LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN
TIERÄRZTLICHE FAKULTÄT
ZENTRUM FÜR KLINISCHE TIERMEDIZIN
KLINIK FÜR SCHWEINE

Übersicht aus den aktuellen Arbeiten von den internationalen Schweinekongressen

M. Ritzmann
Klinik für Schweine
Ludwig-Maximilians-Universität München

Kongress 2023

Kongresse 2022

IPVS2022
25th international pig veterinary society congress - rio de janeiro - brazil

Kongress 2023

Vorträge

	n
PRRS	**14**
Biosicherheit	12
PED	**7**
Influenza	5
APP	3
enterale Erreger	3
andere Viren	**5**
Str. suis	2
AM/Fütterung	2

Zusätzlich:
- 10 Seminare
- 52 Vorträge von Industriepartnern
- 72 Poster

Schwerpunkte bei PRRS

- Epidemiologie
- **Isolate**
- Diagnostik
- Klinik
- Bekämpfung / **Elimination**

Vorträge

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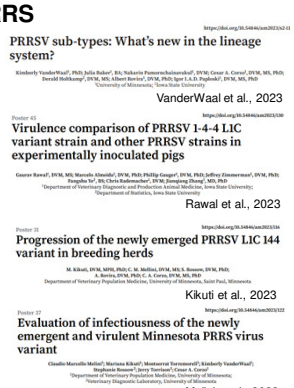
PRRS

PRRSV-2: Isolat L1C 1-4-4:

- seit 2020 insbesondere in Aufzucht und Mast vermehrt Anorexie, Fieber, Apathie und Todesfälle
- Aborte, Totgeburten, Mumien, hohe Saugferkelsterblichkeit


PRRSV sub-types: What's new in the lineage system?

VanderWaal et al., 2023

Virulence comparison of PRRSV 1-4-4 L1C variant strain and other PRRSV strains in experimentally inoculated pigs

Rawal et al., 2023

Progression of the newly emerged PRRSV L1C 144 variant in breeding herds

Kikuti et al., 2023

Evaluation of infectiousness of the newly emergent and virulent Minnesota PRRS virus variant

Melini et al., 2023

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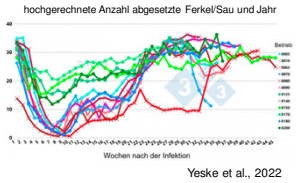

Yeske et al., 2022

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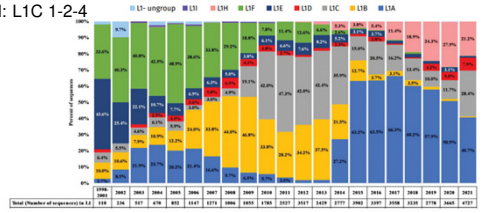
PRRS

PRRSV-2:

- L1 - L10
- „Untergruppen“: z.B. L1A - L1F und L1H - L1J
- hohe Dynamik bei phylogenetischen Klassifizierungen erkennbar
- aktuell: L1C 1-2-4

Refining PRRSV-2 genetic classification based on global ORF5 sequences and investigation of geographic distributions and temporal changes



Yim-im et al., 2023

PRRS

PRRSV-1: Isolat Rosalia:

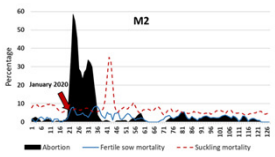
- seit 2020 hohe Mortalität in Aufzucht (z.T. bis 50%) und Mast
- hohe Abortrate, viele Totgeburten, Mortalität Sauen bis 25%

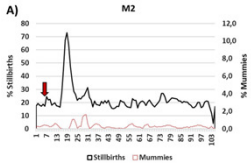
Emerging PRRS Virus Strains L1C 1-2-4 and Rosalia: Want to Learn More?

