

# AVAC ASF LIVE vaccine - an effective solution for preventing African swine fever

**DVM. PhD. NGUYEN VAN DIEP, CEO AVAC**



Hanoi, November 27, 2024

# Contents

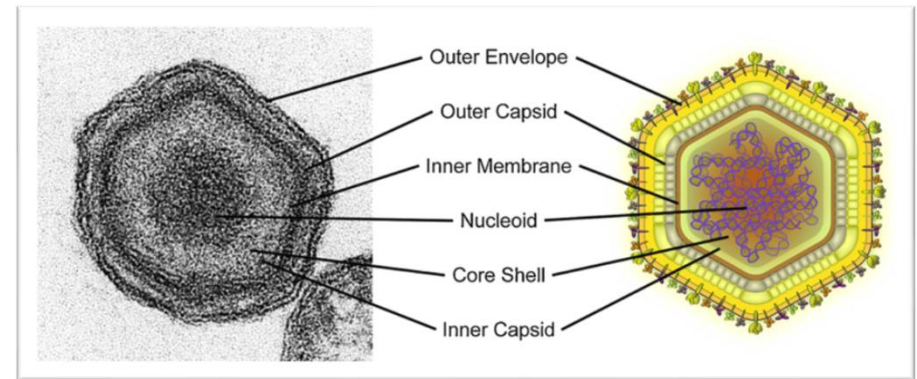
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1. Introduction of the AVAC ASF LIVE vaccine
2. Vaccine production and commercialization
3. Challenges and solutions

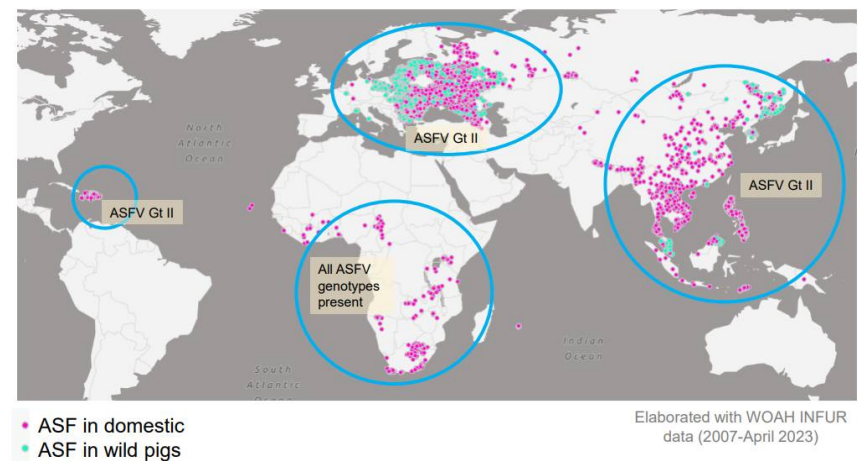
# 1. Introduction of AVAC ASF LIVE vaccine

- ASFV, Mortality~ 100%
- Genotype II ASFV in > 50 countries
- Gt I/II in China, Vietnam, Rusia

**Vaccination: most proactive, positive and effective solution**

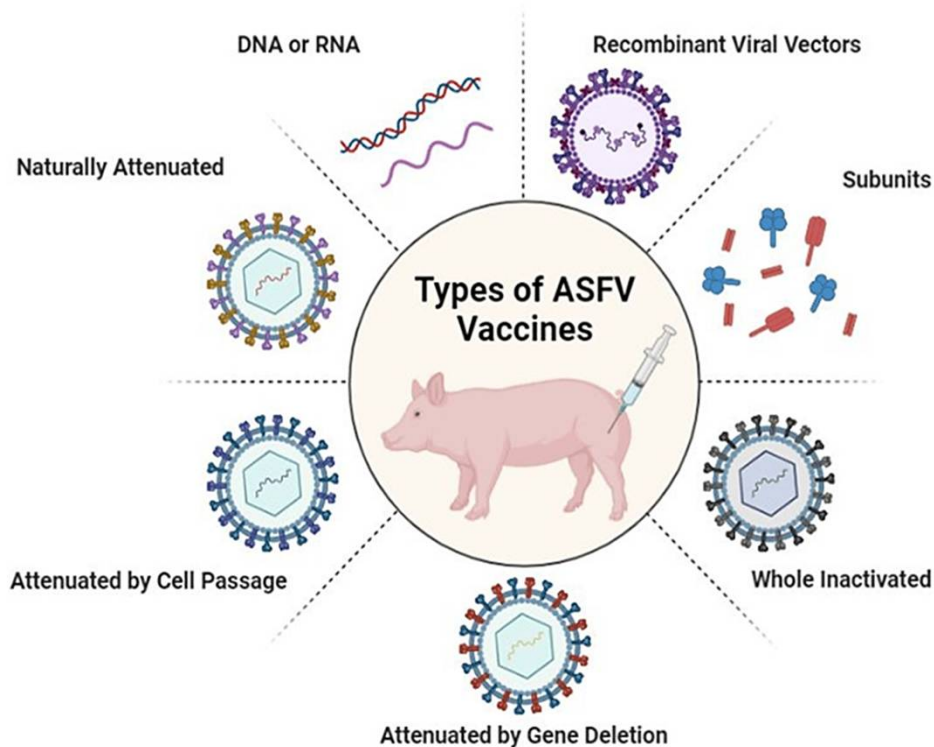


Global situation of ASF outbreak since 2007



# 1. Introduction of AVAC ASF LIVE vaccine

## 7 vaccine types



## Challenges in development

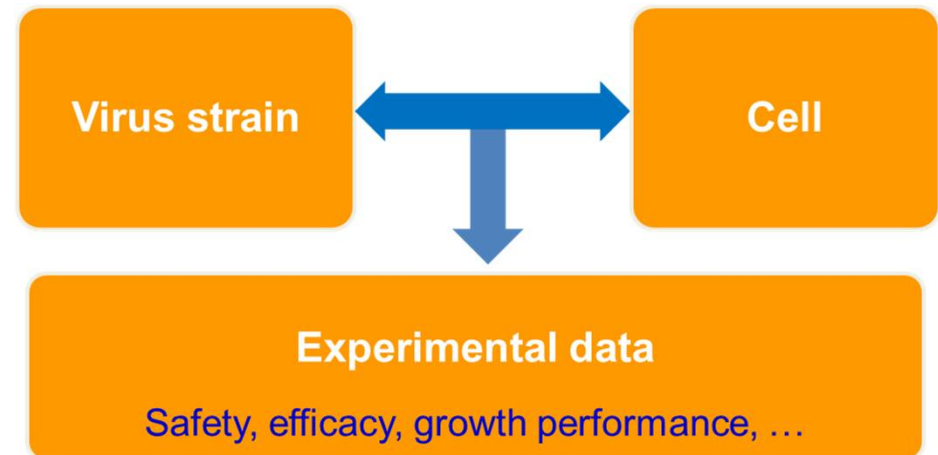
1. Inactivated vaccines: not effective
2. Subunit/vector vaccine: low protection & high cost
3. DNA/RNA vaccine: low protection
4. Naturally/cell passage attenuated virus: safety issue

