



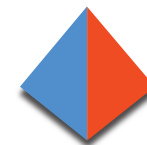
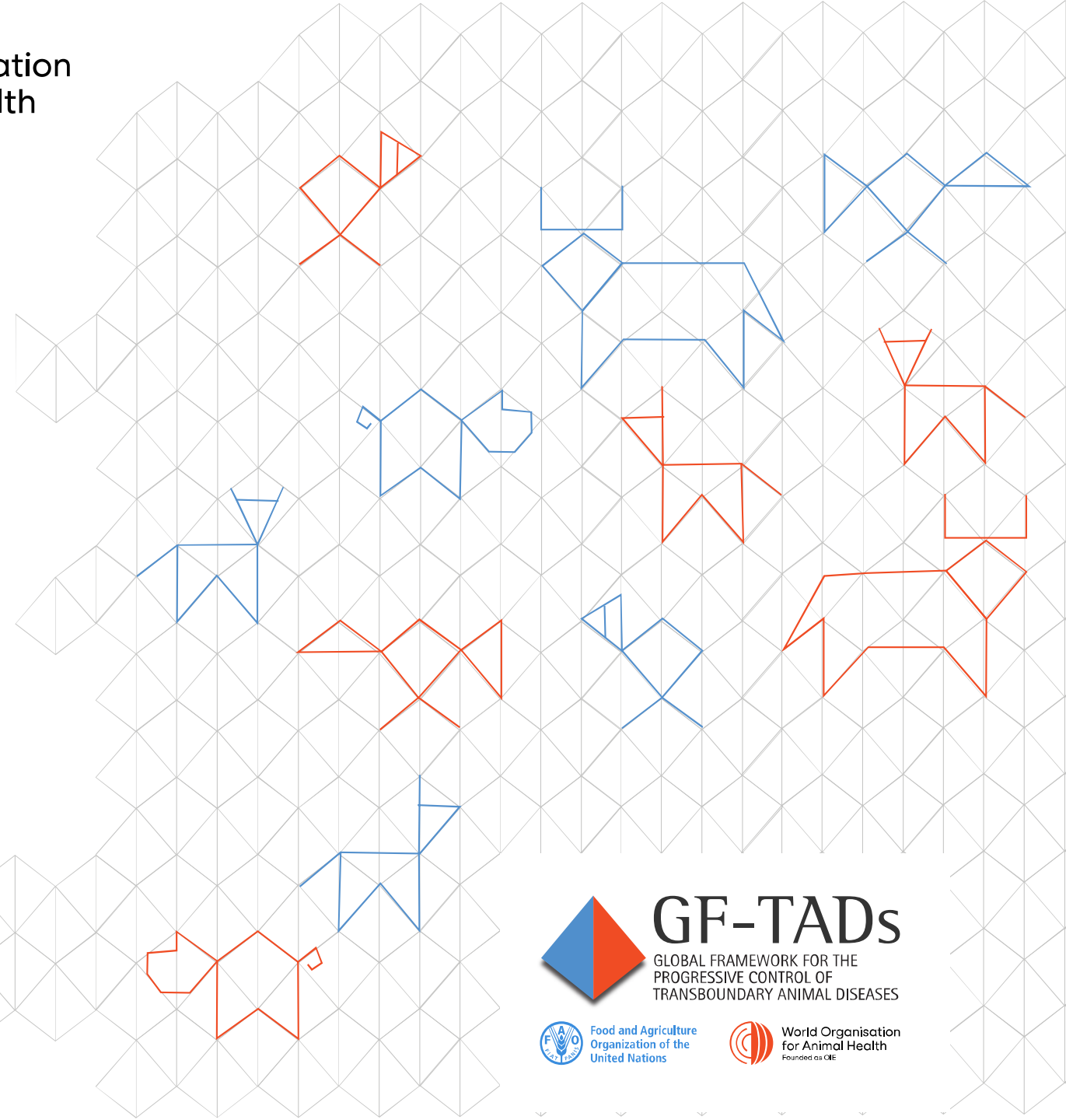
Food and Agriculture  
Organization of the  
United Nations