Shike, 2023

Introduction of a PRRSV-1 strain of increased virulence in a pig production structure in Spain: virus evolution and impact on production

Gerard E. Martín-Valls[1†], Martí Cortey[1†], Alberto Allepuz[2], Francesc Illas[3], Montserrat Tello[1] and Enric Mateu[1*]





Martin-Valls et al., 2023

PRRS

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- Ursprung vermutlich 2012 in Italien

Description of a New Clade within Subtype 1 of *Betaarterivirus suid 1* Causing Severe Outbreaks in Spain

Gerard E. Martín-Valls,* Martí Cortey,* Alberto Allepuz,* Francesc Illas,* Montse Tello,* Enric Mateu*

Martin-Valls et al., 2022

PRRS

Elimination: Rückblick Herbstsymposium 2015:

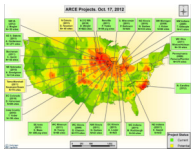
USA: ARCE (area regional control and elimination)

Dänemark: Betriebsebene
- insg. 7.400 Betriebe, ca. 2.100 mit Status PRRS frei
- Machbarkeitsstudie zur regionalen Eliminierung läuft

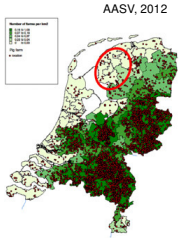
Frankreich: Betriebsebene + regionales Programm
- 13 Betriebe in Bretagne
- regionales Screening-Programm in Normandie

Niederlande: Betriebsebene + regionales Programm
- 2011 geplant, November 2012 begonnen
- 72 Betriebe (48 Besitzer) im Norden der Niederlande

Ungarn: staatliches Programm seit 2014



AASV, 2012



Duinhof, 2015

PRRS

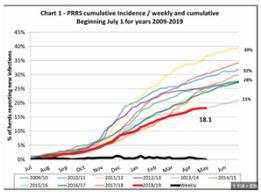
Elimination: aktueller Stand USA
- Monitoring
- Klassifizierung Betriebe
- Klassifizierung Region
- Kontroll-/Eliminationsprogramme

Next Generation of Voluntary PRRS Virus Regional Control Programs

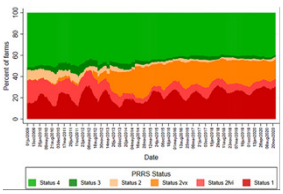
Edison S. Magalhães[1*], Jeffrey J. Zimmerman[1], Derald J. Holtkamp[1], Dyneah M. Classen[1], Douglas D. Groth[1], Lauren Glowzenski[1], Reid Phillips[1], Gustavo S. Silva[2] and Daniel C. L. Linhares[1]

[1] Department of Veterinary Diagnostic and Production Animal Medicine, College of Veterinary Medicine, Iowa State University, Ames, IA, United States, [2] Carthage Veterinary Service, Ltd., Carthage, IL, United States, [3] RCIab Foods Inc., Oakville, IA, United States, [4] Boehringer Ingelheim Animal Health USA Inc., Atlanta, GA, United States

Magalhães et al., 2021



AASV, 2019

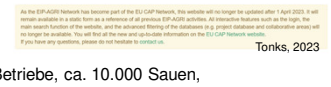


AASV, 2021

PRRS

Elimination: aktueller Stand Europa

PRRS Area Regional Control Programme



Tonks, 2023

Dänemark:
- 2019: 40 Betriebe, ca. 10.000 Sauen, ca. 40.000 Mastschweine: PRRS eliminiert
- 2022: Statuserhebung aller Betriebe (ca. 5.000)

	Starting point 2022	Goals	January 2023
Proportion of finishers declared seronegative for PRRSV at slaughter	25%	75%	46%
Proportion of sow herds declared seronegative for PRRSV	58%	85%	58%

Weber, 2023

Kusk et al., 2020

PRRS – PED

Elimination:

50+ years of US swine disease eradication

J. E. Connor, DVM, MS

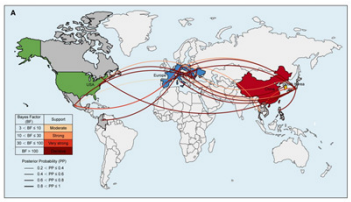
Table 1: Pathogens that can be eliminated