[Kiramage Chaturanga](#) & [Jong-Soo Lee](#) 2023

**Live vaccine: most potential – good protection & cost**

# 1. Introduction of AVAC ASF LIVE vaccine

## 3 key components



**1. Develop DMAC cell line**

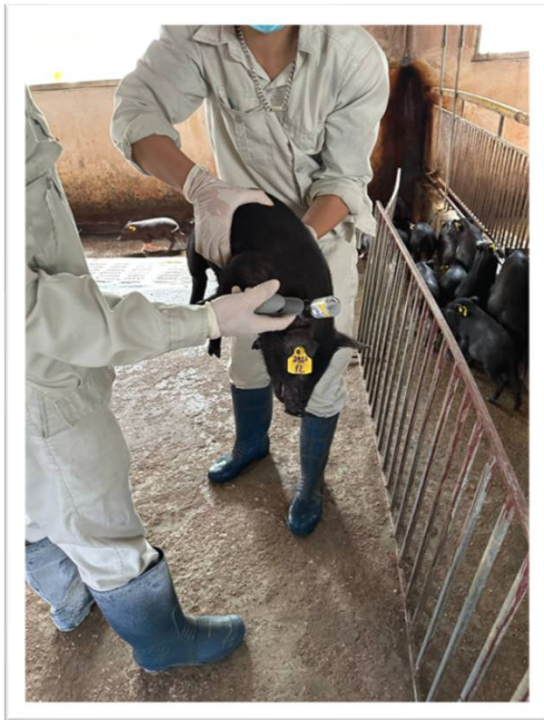
**2. Virus strain ASF-G- $\Delta$ MGF (USDA), adapted in DMAC cell (WGS: 61 mutations, 10 proteins changed)**

**3. Research data (>100 animal experiments)**

# 1. Introduction of AVAC ASF LIVE vaccine

## Safe for native pigs and wild boars

- Safe:  $>10^6$  HAD<sub>50</sub> ( $>100$  dose)/pig
- Various ages (from 4 w)
- No local inflammation,
- Healthy (PRRSV, PCV2... +)

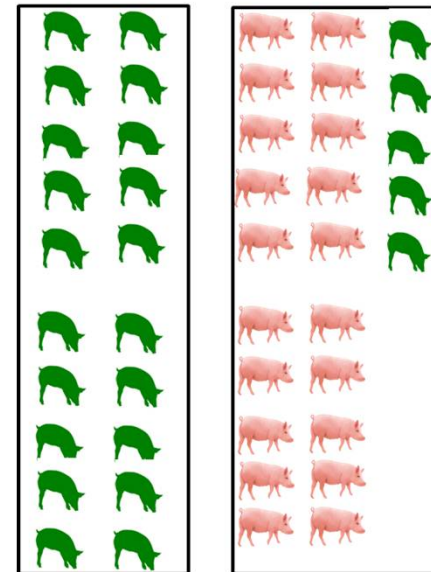


# 1. Introduction of AVAC ASF LIVE vaccine

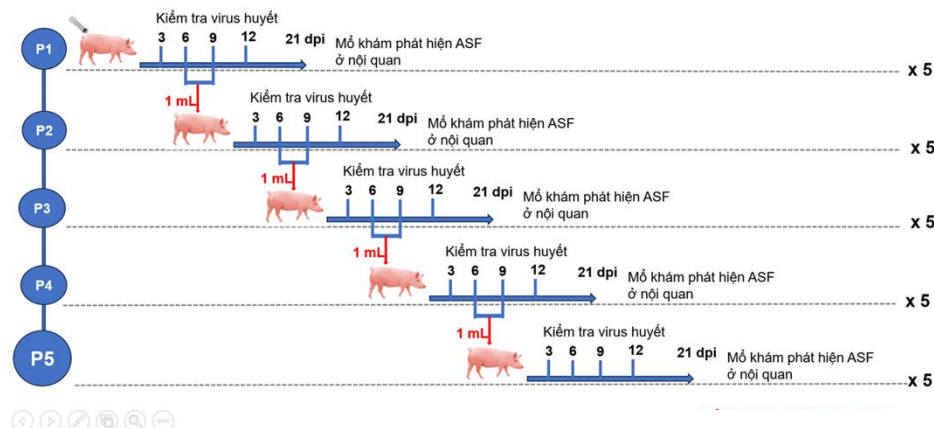
**No virus shedding through secretions**

dpi	Result			
	blood	Feces	Urine	Oral
7	+	-	-	-
14	+/-	-	-	-
21	-	-	-	-
28	-	-	-	-
56	-	-	-	-
84	-	-	-	-
112	-	-	-	-
140	-	-	-	-

**No transmission to co-mingled pigs**



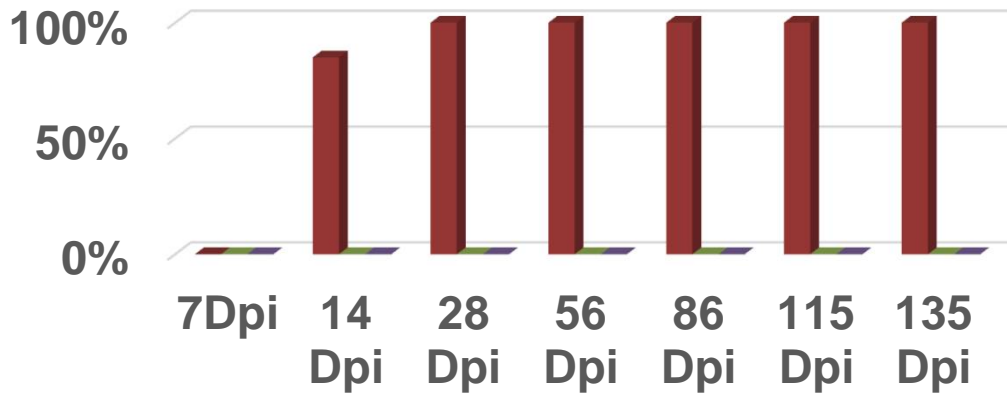
**No re-irulence through 5 passages**



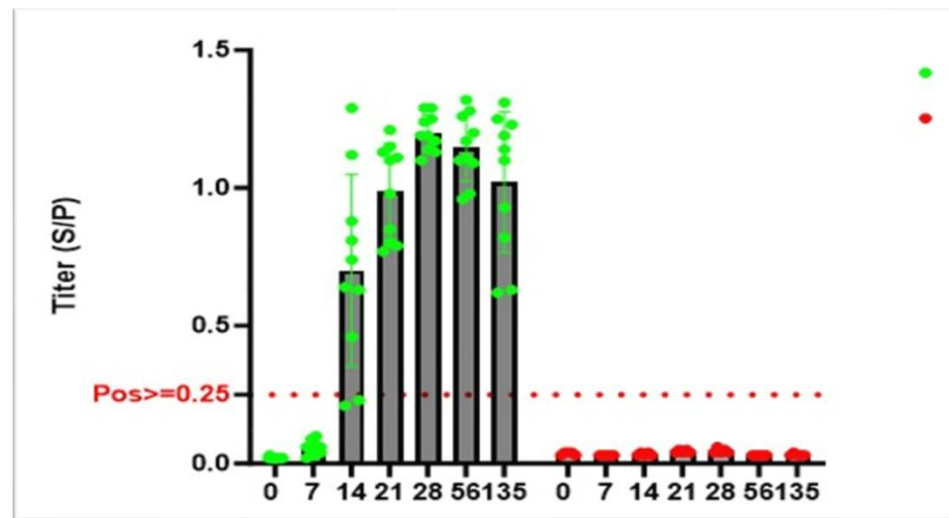
**All alive healthy**

# Immunity response

## Positive antibodies post- vaccination



## S/P value



Vaccination  
Control

# Feature of the ASF vaccine

**Efficacy >90%**

Pig group	Number (pigs)	Vaccine dose and route
Immunized	8	1 dose/ pig – intramuscular injection
Control	8	1 ml PBS – intramuscular injection

