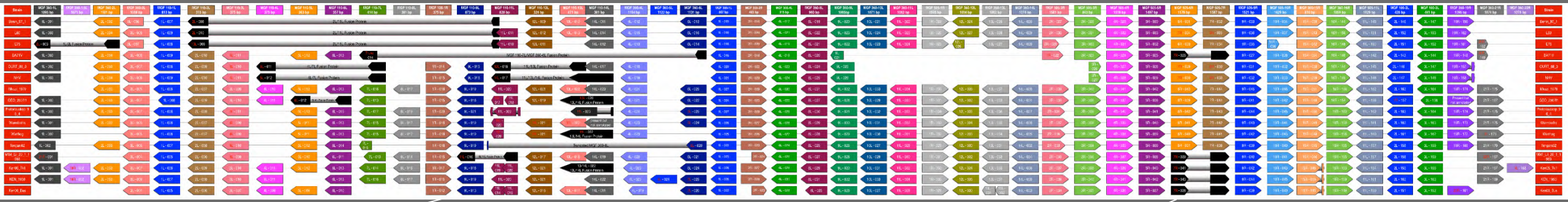
Received 7 August 2003/Accepted 29 October 2003

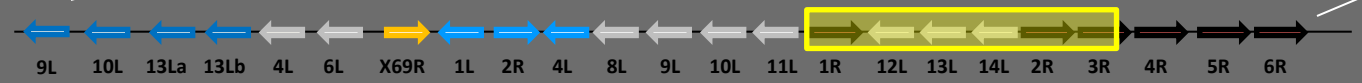
JOURNAL OF VIROLOGY, Apr. 2001, p. 3066–3076
0022-538X/01/$04.00+0 DOI: 10.1128/JVI.75.7.3066–3076.2001
Vol. 75, No. 7

African Swine Fever Virus Multigene Family 360 and 530 Genes Are Novel Macrophage Host Range Determinants

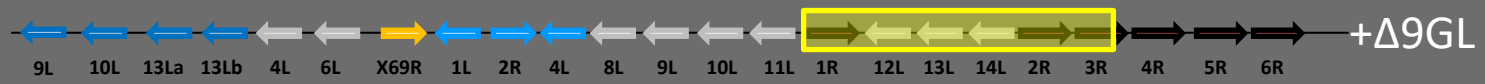
L. ZSAK,* Z. LU, T. G. BURRAGE, J. G. NEILAN, G. F. KUTISH, D. M. MOORE, AND D. L. ROCK
Plum Island Animal Disease Center, Agricultural Research Service, U.S. Department of Agriculture, Greenport, New York 11944-0848

Received 10 November 2000/Accepted 10 January 2001





Vaccine



Attenuated, not a vaccine

African Swine Fever Virus Georgia Isolate Harboring Deletions of MGF360 and MGF505 Genes Is Attenuated in Swine and Confers Protection against Challenge with Virulent Parental Virus

Vivian O'Donnell,[a,b] Lauren G. Holinka,[a] Douglas P. Gladue,[a,b] Brenton Sanford,[a] Peter W. Krug,[a] Xiqiang Lu,[c] Jonathan Arzt,[a] Bo Reese,[d] Consuelo Carrillo,[e] Guillermo R. Risatti,[b] Manuel V. Borca[a]

Agricultural Research Service[a] and APHIS,[e] USDA, Plum Island Animal Disease Center, Greenport, New York, USA; DHS, Plum Island Animal Disease Center, Greenport, New York, USA[c]; Department of Pathobiology and Veterinary Science, CAHNR,[b] and Center for Genome Innovation,[d] University of Connecticut, Storrs, Connecticut, USA

Contents lists available at ScienceDirect

Virus Research

journal homepage: www.elsevier.com/locate/virusres

African swine fever virus Georgia isolate harboring deletions of 9GL and MGF360/505 genes is highly attenuated in swine but does not confer protection against parental virus challenge

Vivian O'Donnell[a,c], Lauren G. Holinka[a], Brenton Sanford[b], Peter W. Krug[a], Jolene Carlson[a,c], Juan M. Pacheco[b], Bo Reese[d], Guillermo R. Risatti[c], Douglas P. Gladue[a], Manuel V. Borca[a,*]

[a] Agricultural Research Service, Plum Island Animal Disease Center, Greenport, NY 11944, USA