World Organisation  
for Animal Health  
Founded as OIE

# The Qualitative Risk Assessment for African Swine Fever Virus (ASFV) Introduction - Caribbean, South, Central and North Americas

Andriy Rozstalnyy, Animal Health Officer,  
Food and Agriculture Organization of the  
United Nations



**GF-TADS**

GLOBAL FRAMEWORK FOR THE  
PROGRESSIVE CONTROL OF  
TRANSBOUNDARY ANIMAL DISEASES



Food and Agriculture  
Organization of the  
United Nations

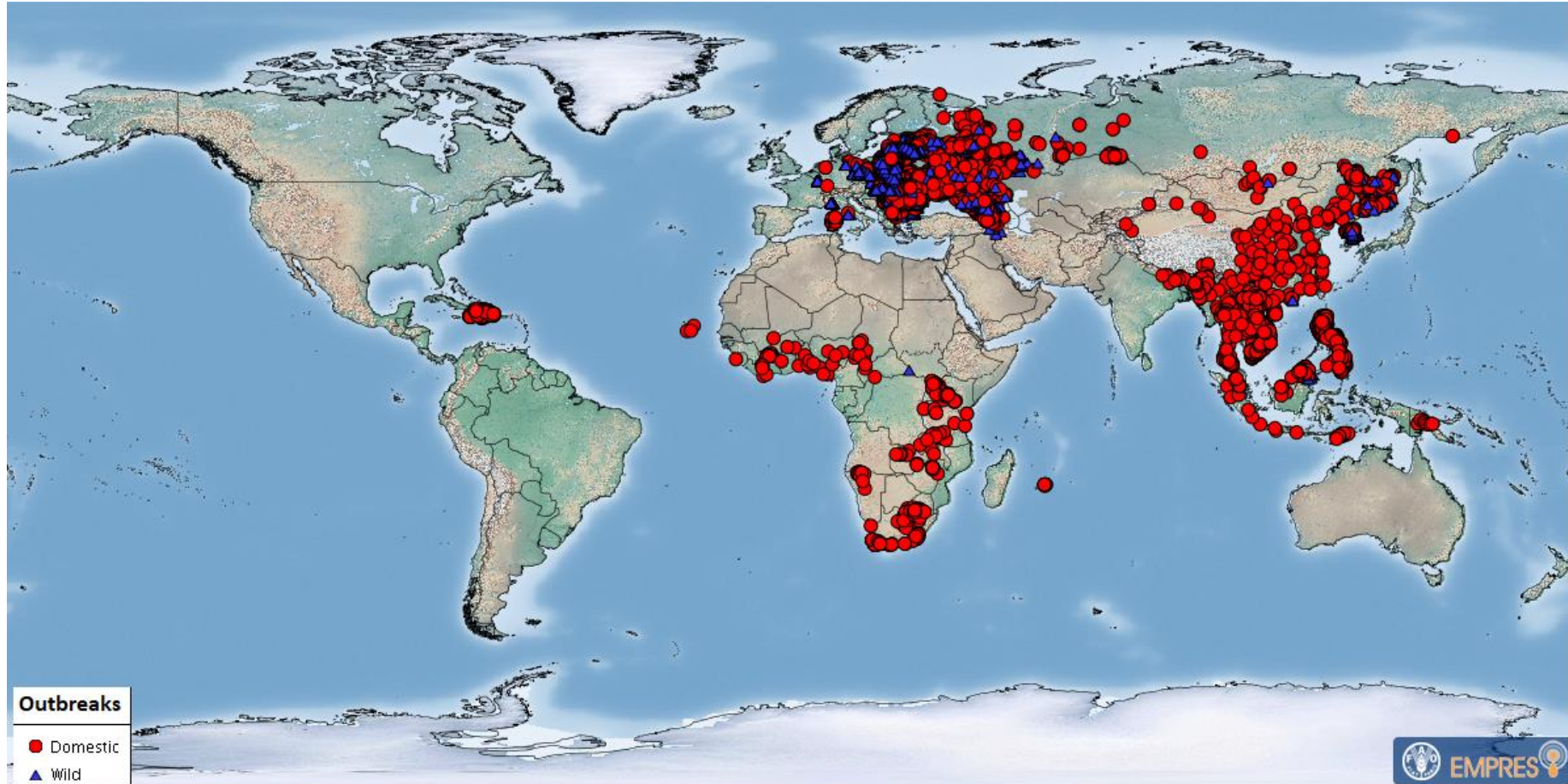


World Organisation  
for Animal Health  
Founded as OIE

# Content

- **Background**
- **FAO Qualitative Risk Assessment on ASF introduction in the Americas**
- **Recent ASF global risk assessment**

## Global situation



**Figure 1. ASF global situation 2007- 25 July 2022**

**All ASF disease events extracted from EMPRES-i + database. Source: FAO**

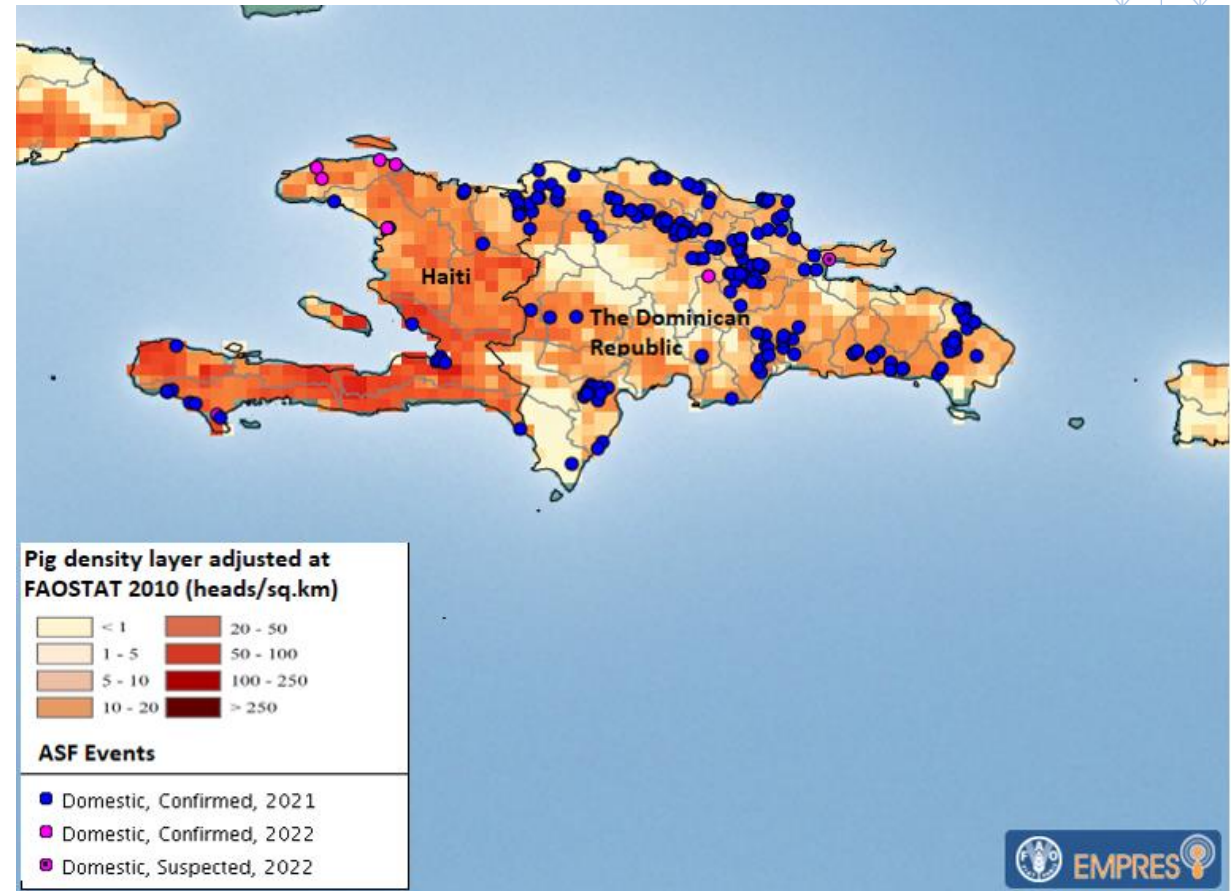
## ASF re-emergence the Hispaniola Island after 40 years