Challenged 28 days post-vaccination



# Efficacy ~> 90%

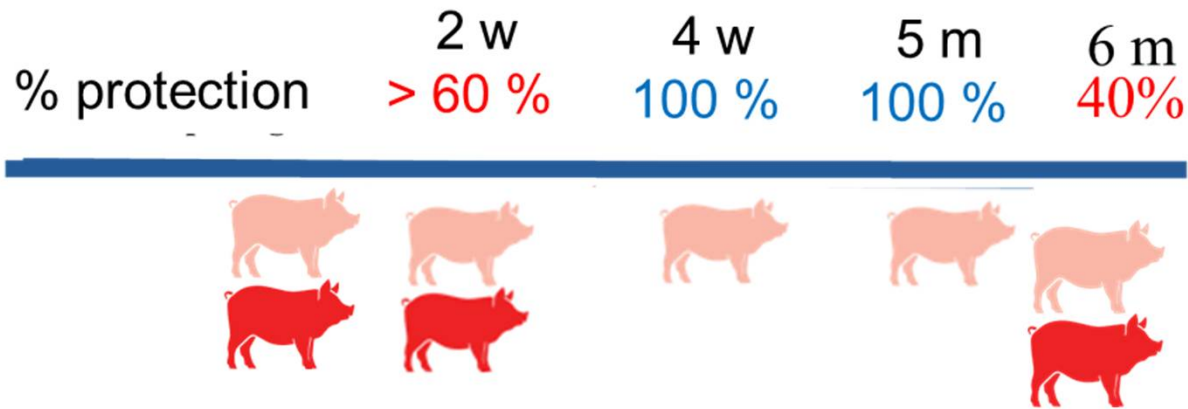
## Clinical symptoms

Nhóm Ki hiệu	Control								immunized							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
3	2	0	2	0	2	0	2	0	0	0	0	0	2	0	0	2
4	2	2	2	1,2	1,2	0	4	0	2	2	0	0	2	0	0	0
5	1,2	1,2	1,2	8	1,2	1,2	1,2	0	2	0	0	0	0	0	0	0
6	1,2,3,7	1,2,3,7	1,2,3,7		1,2,3,7	1,2,3	8	1,2	0	0	0	0	0	0	2	2
7	1,2,3,7	1,2,3	8		8	1,2,3,7		1,2,3,7	2	0	2	0	0	2	0	2
8	1,2,3	1,2,3				1,2,3,7		8	0	0	0	2	0	0	0	0
9	8	8				8			0	0	0	0	0	0	0	0
10									0	0	0	0	0	0	0	0
11									0	0	0	0	0	2	0	0
12									0	0	0	0	0	0	0	0
13									0	0	0	0	0	0	0	0
14									0	0	0	0	0	0	0	0
15									0	0	0	0	0	0	0	0
16									0	0	0	0	0	0	0	0
17									0	0	0	0	0	0	0	0
18									0	0	0	0	0	0	0	0
19									0	0	0	0	0	0	0	0
20									0	0	0	0	0	0	0	0
21									0	0	0	0	0	0	0	0

Note: 0= healthy      2: fever      4: cough      6: diarrhea;      8: died  
 1: loss of appetite; 3: fatigue;      5: purple skin;      7: lack of exercise

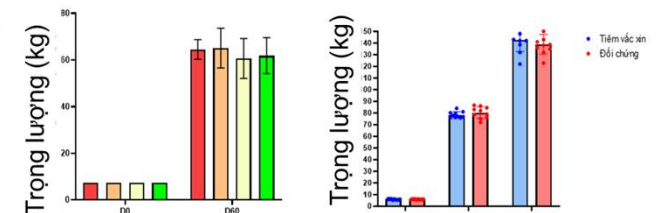
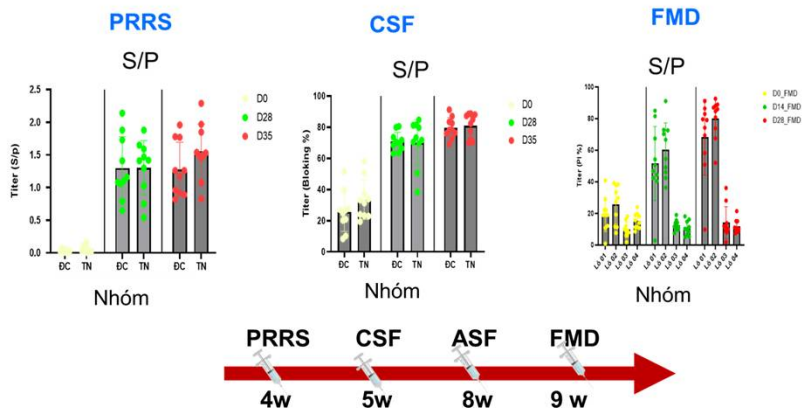
# 1. Introduction of AVAC ASF LIVE vaccine

## Duration of Immunity



Not interfere other vaccines

Not affect the growth of pigs



Time post-vaccination

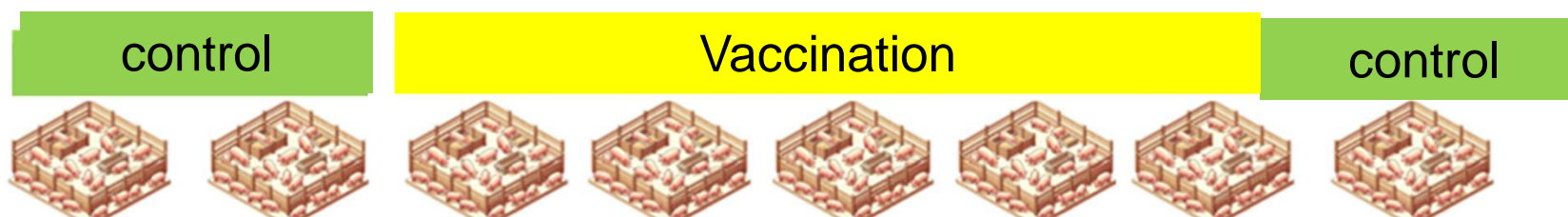
# 1. Introduction of AVAC ASF LIVE vaccine

## For breeders

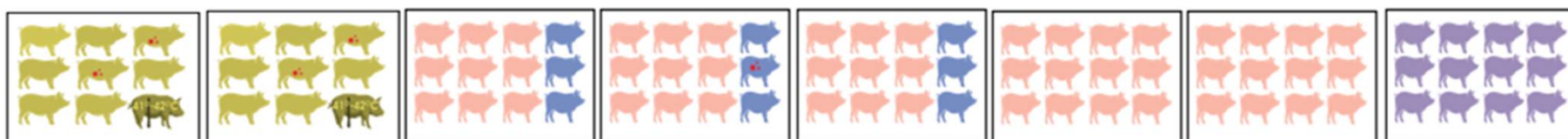
- Safe for boars and sows
- Does not affect reproductive performance
- No vertical (transplacental) transmission
- No viral shedding in semen



# An ASF outbreak, protect ~ 90% of vaccinated pigs



107 days post-vaccination, **ASF** occurred in the unvaccinated pen  
All control pigs were sick, died, and were culled within 10 days



## Follow up to marketing-time:

- Vaccinated pig death: 2/120 (1.7%)
- Vaccinated pig got sick: 12/120 (10%)
- Vaccinated pigs were protected: 106/120 (88.3%)

# 1. Introduction of AVAC ASF LIVE vaccine

1. Name: AVAC ASF LIVE

2. Forms: Freeze-dry

3. Ingredient: each dose  $> 10^{3,5} \text{HAD}_{50}$   
strain ASF-G-MGF

4. Indication: ASF prevention

- Piglets from 4 weeks old,
- A single shot



# 1. Introduction of AVAC ASF LIVE vaccine

## Evaluations by DAH

1. Purity
2. Safety (over dose)
3. Protective (>80% by challenge)

Test of 7 vaccine batches

Trials at two farms

Trials at a small scale  
(4 farms)

Supervision of large scale  
(600.000 doses)

# Approval for circulation

## AVAC ASF Live circulated from 24/7/2023

BỘ NÔNG NGHIỆP  
VÀ PHÁT TRIỂN NÔNG THÔN  
MINISTRY OF AGRICULTURE  
AND RURAL DEVELOPMENT  
**CỤC THÚ Y**  
DEPARTMENT OF ANIMAL HEALTH

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM  
SOCIALIST REPUBLIC OF VIETNAM  
Độc lập - Tự do - Hạnh phúc  
Independence- Freedom- Happiness



MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT  
**DEPARTMENT OF ANIMAL HEALTH**  
15/78 Giai Phong Street - Dong Da - Hanoi - Viet Nam  
Tel.: (84-4) 3 8693605/3 8696788  
Fax: (84-4) 3 8685961/3 8691311  
Email: vanphongcuc@dah.gov.vn  
Website: www.cucthuy.gov.vn

### GIẤY CHỨNG NHẬN LƯU HÀNH THUỐC THÚ Y MARKETING AUTHORIZATION

Số/No: 999/QLT-SX-22

Tên sản phẩm : **AVAC ASF LIVE**  
(Vắc xin Dịch tả lợn Châu Phi nhược độc, đông khô)  
Name of product:  
Số đăng ký : AVAC-37  
Registration number:  
Thành phần hoạt chất/ : Vi rút Dịch tả lợn Châu Phi nhược độc,  
Active Ingredients: chủng ASF-G-ΔMGF.  
Công dụng : Phòng bệnh Dịch tả lợn Châu Phi cho lợn thịt  
Indications: khỏe mạnh từ 4 tuần tuổi trở lên.  
Dạng bào chế/ Dosage form: : Nhược độc, đông khô.  
Quy cách đóng gói/ Packing Size: : Lọ (5 liều, 10 liều, 20 liều, 25 liều, 50 liều và 100 liều)  
Hạn dùng/ Shelf-life: : 12 tháng  
Tên cơ sở đăng ký lưu hành : Công ty TNHH MTV Avac Việt Nam.  
Name of Marketing Authorization Holder:  
Địa chỉ : Quốc Lộ 5A, thôn Ngọc Lịch, xã Trung Trác,  
Address: huyện Văn Lâm, tỉnh Hưng Yên.  
Số điện thoại/Tel.: 0221 3980507 : Số Fax/Fax. No: 0221 0788679  
Tên cơ sở sản xuất : Công ty TNHH MTV Avac Việt Nam.  
Name of Manufacturer:  
Địa chỉ : Quốc Lộ 5A, thôn Ngọc Lịch, xã Trung Trác,  
Address: huyện Văn Lâm, tỉnh Hưng Yên.  
Số điện thoại/Tel.: 0221 3980507 : Số Fax/Fax No: 0221 0788679

Giấy chứng nhận lưu hành này có hiệu lực đến: 08/7/2027.

This marketing authorization is valid until

Hà Nội, ngày 08 tháng 7 năm 2022  
Hanoi Date month year

**Q. CỤC TRƯỞNG**  
**DIRECTOR GENERAL**



Nguyễn Văn Long

### CERTIFICATE OF FREE SALES

Ref.No: 785/2023/QLT-CFS

Date: 04/7/2023

To Whom It May Concern,

This is to certify that the product: **AVAC ASF LIVE**

Export name: AVAC ASF LIVE

- is produced by **AVAC VIET NAM JOINT STOCK COMPANY**,  
- at address: Highway 5A, Ngọc Lịch Village, Trung Trac Commune,  
Van Lam District, Hung Yen Province.

Tel: (+84) 2213980507 Fax: (+84) 2213788679

The product mentioned above:

- is registered in Viet Nam, Reg. No: AVAC-37

- and be freely sold in both Viet Nam and oversea markets under the  
supervision of government authorities.

This certificate is valid for two years.

**DEPARTMENT OF ANIMAL HEALTH OF VIET NAM**  
**DIRECTOR GENERAL**



Nguyễn Văn Long

## 2. Vaccine production and commercialization

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- To the present time,
  - > **3 million** doses supplied to the market
  - Domestic: > **2,5 million** doses,
  - Philippines: 460,000 doses, Nigeria 5000 does
  - Register for circulation in some countries: India, Indonesia, Malaysia, Nepal, Myanmar, Nigeria...
- Stored at AVAC warehouse: 1.5 million doses



## 2. Vaccine production and commercialization

### Vaccination with strict supervision at >100 facilities in 21 provinces

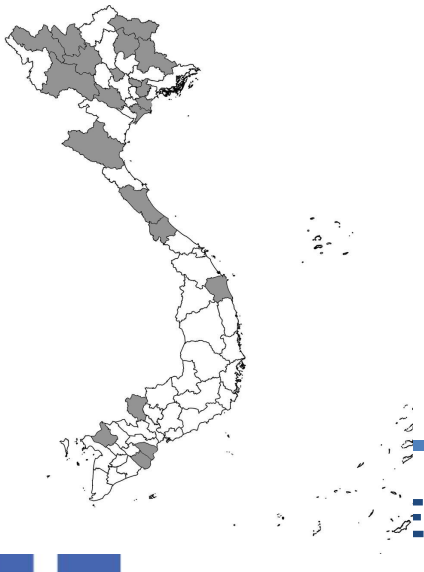
Parameters	Results
Vaccinated pig/ prov.	30 – 1.200
Total vaccinated pigs	~ 12000
Positive antibodies at 28 dpv	89 – 100% (test ~1000 samples)

### Massive vaccination (with governmental support)

Cao Bang	108,350
Lang Son	57,350
Bac Ninh	48,900
Quang Ngai	37,500
Lai Chau	15,110
Hai Duong	15,000
Son La	20,580
Tra Vinh	18,000