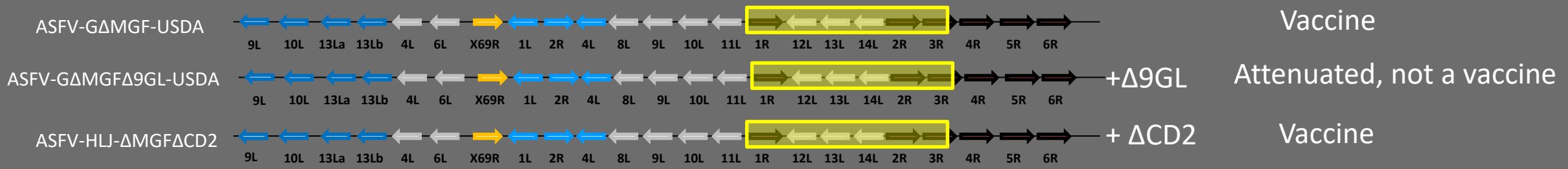
ASFV-G-ΔMGF

- Deletion of 6 MGF genes
- Protective at single low dose
- No clinical symptoms at higher doses one day of mild fever

ASFV-G-ΔMGFΔ9GL

- Deletion of 6 MGF genes and 9GL
- Full Attenuation
- No replication in swine
- Addition on 9GL to MGF : Not a Vaccine

MGF: Multigene Family



Springer Link

Research Paper | Published: 01 March 2020

A seven-gene-deleted African swine fever virus is safe and effective as a live attenuated vaccine in pigs

Weiye Chen, Dongming Zhao, Xijun He, Renqiang Liu, Zilong Wang, Xianfeng Zhang, Fang Li, Dan Shan, Hefeng Chen, Jiwen Zhang, Lulu Wang, Zhiyuan Wen, Xijun Wang, Yuntao Guan, Jinxiong Liu & Zhigao Bu

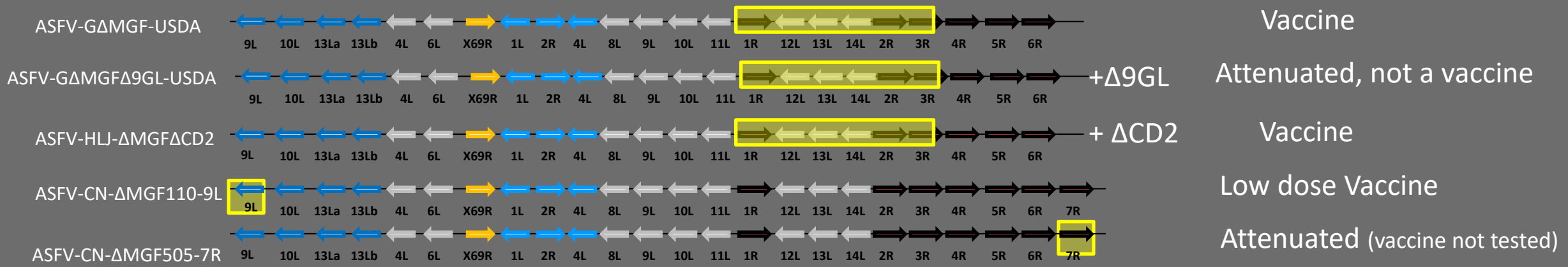
Science China Life Sciences (2020) | Cite this article

193 Accesses | 29 Altmetric | Metrics

HLJ/18-7GD –(ΔMGF ΔCD2)

- Using the ASFV-G-ΔMGF-USDA
- Add deletion to CD2
- CD2 by itself is not attenuated (confirming Borca et.al)
- HLJ/18-7GD is protective
- Reversion to virulence: 5 passages in pigs
- Tested in pregnant sows
- Being tested in field trials in China

MGF: Multigene Family



RESEARCH ARTICLE

African Swine Fever Virus MGF-110-9L-deficient Mutant Has Attenuated Virulence in Pigs

Dan Li[1] · Yinguang Liu[1] · Xiaolan Qi[1] · Yuan Wen[1] · Pan Li[1] · Zhao Ma[1] · Yongjie Liu[1] · Haixue Zheng[1] · Zhijie Liu[1]

Received: 18 July 2020 / Accepted: 17 December 2020

The Journal of Immunology

African Swine Fever Virus MGF-505-7R Negatively Regulates cGAS–STING-Mediated Signaling Pathway

Dan Li, Wenping Yang, Lulu Li, Pan Li, Zhao Ma, Jing Zhang, Xiaolan Qi, Jingjing Ren, Yi Ru, Qingli Niu, Zhijie Liu, Xiangtao Liu and Haixue Zheng