### The Dominican Republic

- First observation date: 10 April 2021
- First reporting date by USDA : 28 July 2021
- Officially notified to OIE : 29 July 2021

### Haiti

- First reporting date: 26 August 2021



**Figure 2. Outbreaks of ASF in the Dominican Republic and Haiti in 2021 (as of 25.07.2022). All ASF disease events extracted from EMPRES-i + database. Source: FAO**

## Background

**Total domestic pig population and volume of pork meat production in 2019 in the top five countries/territories in the Caribbean region. *Source: FAOSTAT, 2021***

Country/territory	Stocks (in heads)	Pork meat production (in tons)
Cuba	2,369,459	234,864
Haiti	1,016,836	32,016
Dominican Republic	491,746	79,943
Jamaica	216,135	8,355
Puerto Rico	45,102	8,284



# ASFV introduction in the Americas Qualitative Risk Assessment

<https://www.fao.org/publications/card/en/c/CB8748EN/>

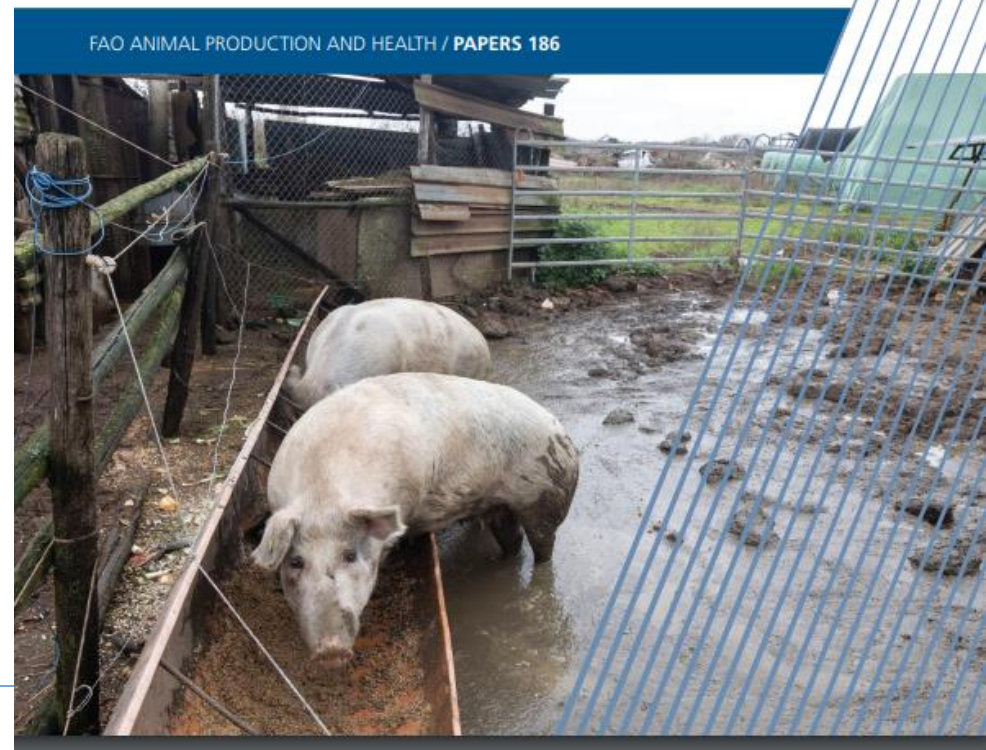


Food and Agriculture  
Organization of the  
United Nations

ISBN 978-92-51-46119-8

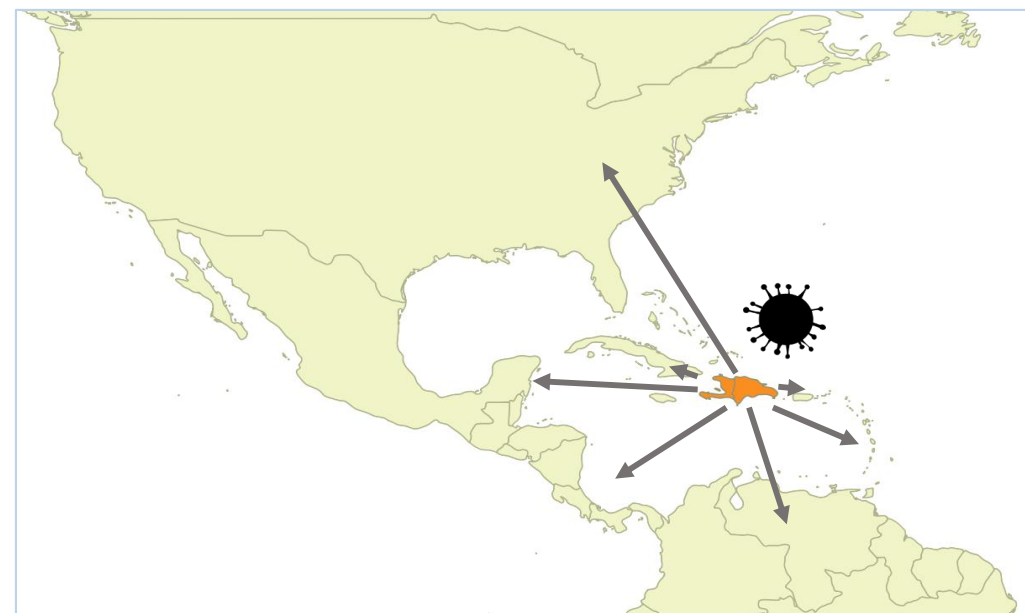
Qualitative risk assessment for  
African swine fever virus introduction

Caribbean, South, Central and North Americas



## Scope and methodology of the risk assessment

- Risk of ASF introduction from Hispaniola island to unaffected countries/territories in the Americas
- **Targeted region:** Americas, including 35 countries and 18 territories
- **Period covered**  
December 2021 – February 2022
- **Introduction** = likelihood of entry x likelihood of exposure
- **Consequences** assessed in economic impact section



## Scope and methodology of the risk assessment

### Data collection

- 169 questions survey addressing multiple risk factors