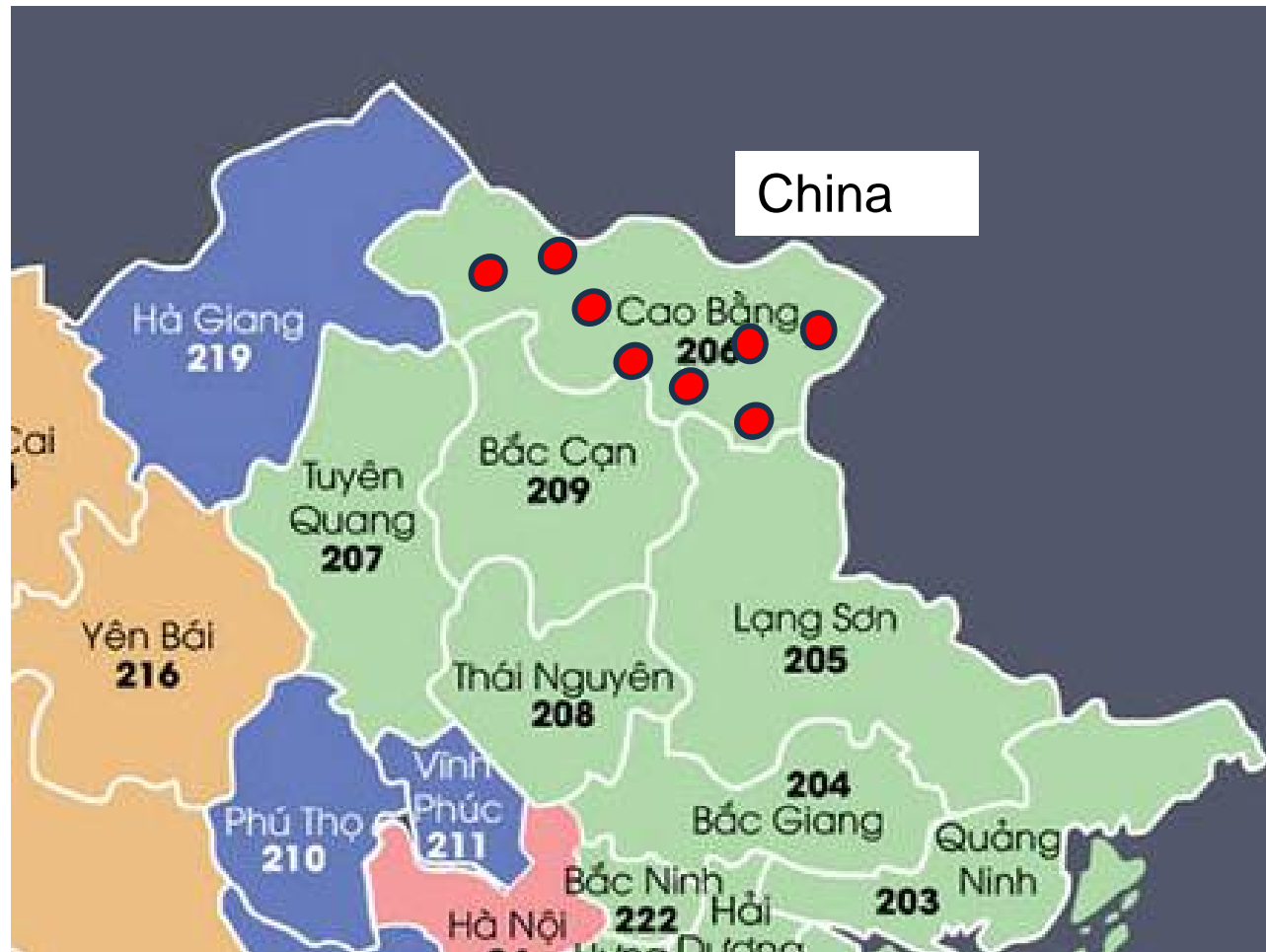
Government usage >400.000

So far, vaccinated pigs: safe and well protected, healthy until slaughtered

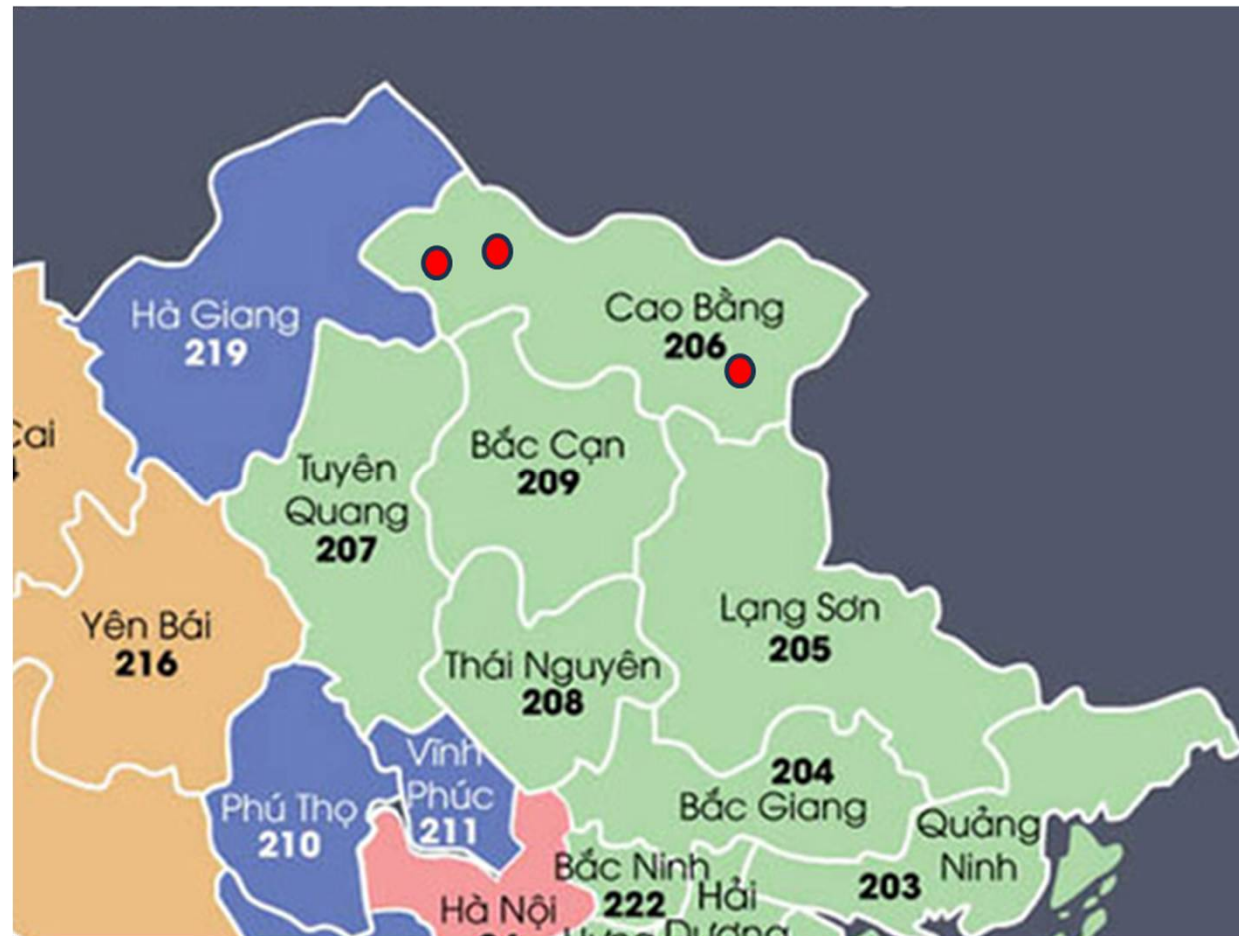


# Control of ASF by mass vaccination in Cao Bang

## Outbreaks late 2023

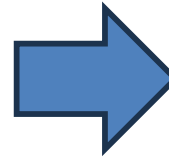
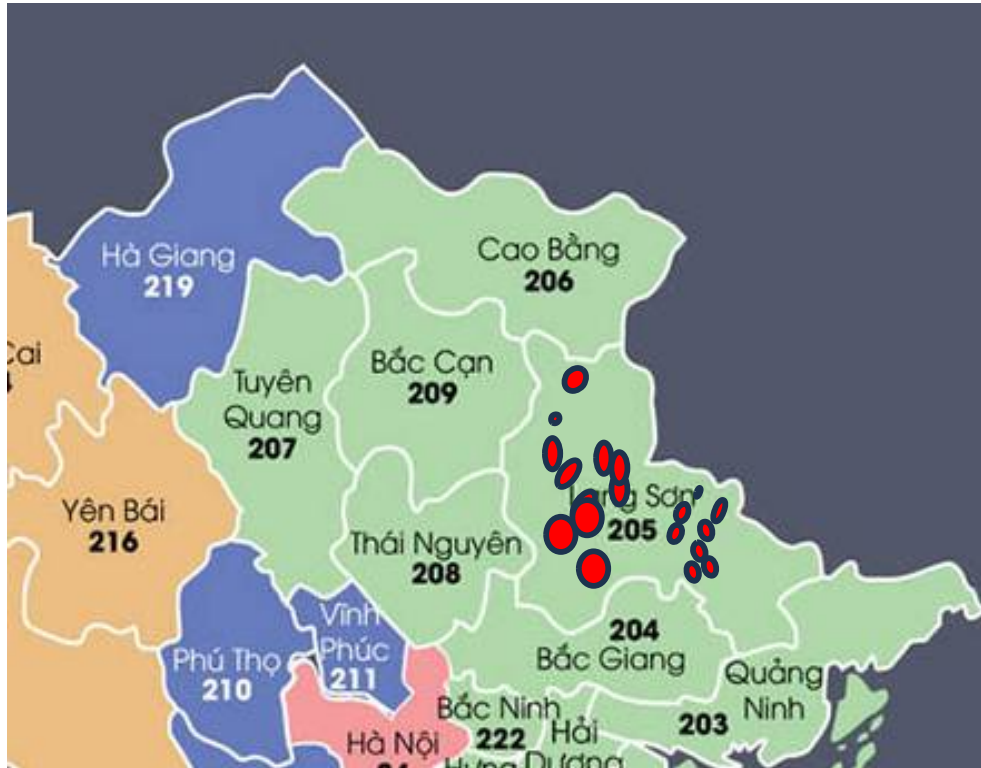