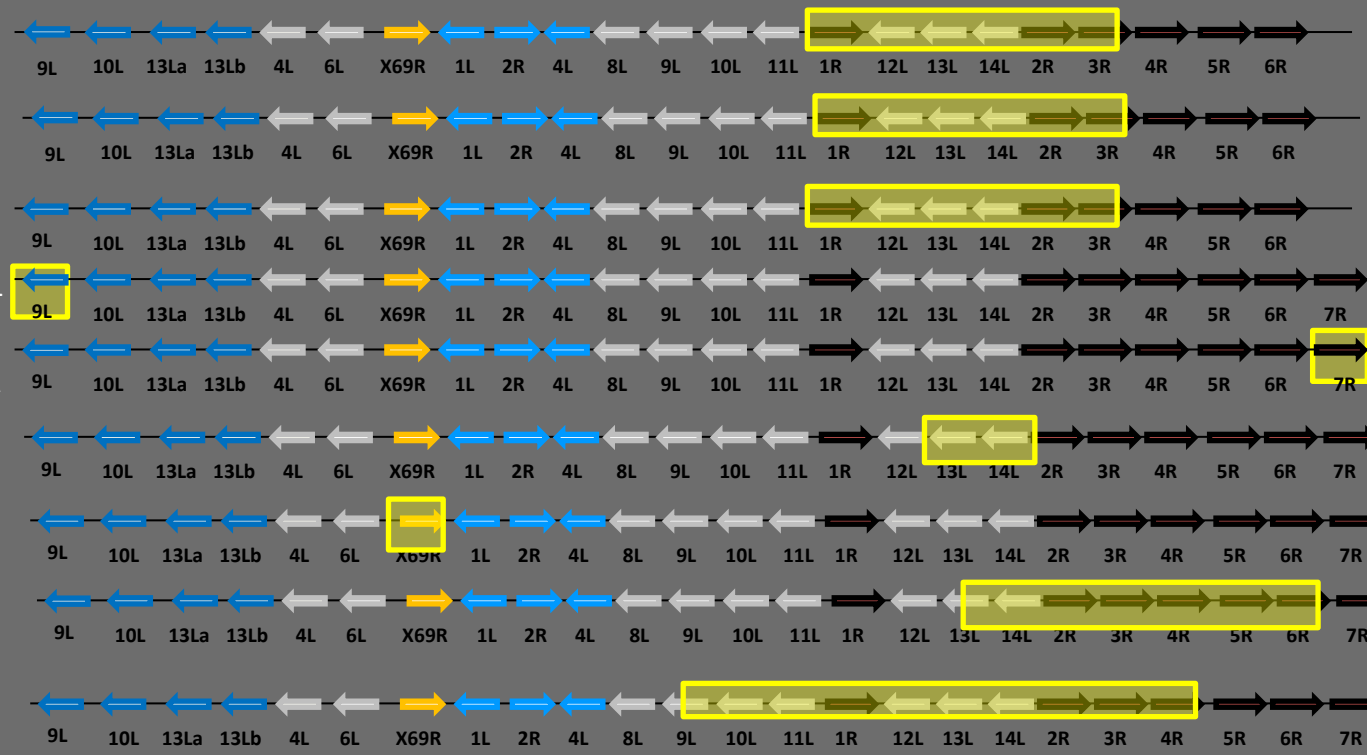
ASFV-CN/GS/2018-ΔMGF110-9L

- Attenuated in swine at very low doses (HAD10)
- Challenged animals survived
- Vaccine detected in nasal swabs (possible shedding)
- Higher doses not tested

ASFV-CN/GS/2018-ΔMGF505-7R

- Attenuated in swine at very low doses (HAD10)
- Higher doses or vaccine efficacy not tested

MGF: Multigene Family



		Vaccine
	+Δ9GL	Attenuated, not a vaccine
	+ ΔCD2	Vaccine
		Low dose Vaccine
		Attenuated (vaccine not tested)
		Virulent
		Virulent
	+ΔL7L-L11L	Attenuated: Not a vaccine
		Partial Protection

SCIENTIFIC

OPEN

Development of strain that retain cause disease in

Received: 14 December 2016
Accepted: 24 March 2017

Manuel V. Borca[1], Vivian O'Donnell[1,2], Laure Guillermo R. Risatti[1] & Douglas P. Gladue[1]

viruses

Brief Report

X69R Is a Non-Essential Gene That, W from African Swine Fever, Does Not A in Swine