Virus	Bacteria	Parasite
Aujeszky's disease virus (pseudorabies virus)	*Actinobacillus pleuropneumoniae*	*Ascaris suis*
Classical swine fever (hog cholera)	*Bordetella bronchiseptica*	*Metastrongylus elongatus*
Foot-and-mouth disease	*Brachyspira hyodysenteriae*	*Oesophagostomum* spp.
Influenza A virus – swine	*Leptospira* sp.	*Sarcoptes scabei* var *suis*
Porcine deltacoronavirus	*Pasteurella multocida* toxigenic	*Stephanurus dentatus*
Porcine epidemic diarrhea virus 2		*Trichuris suis*
Porcine reproductive and respiratory syndrome virus		
Seneca Valley virus		
Transmissible gastroenteritis virus		
Vesicular exanthema		

50th Annual Meeting of the American Association of Swine Veterinarians (Orlando; March 9-12, 2019) 445

PED

„Akute“ Ausbrüche mit virulenten Stämmen:
- seit 2010 in China
- seit 2013 in USA
- seit 2014 in Deutschland

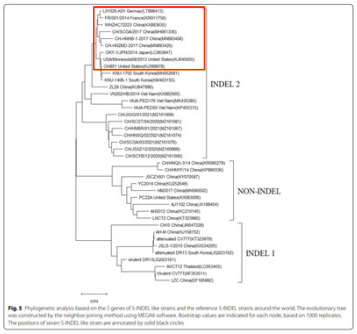


Zhang et al., 2023

PED

- INDEL in Europa
- non-INDEL derzeit in Asien dominierend
- rekombinante Isolate nachgewiesen

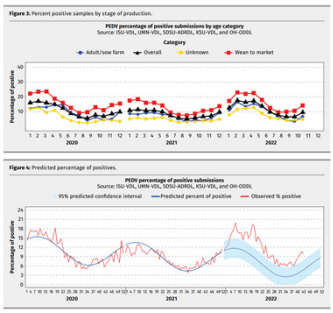
INDEL:
(Insertions- und Deletionsmutationen im für das Spike-Protein kodierenden Genabschnitt)



Zhuang et al., 2022

PED

- inzwischen endemisch
- jährlicher Ausbruch USA:
  2014: 15% der Betriebe
  2021: 8% der Betriebe
- Ausbrüche vorwiegend
  Januar bis März



Yeske, 2023

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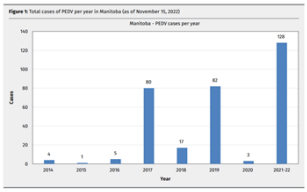
PED

- inzwischen endemisch
- jährlicher Ausbruch USA:
  2014: 15% der Betriebe
  2021: 8% der Betriebe
- Ausbrüche vorwiegend
  Januar bis März
- wellenförmig alle 2 Jahre?



Talbot, 2023

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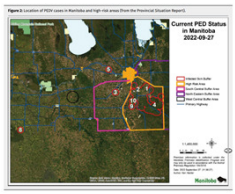
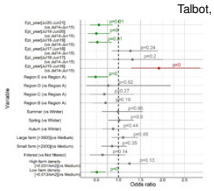
PED

- Risikofaktor Region (unabhängig von Schweinepopulation)
- Einschleppung häufig durch Jungsauen / Transporte



Talbot, 2023



Makau et al., 2022

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PED

Tenazität / Inaktivierung auf Aluminiumoberfläche:
- bei 20°C: 36 Stunden
- bei 50°C: 15 min

https://doi.org/10.54846/sm2023/14

Testing the efficacy of different combinations of time and temperature to inactivate PRRSV and PEDV

Mafalda Mil-Homens; Ethan Aljets; Rodrigo Paiva; Isadora Machado; Guilherme Cezar; Onyekachukwu Osemeke; Daniel Moraes; Swaminathan Jayaraman; Mckenna Brinning; Lauren Tidgren; Madison Durflinger; Mallory Wilhelm; Vivian Flores; Julie Frenier; Daniel Linhares; Jianqiang Zhang; Derald Holtkamp; Gustavo Silva
Veterinary Diagnostic and Production Animal Medicine, College of Veterinary Medicine, Iowa State University, Ames, Iowa