# Control of ASF by mass vaccination in Cao Bang



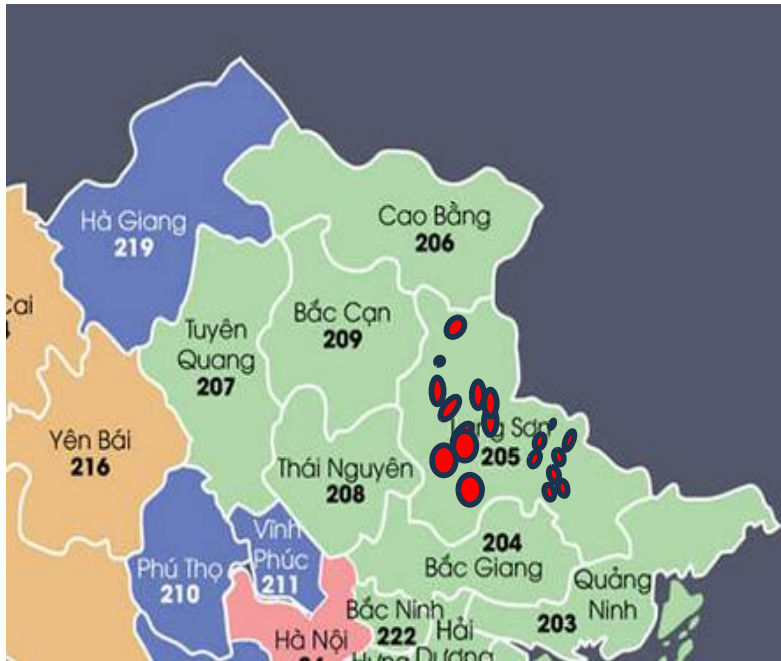
- Only 11 pigs died (from 38,000 vaccinated pigs)
- So far 108.000 vaccinated pigs,

# Control of ASF by mass vaccination in Lang Son



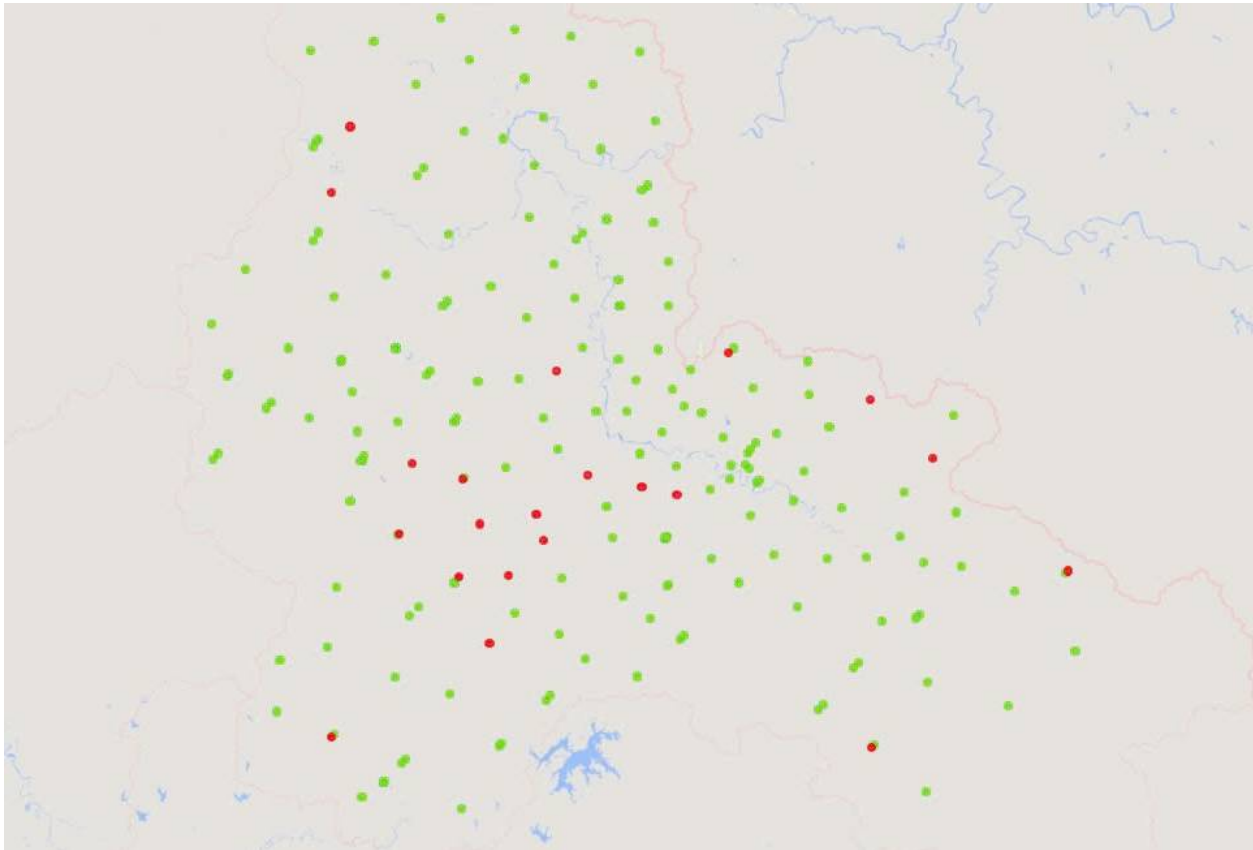
Till May/2024: outbreak in 133 communes, 11/11 districts  
Loss: 16.000 pigs (15%)

# Control of ASF by mass vaccination in Lang Son



- 6/2024, AVAC donated 2200 doses
- Sub-DAH Lang Son, on 25-26/Jun/2024, vaccinated 2.003/2.265 in 3 communes of Bac Son district.
- Healthy after vaccination. Only 6/9 pigs (one household) died after a few days post vaccination
- No more outbreak reported

# Control of ASF by mass vaccination in Lang Son



Local budget - 57.000ds  
Private: 8900 ds

**July-Sept 2024, ~ >60.000 pigs vaccinated  
(88% pop), 17 pigs (0.03%) died within 3  
days post vaccination**

 **90% of  
outbreak**

<https://sonn.langson.gov.vn>

Update on 22/9/2024

# Vaccination in Son La province

## Phu Yen district

- outbreaks in late 2023
- Vaccinated 667 pigs in 2 communes (1/2024)
- All pigs healthy to sale time (no death). No more outbreak

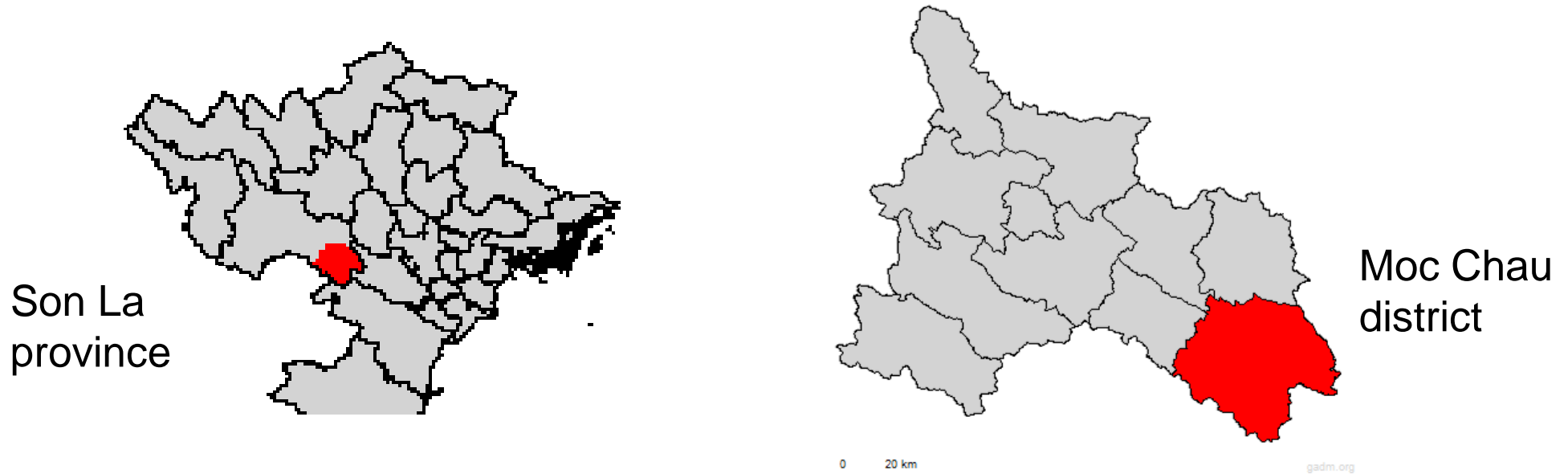
-> Vaccinated in outbreak area: Muong Do commune (1 outbreak reported) → control the disease