Elizabeth Ramirez-Medina [1,2,†], Elizabeth Vuono [1,3,†], Sarah Pruitt [1], Ediane Silva [1,4], James Zhu [1], Lauro Velazquez-Salinas [1,4], Douglas I Manuel V. Borca [1,*]

JVI Journals.ASM.org

Journal of Virology February 2015 V

The Progressive Adaptation of a Georgian Isolate of African S Fever Virus to Vero Cells Leads to a Gradual Attenuation of V in Swine Corresponding to Major Modifications of the Viral G

Peter W. Krug,[a] Lauren G. Holinka,[a] Vivian O'Donnell,[a,b] Bo Reese,[c] Brenton Sanford,[a] Ignacio Fernandez-Sainz,[a,b] Douglas P. Gladue,[a,b] Jonathan Arzt,[a] Luis Rodriguez,[a] Guillermo R. Risatti,[b] Manuel V. Borca[a]

Agricultural Research Service, U.S. Department of Agriculture, Plum Island Animal Disease Center, Greenport, New York, USA[a]; Department of Pathobi Science, CANR, University of Connecticut, Storrs, Connecticut, USA[b]; Center for Applied Genetics and Technology, University of Connecticut, Storrs,

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Vaccine

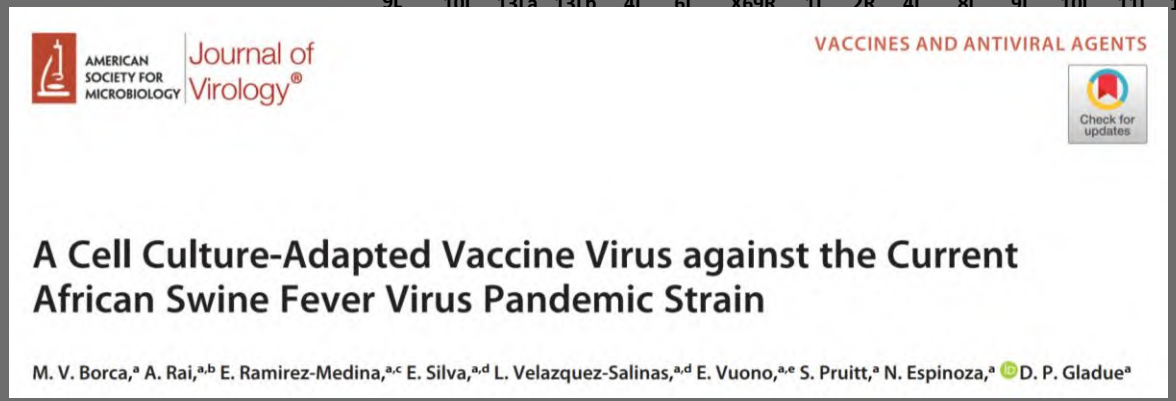
journal homepage: www.elsevier.com/locate/vaccine

Evaluation of protection induced by immunisation of domestic pigs with deletion mutant African swine fever virus BeninΔMGF by different doses and routes

Pedro J. Sánchez-Cordón [a,*], Tamara Jabbar [a], Margot Berrezaie [a], Dave Chapman [a,1], Ana Reis [a], Patricia Sastre [b], Paloma Rueda [b], Lynnette Goatley [a], Linda K. Dixon [a]

MGF: Multigene Family

ASFV-GΔMGF-USDA		Vaccine
ASFV-GΔMGFΔ9GL-USDA	+Δ9GL	Attenuated, not a vaccine
ASFV-HLJ-ΔMGFΔCD2	+ ΔCD2	Vaccine
ASFV-CN-ΔMGF110-9L		Low dose Vaccine
ASFV-CN-ΔMGF505-7R		Attenuated (vaccine not tested)
ASFV-G-ΔMGF-13/14L		Virulent
ASFV-G-ΔX69R		Virulent
ASFV-G-ΔVERO	+ΔL7L-L11L	Attenuated: Not a vaccine
ASFV-BeninΔMGF		Partial Protection
ASFV-G- ΔI177LΔLVR	+I177L	Vaccine