PRRSV:
- L1C 1-4-4 : bei 20°C: 36 Stunden
  bei 50°C: 15 min
- MN184: bei 20°C: 36 Stunden
  bei 50°C: 6 Stunden

PED

„controlled exposure / feedback“:
- rechtliche Vorgaben berücksichtigen
- wird zunehmend kritischer betrachtet:
  - Infektion negativer Tiere (JS)
  - Ausscheidung
  - virämische Ferkel
  - Erregermenge
  - andere Erreger (z.B. Rotaviren)
  - Tenazität (z.B. 1 Jahr in Gülle)

https://doi.org/10.54846/sm2023/178

PED controlled exposure: A critical tool

Luc Dufresne, DVM
Seaboard Foods, Shawnee Mission, Kansas

Dufrense, 2023

https://doi.org/10.54846/sm2023/179

PEDV exposure, a tool for elimination?

Karine Talbot, DVM
HyLife Ltd

Talbot, 2023

https://doi.org/10.54846/sm2023/180

Experiences in removing planned PEDV exposure for acclimatization in a large commercial production system

L. Glowzenski, VMD
Triumph Foods, Oakville, Iowa

Glowzenski, 2023

Analysis of the effect of feedback feeding on the farm-level occurrence of porcine epidemic diarrhea in Kagoshima and Miyazaki Prefectures, Japan

Taiki YAMAGAMI[1,2], Takeshi MIYAMA[2,3], Haruya TOYOMAKI[1,2], Satoshi SEKIGUCHI[4,5], Yosuke SASAKI[4,6], Masao SUEYOSHI[4] and Kohei MAKITA[1,2,3]

Yamagami et al., 2021

Article

Antibody Evaluation and Mutations of Antigenic Epitopes in the Spike Protein of the Porcine Epidemic Diarrhea Virus from Pig Farms with Repeated Intentional Exposure (Feedback)

Thu Hien Nguyen Thi [1,†], Chi-Chih Chen [1,†], Wen-Bin Chung [2], Hsu-Chi Chuang [2], Yen-Li Huang [3], Li-Ting Cheng [1,*] and Guan-Ming Ke [1,2,*]

Thi et al., 2022

PED

Vakzination:
- non-S INDEL Isolate besser geeignet als Impfstoffkandidaten?
- inaktivierte Impfstoffe
- Lebendimpfstoffe

https://doi.org/10.54846/sm2023/15

Attenuation phenotypes and protective efficacy of cell culture adapted PEDV non-S INDEL strain

L. Schumacher, DVM, PhD; Qi Chen, DVM, PhD; Holly Salzbrenner, DVM; Phillip Gauger, DVM, PhD; Jinhui Zhu, BS; Wannarat Yim-im, PhD; Mallory Wilhelm, BS; Ethan Aljets, BS; Gaurav Rawal, DVM, MS; Joseph Thomas, DVM, MS; Michael Welch, DVM, PhD; Drew Magstadt, DVM, MS; Jianqiang Zhang, MD, PhD
Department of Veterinary Diagnostic and Production Animal Medicine, College of Veterinary Medicine, Iowa State University, Ames, Iowa

Schumacher et al., 2023

Investigation and analysis of Porcine epidemic diarrhea cases and evaluation of different immunization strategies in the large-scale swine farming system

Xiaowen Li[1,2], Bingzhou Zhang[1,2], Jie Qing[1,2], Junxian Li[1], Jing Chen[1,2], Yang Li[1,2], Zhong Yan[1], Xiaofing Hu[1,2], Wensheng Wu[1], Zhichun Yan[1,2,*]
[1]Swine Research Institute of New Hope Liuhe Co., Ltd; [2]Shandong New hope Liuhe Agriculture and Animal Husbandry Technology Co. LTD., Dezhou, Shandong, China, lrw8272@163.com

Li et al., 2022

https://doi.org/10.54846/sm2022/173

Utilizing vaccine to reduce the duration and impact of sow farm porcine epidemic diarrhea (PED) outbreaks

B. Sexton, DVM
The Maschhoffs, Carlyle, Illinois

Sexton, 2022

PED

- Elimination

To eradicate or not to eradicate, that is the question!