- 35/53 answers received from countries/territories
- Various secondary sources (reports, publications, databases...)
- 6 questions addressing **likelihood of entry** through 6 key risk pathways
- 1 question addressing **likelihood of exposure**
- 5 likelihood levels (negligible to high)
- 3 uncertainty levels (low to high) to reflect data availability and quality

Likelihood estimate	Definition
High	The event is highly likely to occur
Moderate	The event is potentially occurring
Low	The event is unlikely to occur
Very Low	The event is very unlikely to occur
Negligible	The event is extremely unlikely to occur/almost never occurring

Based on [FAO Rapid risk assessment](#) and [WOAH import risk analysis](#) methodologies

What is the likelihood of ASF virus being introduced from Hispaniola island to non-affected countries/territories in the Americas through...



Q.1 Live pig trade



Q.2. Pork products importations



Q.3. Pig genetic material importations



Q.4. Food waste



Q.5. Fomites



Q.6. Feed of animal origin

Level of uncertainty	Definition
High uncertainty	Lack of data, limited data, or lack of conclusive data; weak correlation or crude speculation
Medium uncertainty	Small sample data set(s), fair correlation/good fit; reliable method
Low uncertainty	Large sample data set(s); known fact, event known to occur, or exact measure



## Results – Likelihood of entry of ASFv from Hispaniola island to unaffected countries/territories

Based on answers from questionnaires and various sources including data on trade, tourism, migration, prevention and control measures in place...