## 2. Kết quả theo dõi sau tiêm phòng

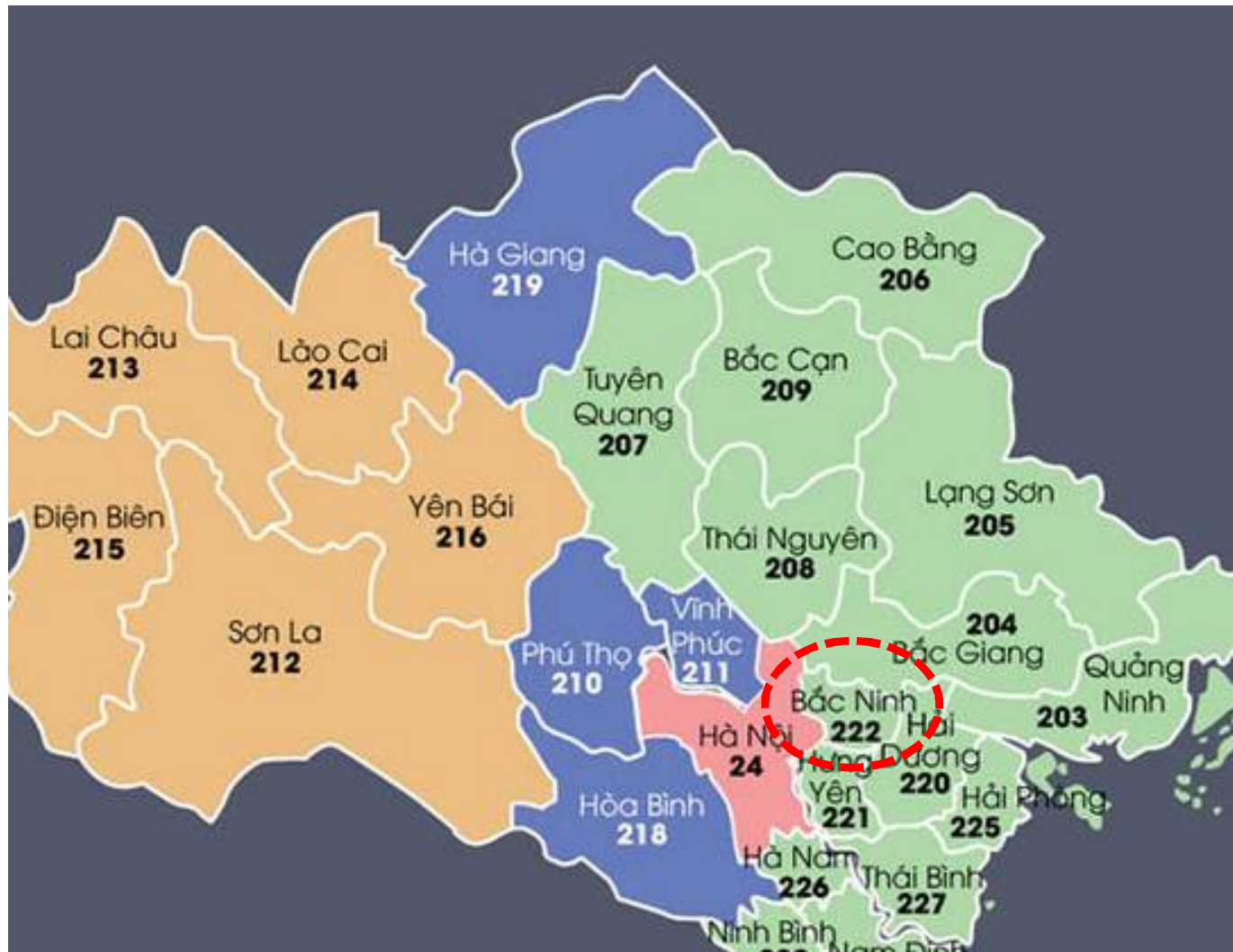
- Biểu hiện lâm sàng sau khi tiêm: toàn bộ đàn lợn khoẻ mạnh, không xảy ra trường hợp có biểu hiện bất thường như phản ứng phụ do vắc xin hay bỏ ăn sau khi tiêm. Lợn sinh trưởng phát triển bình thường đến lúc xuất bán.
- Đến nay toàn bộ số lợn 667 con (100%) được tiêm vắc xin DTLCP tại 02 xã đã được xuất bán ra thị trường.
- Đánh giá đáp ứng miễn dịch sau tiêm phòng: Công tác lấy mẫu máu để xét nghiệm kháng thể được triển khai ngày 20/02/2024 (sau 28 ngày tiêm vắc xin). Số lượng mẫu máu đã lấy tại xã Huy Thượng, gửi xét nghiệm để đánh giá kháng thể miễn dịch sau khi tiêm vắc xin là 20 mẫu, gửi Trung tâm chẩn đoán Thú y Trung ương. Kết quả xét nghiệm tại phiếu trả lời số 845/CĐ-XN ngày 22/02/2024 của Trung tâm Chẩn đoán Thú y Trung ương cho thấy 100% (20/20) mẫu xét nghiệm dương tính với kháng thể DTLCP, tỷ lệ đáp ứng miễn dịch đạt 100 %.