I vividly remember the summer of 2013. That is when PEDV went through a significant part of our system. Initially the virus went through our Colorado system (likely through infected feed ingredients as we were one of the index cases). Then through the Panhandle of Oklahoma and Kansas, where in a matter of 3 weeks it infected over 150,000 sows and an estimated 2,000,000 pigs from 3 different companies. The infection was first detected in a finisher site and then started moving quickly through multiple sites due to vector spreading and area spread. We were able to detect PED genetic material over a distance of 10 miles during the outbreak. We believe that the situation was worsened by several factors:

1. High pig density combined with sows and growing pigs in the same area
2. Very large finisher multi-sites with low biosecurity containment within said multi-sites
3. High wind speeds with no natural barriers
4. Wide use of natural ventilation

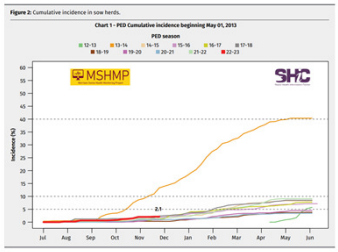
Dufrense, 2023

https://doi.org/10.54846/am2023/377

The time is now to eliminate porcine epidemic diarrhea virus (PEDV)

Paul Yeske, DVM, MS
Swine Vet Center, St. Peter, Minnesota

Figure 2: Cumulative incidence in sow herds.



Yeske, 2023

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PED – Senecavirus A

- Elimination

50+ years of US swine disease eradication

J. F. Connor, DVM, MS

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Porcine reproductive and respiratory syndrome virus		
Seneca Valley virus		
Transmissible gastroenteritis virus		
Vesicular exanthema		

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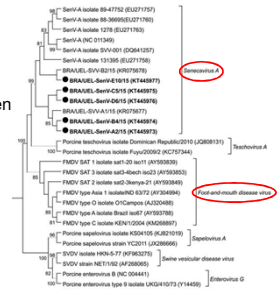
Senecavirus A

- Seneca Valley Virus (SVV)
- Seneca Valley (Seneca creek)
- Gaithersburg, Maryland
- im Jahr 2002 erstmals beschrieben
- zufällig in einer Zellkultur bei Suche nach viralen Vektoren

frontiers in Veterinary Science

A 5-Year Review of Senecavirus A in China since Its Emergence in 2015



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Senecavirus A

Nachweise mit Klinik:
- 2007: Kanada
- 2010: zuerst 1 Eber in USA
- 2014: Brasilien
- 2015: China

- Vesikuläre Krankheit
- IVD: idiopathic vesicular disease oder PIVD
- Fam. Picornaviridae
- Veränderungen vorwiegend an Rüsselscheibe, Kronsaum, Zunge
- klinisch kein Unterschied zu MKS