Risk Pathways								
Likelihood of entry	Live pig trade		Pork products importations		Pig genetic material importations	Food waste	Fomites	Animal-origin feed
	Formal	Informal	Formal	Informal				
Highest level	Very low	Low to Moderate	Very low	Moderate	Negligible	Moderate	Moderate	Low
Lowest level	Negligible	Negligible to very low	Negligible	Very low	Negligible	Very low	Very low	Negligible to low

**Highest likelihood of entry = Moderate** for several countries/territories through informal live pig trade ; informal pork product importation ; food waste ; fomites - notably Cuba, Jamaica, and Puerto Rico.

**Smuggling of pork products** through tourism/migration flows is a very important risk pathway and not easy to control.

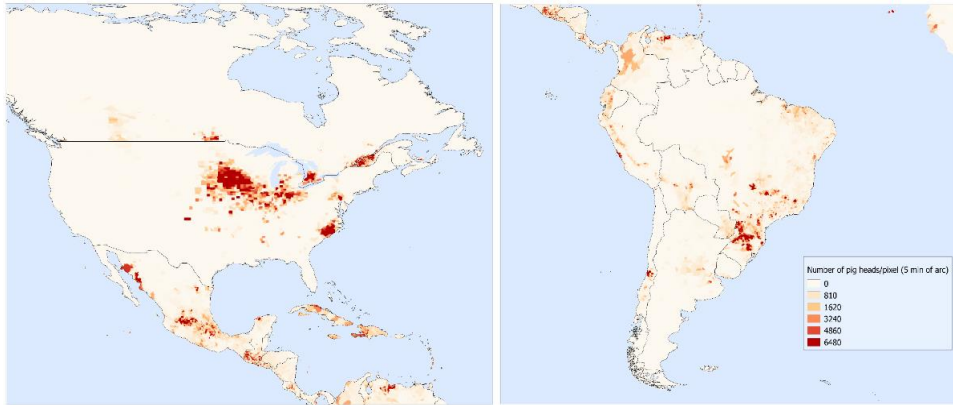
Other risk pathways, especially those related to formal trade of commodities (live pig, pig genetic material) are more secondary and present lower likelihoods given the current regulatory frameworks in place.

## Results – Likelihood of exposure

Should ASF virus enter an unaffected country or territory in the Americas, how likely are susceptible hosts to be exposed to ASF virus?

Several key risk factors to look at:

**Figure 3. Distribution of domestic pigs in the Americas in 2010 (adapted from Gilbert et al., 2018)**



Open landfills accessible to pigs and waste management

Self-evaluation on preparedness filled by 35 countries/territories



Presence of feral or wild pigs



Swill feeding practices

Country/territory	Preparedness in terms of provisions for...					Total score out of a maximum of 15
	laboratory diagnosis	quarantine and movement control	stamping out	carcasses disposal	affected premises cleaning and disinfection	
United States of America	3	3	3	3	3	15
Mexico	3	3	3	3	3	15
Chile	3	3	3	3	3	15
Paraguay	3	2	3	3	3	14
Cuba	2	3	3	3	3	14
Brazil	3	3	2	3	3	14
Colombia	3	2	3	2	3	13
Panama	3	3	2	2	3	13
French Guyana	3	1	3	3	3	13
Bonaire	3	2	2	3	1	11
Jamaica	1	2	3	2	3	11
Peru	3	2	2	2	2	11
Costa Rica	3	2	2	2	2	11
Guadeloupe	3	2	2	2	2	11
Martinique	2	2	2	2	3	11
Dominica	2	2	2	2	2	10
Trinidad and Tobago	2	2	2	2	2	10
Uruguay	1	3	2	2	2	10
Nicaragua	2	2	2	2	2	10
Honduras	2	2	2	2	2	10
Saint Vincent and the Grenadines	2	2	1	1	3	9
Curaçao	1	2	1	3	2	9
Ecuador	2	2	1	1	3	9
Puerto Rico	2	3	1	1	2	9
Barbados	1	2	1	2	2	8
British virgin Islands	1	2	2	1	2	8
Venezuela (Bolivarian Republic of)	1	2	1	1	3	8
Suriname	2	1	1	1	2	7
Aruba	2	1	1	2	1	7
Saint Martin	2	1	2	1	1	7
El Salvador	1	1	1	1	2	6
Cayman Islands	1	1	1	1	2	6
Turks and Caicos Islands	1	1	1	1	1	5
Sint Eustatius	1	1	1	1	1	5
Saint Lucia	1	1	1	1	1	5