AMERICAN SOCIETY FOR MICROBIOLOGY | Journal of Virology®

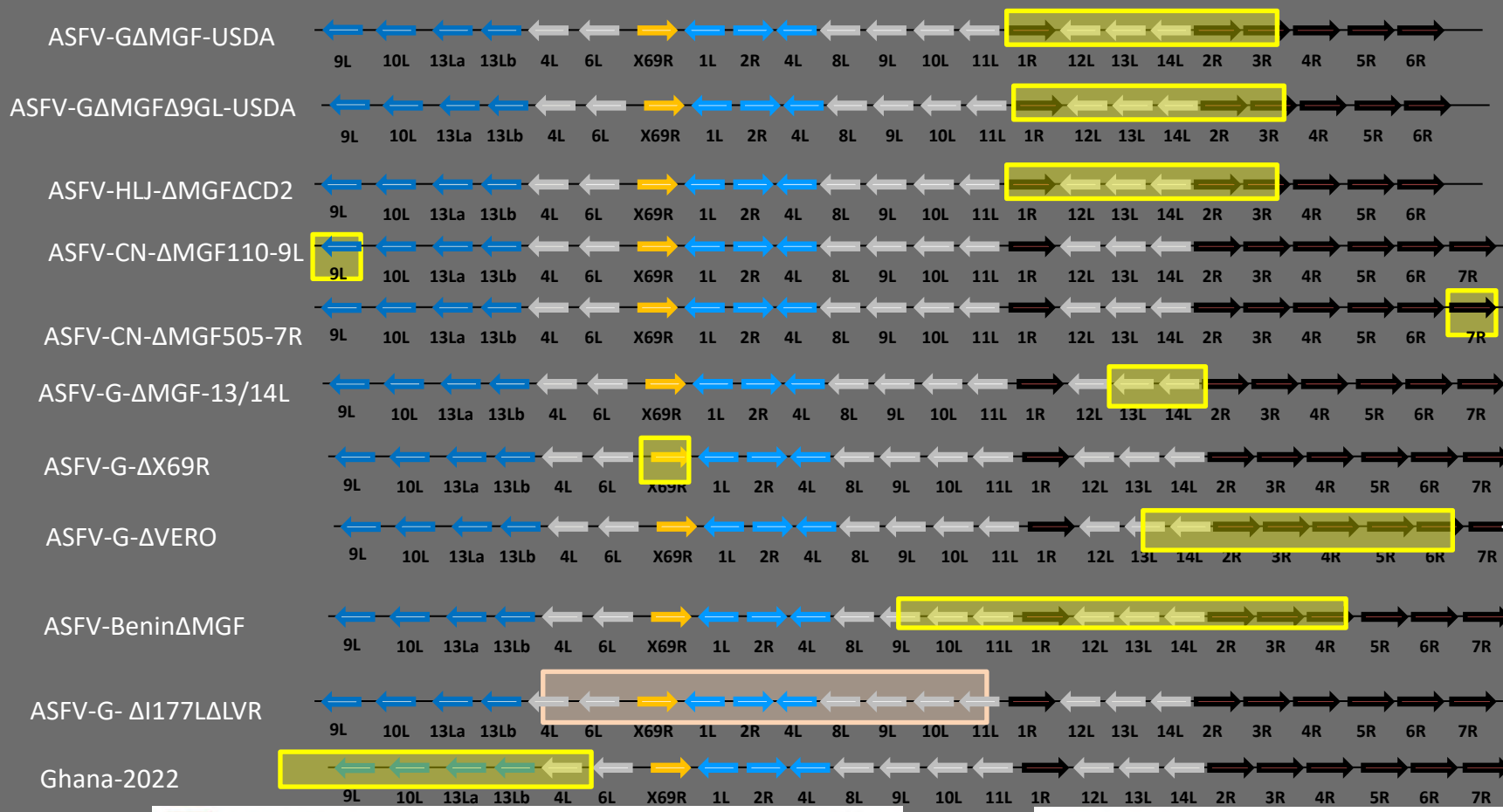
VACCINES AND ANTIVIRAL AGENTS

Check for updates

A Cell Culture-Adapted Vaccine Virus against the Current African Swine Fever Virus Pandemic Strain

M. V. Borca,[a] A. Rai,[a,b] E. Ramirez-Medina,[a,c] E. Silva,[a,d] L. Velazquez-Salinas,[a,d] E. Vuono,[a,e] S. Pruitt,[a] N. Espinoza,[a] D. P. Gladue[a]