Senecavirus A

- Vorkommen MKS

MKS-Ausbrüche
Wiederkäuer 2018-2023

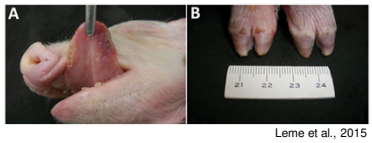
MKS-Ausbrüche
Schwein 2018-2023

WAHIS, 30.03.2023

Senecavirus A

experimentelle Infektionen:
- teilweise keine Klinik

Gründe:
- Isolat
- Alter der Tiere
- Infektionsdosis
- Infektionsroute



Leme et al., 2015

Buckley et al., 2018

Senecavirus A

experimentelle Infektionen:
- teilweise keine Klinik

Gründe:
- Isolat
- Alter der Tiere
- Infektionsdosis
- Infektionsroute

- Replikation in Tonsillen
- Virämie max. 7 Tage
- Virusausscheidung 1-35 Tage

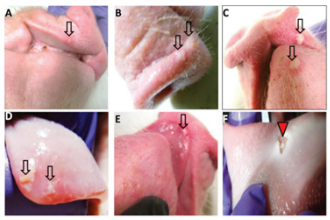


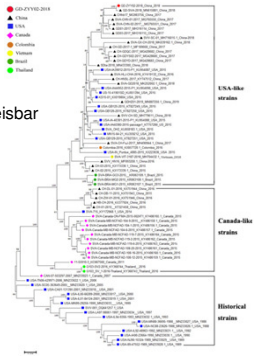
Figure 3. Mouth lesions in pigs infected with Senecavirus A. Vesicles on the upper lip (A) and snout (B); vesicles on upper and lower lips (C); ruptured vesicles at the tip of the tongue (D) and the undersurface of the tongue (E); and healed erosion at the back of the tongue (F). Arrows and arrowheads point to lesions.

Hole et al., 2019

Senecavirus A

Fragestellungen zu SVA:

- Epidemiologie:
  Erreger zumindest seit 1989 nachweisbar



Li et al., 2021

Senecavirus A

Fragestellungen zu SVA:

- Vorkommen SVA: Seroprävalenz USA 7-18%

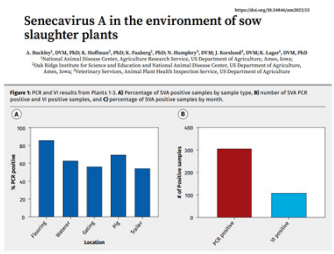

Senecavirus A in the environment of sow slaughter plants

Figure 1: PCR and VI results from Plants 1-3. A) Percentage of SVA positive samples by sample type, B) number of SVA PCR positive and VI positive samples, and C) percentage of SVA positive samples by month.

Buckley et al., 2022

Senecavirus A

Fragestellungen zu SVA:

- Vorkommen SVA in Europa

GOV.UK

Home > Environment > Wildlife, animals, biodiversity and ecosystems > Animal and plant health

Government response

Seneca Valley Virus confirmed in pigs in England

UK Chief Veterinary Officer has confirmed five cases of Seneca Valley Virus in pigs

The UK Chief Veterinary Officer has today confirmed that the five cases of vesicular disease in pigs identified in farms in England between June and September 2022 were Seneca Valley Virus (SVV).

The confirmation comes following an extensive investigation by the Animal Plant Health Agency (APHA).

Seneca Valley Virus only affects pigs for a short period with infected pigs making a full recovery. There is no risk to human health.

SVV is not a notifiable or reportable disease in the UK nor a listed disease by the World Organisation of Animal Health (WOAH). However, the clinical signs however do resemble notifiable vesicular diseases, in particular Foot-and-Mouth Disease. Defra is therefore calling on pig producers and vets to continue to promptly report any clinical signs of vesicular disease in pigs so that APHA can carry out an official investigation.

Senecavirus A

Fragestellungen zu SVA:

- Vorkommen SVA in Europa
- Einschleppung/Verschleppung:
  Nachweis im Sojaschrot

Received: 14 August 2022 | Revised: 17 August 2022 | Accepted: 18 August 2022
DOI: 10.1111/tbed.14684

RESEARCH NEWS

Transboundary and Emerging Diseases WILEY

Detection of Senecavirus A in pigs from a historically negative national swine herd and associated with feed imports from endemically infected countries

Scott Dee | Karyn Havas | Gordon Spronk

Pipestone Applied Research, Pipestone Veterinary Services, Pipestone, Minnesota, USA

Source of sample	Number of samples tested	Number of samples SVA (+)	Cycle threshold (Ct) value
Imported soybeans	5	0	38.0
Imported soybean meal: SVA positive country	5	2	31.5–35.0
Imported soybean meal: SVA negative countries	2	0	38.0

Senecavirus A

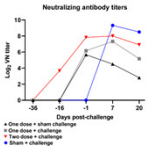
Fragestellungen zu SVA:

- Impfstoffe

Efficacy of an inactivated Seneca Valley virus vaccine in nursery-aged pigs

Alesandra Buckley[1]; Abby Patterson[1]; Albert van Geelen[1]; Kelly Lager[2]