# Vaccination in Son La province



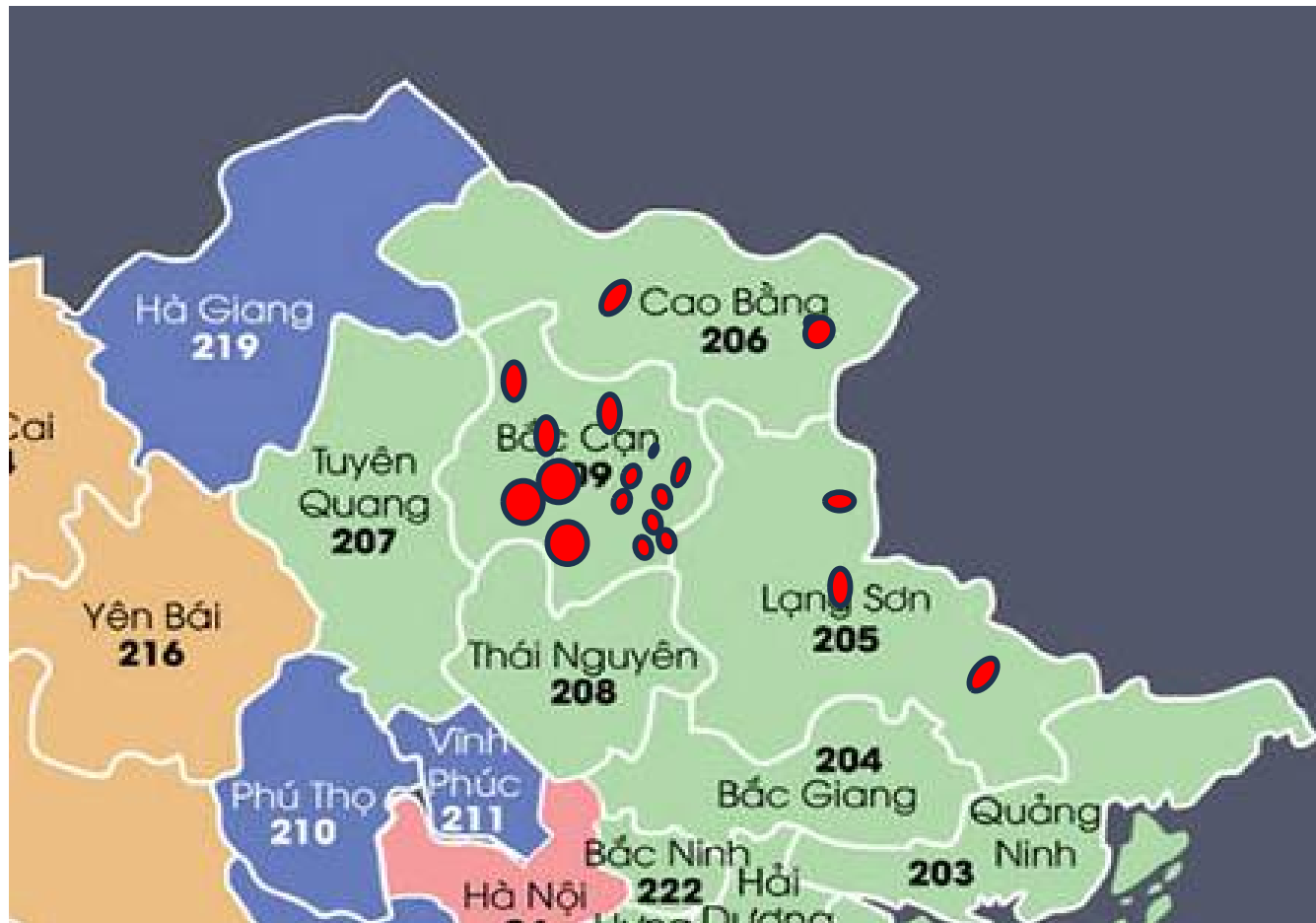
- **Chieng Son commune-Moc Chau district**
- first outbreak in 19/5/2024, 15% pigs died of ASF till July
- → Vaccinated 1400 pigs in > 60 households at
- Only 01 house hole (1 pigs) reported to be ASF infected, no more outbreaks

# Control of ASF by mass vaccination in Bac Ninh



**Vaccinated 30.000 pigs, (~20 died, <0.1%)**

# Severe outbreaks in Bac Kan province



Few vaccine used, no ASF vaccine store/retailer)

# 2. Vaccine production and commercialization

## Vaccination for both grower and breeder

Hanoi's ASF vaccination program has shown remarkable results

(VAN) Thanks to the vaccination program, Mr. Le Viet The from Dan Phuong, Hanoi, is now less worried about allowing other farmers into his livestock area.



### AGRI PROJECTS

Carbon credit [↗](#) 2024 Outlook of Vietnam's Agricultural Products for Export

**f** Pig farming households gain a new lifeline with ASF vaccine

(VAN) Pham Trung Hieu, a farmer in Ha Thach Commune, Phu Tho Town, has vaccinated his entire pig herd against the African swine fever (ASF).



### INVESTMENTS

Carbon credit [↗](#) 2024 Outlook of Vietnam's Agricultural Products for Export

**f** Farmers would even leave livestock farming without ASF vaccines

(VAN) Thanks to having their pigs injected with the AVAC ASF vaccine without hesitation, several husbandry farmers in My Duc (Hanoi) stay steady ahead of the disease 'storm'.



### AGRI PROJECTS

Carbon credit [↗](#) 2024 Outlook of Vietnam's Agricultural Products for Export

**f** Household pig farming has lifeline thanks to ASF vaccine: 'While there's life, there's hope,' unexpectedly find 'secret'

(VAN) In March 2024, pig farming households in Bong Mac village, Lien Mac commune, Me Linh district (Hanoi) all lost everything, except for the farm of Mr. Hoang Van Chuyen's family.



# Vaccinated pigs were protected in outbreaks



Farmer: Nguyen Manh Dai, thôn Trinh Tiết, xã Đại Hưng -Mỹ Đức -Hà Nội)

9 non-vaccinated breeders were ASFV infected and culled, while 70 growers (next room) are protected until marketing time

# Collaboration with C.P Vietnam



- From March-Nov/2024,
- >6000 pigs in 54 farms
- No outbreaks so far

# 2. Vaccine production and commercialization

## Collaboration with C.P Vietnam

### Vaccination for both grower and breeder



#### AGRI PROJECTS

Carbon credit 2024 Outlook of Vietnam's Agricultural Products for Export

Pig farming households gain a new lifeline with ASF vaccine

(VAN) Pham Trung Hieu, a farmer in Ha Thach Commune, Phu Tho Town, has vaccinated his entire pig herd against the African swine fever (ASF).



#### AGRI PROJECTS

Carbon credit 2024 Outlook of Vietnam's Agricultural Products for Export

Household pig farming has lifeline thanks to ASF vaccine: 'While there's life, there's hope,' unexpectedly find 'secret'

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<https://vietnamagriculture.nongnghiep.vn/pig-farming-households-gain-a-new-lifeline-with-asf-vaccine-d407513.html>

<https://vietnamagriculture.nongnghiep.vn/household-pig-farming-has-lifeline-thanks-to-asf-vaccine-while-theres-life-theres-hope-unexpectedly-find-secret-d407690.html>

# 3. Challenges and solutions

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## Difficulties in commercialization

1. Hesitate to use new vaccine
2. The current ASF vaccines: only for fattening pigs
3. No standard for the ASF vaccine issued by WOAHA
4. Newly emerging strains



# 3. Challenges and solutions

## No world-wide standard for ASF vaccine

**World-Wide Standard for ASFV Vaccine?**

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

**USDA / WOA: ASFV Vaccine International Standards**

Recommendations for International Standard  
Guidelines for ASF First Generation Live Attenuated  
Virus Vaccines  
2023 GARA Gap Analysis  
December 05 -07, 2023  
Manila, Philippines  
Cyril Gay and David Brake  
USDA ARS/WOAH SPONSORED, CONTRACTED (CRDF GLOBAL) 2022 -2023  
PROJECT TO BIOQUEST ASSOCIATES, LLC.

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### Exclusive: World animal health body warns of swine fever vaccine risks as Vietnam readies exports

By Francesco Guarascio, Khanh Vu and Mikhail Flores  
December 6, 2023 4:35 PM GMT+7 · Updated 4 months ago



→ Establish the international standard









# 3. Challenges and solutions

## Recombinant ASFV



Article

### Genotype II Live-Attenuated ASFV Vaccine Strains Unable to Completely Protect Pigs against the Emerging Recombinant ASFV Genotype I/II Strain in Vietnam

Nguyen Van Diep <sup>1</sup>, Nguyen Van Duc <sup>1</sup>, Nguyen Thi Ngoc <sup>1</sup>, Vu Xuan Dang <sup>1</sup>, Tran Ngoc Tiep <sup>1</sup>, Viet Dung Nguyen <sup>2</sup>, Thi Tam Than <sup>3</sup>, Dustin Maydaniuk <sup>4</sup>, Kalhari Goonewardene <sup>4</sup>, Aruna Ambagala <sup>4,\*</sup> and Van Phan Le <sup>3,5,\*</sup>

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→ Develop G/II vaccine

## 3. Challenges and solutions

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### **ASFV with low-medium virulence**

1. Wild-type ASFVs
  3. ASFV vaccine candidates
  3. Vaccine-like virus
- 
1. **DIVA – qPCR or WGS**
  2. **Develop- & approval the vaccine for breeder**



# Thank you very much!



**AVAC ASF LIVE**  
Effective solution for preventing  
**African Swine Fever**