MGF: Multigene Family



ASFV-GΔMGF-USDA		Vaccine
ASFV-GΔMGFΔ9GL-USDA	+Δ9GL	Attenuated, not a vaccine
ASFV-HLJ-ΔMGFΔCD2	+ ΔCD2	Vaccine
ASFV-CN-ΔMGF110-9L		Low dose Vaccine
ASFV-CN-ΔMGF505-7R		Attenuated (vaccine not tested)
ASFV-G-ΔMGF-13/14L		Virulent
ASFV-G-ΔX69R		Virulent
ASFV-G-ΔVERO	+ΔL7L-L11L	Attenuated: Not a vaccine
ASFV-BeninΔMGF		Partial Protection
ASFV-G- ΔI177LΔLVR	+I177L	Vaccine
Ghana-2022		Virulent

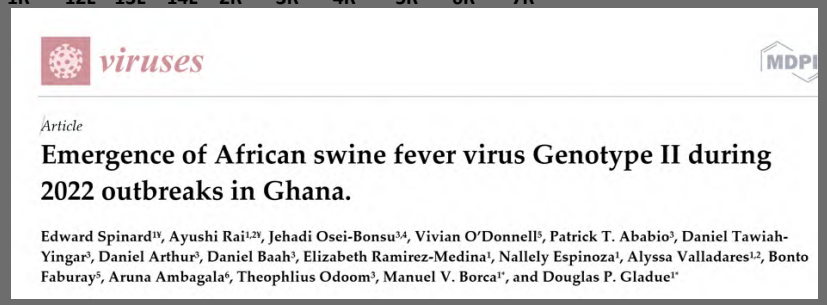
viruses

MDPI

Article

Characterization of a Novel African Swine Fever Virus p72 Genotype II from Nigeria

Aruna Ambagala [1,2,*], Kalhari Goonewardene [1], Lindsey Lamboo [1], Melissa Goolia [1], Cassidy Erdelyan [1], Mathew Fisher [1], Katherine Handel [1], Oliver Lung [1], Sandra Blome [3], Jacqueline King [3], Jan Hendrik Forth [3], Sten Calvelage [3], Edward Spinard [4], Douglas P. Gladue [4], Charles Masembe [5], Adeyinka J. Adedeji [6], Toyin Olubade [6], Nanven A. Maurice [6], Hussaini G. Ularamu [6] and Pam D. Luka [6,*]



viruses

MDPI

Article

Emergence of African swine fever virus Genotype II during 2022 outbreaks in Ghana.

Edward Spinard[1†], Ayushi Rai[1,2†], Jehadi Osei-Bonsu[3,4], Vivian O'Donnell[5], Patrick T. Ababio[3], Daniel Tawiah-Yingar[3], Daniel Arthur[3], Daniel Baah[3], Elizabeth Ramirez-Medina[1], Nallely Espinoza[1], Alyssa Valladares[1,2], Bonto Faburay[5], Aruna Ambagala[6], Theophlius Odoom[3], Manuel V. Borca[1*], and Douglas P. Gladue[1*]

- Not all ΔMGF deleted vaccines are the same
- Specific MGF deletions are Vaccines
- Additional deletions or genomic changes can severely effect vaccine efficacy
  - Different ΔMGF strains can go undetected if only analyzed by PCR

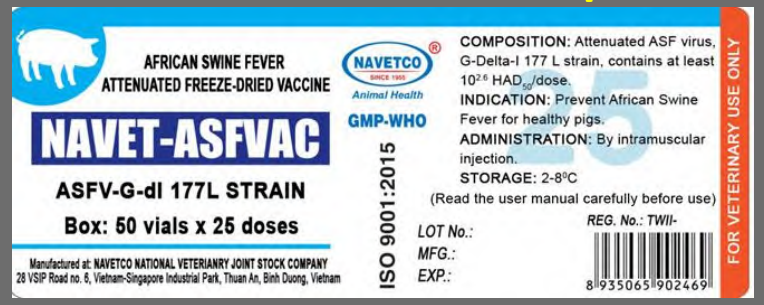
AVAC vaccine is based on the USDA ASFV-G-ΔMGF vaccine platform

Safe and Effective Vaccine for ASFV

World-Wide Standard for ASFV Vaccine?

- Currently there is no standard for ASFV vaccine
- First vaccines are required for standards to be developed

ASFV-G-ΔI177L is the first commercial produced vaccine for ASFV



ASFV-G-ΔMGF is the second commercial produced vaccine for ASFV

World-Wide Standard for ASFV Vaccine?

- Currently there is no standard for ASFV vaccine
- First vaccines are required for standards to be developed

USDA / WOAH: ASFV Vaccine International Standards