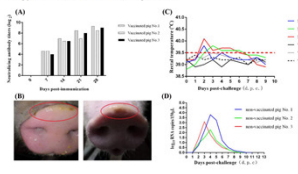
[1]Oak Ridge Institute for Science and Education and National Animal Disease Center and US Department of Agriculture, Ames, Iowa; [2]Boehringer Ingelheim Vetmedica, Inc., Ames, Iowa; [2]National Animal Disease Center, US Department of Agriculture, Ames, Iowa



Article

Preliminary Evaluation of Protective Efficacy of Inactivated Senecavirus A on Pigs

Yuwan Li [1,2,3,†], Yangyi Zhang [1,2,3,†], Yingxin Liao [1,2,3,†], Yawei Sun [1,2,3], Yang Ruan [1,2,3], Chenchen Liu [1,2,3], Mengyu Zhang [1,2,3], Tanglang Li [1,2,3], Xiaowen Li [1,2,3], Shuangqi Fan [1,2,3], Lin Yi [1,2,3], Hongxing Ding [1,2,3], Mingqiu Zhao [1,2,3], Jindai Fan [1,2,3,*] and Jinding Chen [1,2,3,*]



Protein

Evaluation of one versus two doses of an inactivated Senecavirus A vaccine in weaned pigs

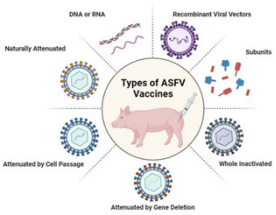
K. Hoffman[1], PhD, K. Lager[2,†], DVM, PhD, A. Buckley[1,†], DVM, PhD

[1]Oak Ridge Institute for Science and Education and National Animal Disease Center, US Department of Agriculture, Agricultural Research Service, Ames, Iowa; [2]National Animal Disease Center, US Department of Agriculture, Agricultural Research Service, Ames, Iowa

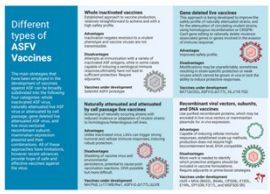
Impfstoffe gegen ASP

Anzahl Publikationen zu ASP-Impfstoffen:

- 2020: 70
- 2021: 90
- 2022: 135
- 2023: 28 (Stand 14.04.23)



Chathuranga und Lee, 2023



Urbano und Ferreira, 2022

Impfstoffe gegen ASP

Vietnam:

- Lebend-Impfstoff gegen ASP im Juni 2022 in Vietnam zugelassen
- zunächst ungeklärte Todesfälle nach der Impfung
- Impfstoff im August 2022 zurückgezogen
- Impfstoff seit Oktober 2022 in Vietnam wieder zugelassen
- bis Februar 2023 ca. 600.000 Schweine in Vietnam geimpft

AVAC, 2023

Impfstoffe gegen ASP

Europa:

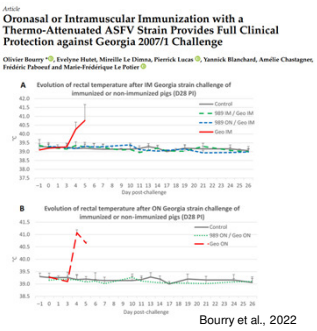
- Wirksamkeit und Sicherheit notwendig
- Impfstoffe für Wildschweine und Hausschweine notwendig
- DIVA notwendig

Taking a Promising Vaccine Candidate Further: Efficacy of ASFV-G-ΔMGF after Intramuscular Vaccination of Domestic Pigs and Oral Vaccination of Wild Boar

Deutschmann et al., 2022

Vaccination With a Gamma Irradiation-Inactivated African Swine Fever Virus Is Safe But Does Not Protect Against a Challenge

Pikalo et al., 2022



Bourry et al., 2022

Schlussfolgerung

- globale Ausbreitung/Verbreitung von Erregern zunehmend?
- Dynamik bei Genotypen, Stämmen, Isolaten… erkennbar
- Diagnostik und Koinfektionen relevant
- Bekämpfungsstrategien sehr heterogen
- Vakzinationen von weiter zunhemend hoher Bedeutung
- Eliminationen häufig schwierig