## Results – *Likelihood of exposure*

**Should ASF virus enter an unaffected country or territory in the Americas, how likely are susceptible hosts to be exposed to ASF virus?**

**High with high uncertainty** for countries and territories that demonstrate several of the following risk factors:

1. Presence of pigs (domestic, feral or wild);
2. High proportion (above 50 percent) of domestic pigs kept in low biosecurity holdings (e.g. backyard and smallholder farms);
3. Low biosecurity practices predominant in the pig sector, particularly linked to the number of backyard holdings and smallholder farms;
4. Swill feeding = common practice;
5. Poor preparedness for ASF prevention and control;
6. Significant presence of poor waste management systems.

**Low with high uncertainty** for other countries and territories in the Americas due to:

1. either very low to low densities/numbers of domestic pigs
2. or moderate to high density of domestic pigs but with overall high biosecurity in the production sector and low proportion (<20%) of domestic pigs kept in low biosecurity holdings

## Likelihood of entry estimates per country/territory and risk pathway addressed

*Note: Likelihood levels for entry of ASF virus through formal importations of live pigs and pork products (i.e. negligible to very low for all countries/territories), and formal and informal importations of pig genetic materials (i.e. negligible for all countries and territories) are not shown in the table.*

Pathways	Introduction through informal live pig importation	Introduction through informal importations of pork products	Introduction through food waste	Introduction through fomites	Introduction through importation of feed of animal origin
<b>Country/territory</b>					
<b>Cuba</b>	Low to Moderate	Moderate	Moderate	Moderate	Low
<b>Jamaica</b>	Low to Moderate	Moderate	Moderate	Moderate	Low
<b>Puerto Rico</b>	Low to Moderate	Moderate	Moderate	Moderate	Low
<b>Aruba</b>	Negligible to very low	Moderate	Moderate	Moderate	Low
<b>Bonaire</b>	Negligible to very low	Moderate	Moderate	Moderate	Low
<b>Colombia</b>	Negligible to very low	Moderate	Moderate	Moderate	Negligible to Low
<b>Curaçao</b>	Negligible to very low	Moderate	Moderate	Moderate	Low
<b>Mexico</b>	Negligible to very low	Moderate	Moderate	Moderate	Negligible to Low
<b>Panama</b>	Negligible to very low	Moderate	Moderate	Moderate	Negligible to Low
<b>Turks and Caicos Islands</b>	Negligible to very low	Moderate	Moderate	Moderate	Low
<b>Venezuela (Bolivarian Republic of)</b>	Negligible to very low	Moderate	Moderate	Moderate	Negligible to Low
<b>United States of America</b>	Negligible to very low	Moderate	Low	Moderate	Negligible to Low
<b>Argentina</b>	Negligible to very low	Low to Moderate	Low	Moderate	Negligible to Low
<b>Bolivia (the Plurinational State of)</b>	Negligible to very low	Low to Moderate	Low	Moderate	Negligible to Low
<b>Brazil</b>	Negligible to very low	Low to Moderate	Low	Moderate	Negligible to Low
<b>Chile</b>	Negligible to very low	Low to Moderate	Low	Moderate	Negligible to Low
<b>Costa Rica</b>	Negligible to very low	Low to Moderate	Low	Moderate	Negligible to Low
<b>Dominica</b>	Negligible to very low	Low to Moderate	Low	Moderate	Negligible to Low
<b>Ecuador</b>	Negligible to very low	Low to Moderate	Low	Moderate	Negligible to Low
<b>El Salvador</b>	Negligible to very low	Low to Moderate	Low	Moderate	Negligible to Low
<b>Guadeloupe</b>	Negligible to very low	Low to Moderate	Low	Moderate	Negligible to Low
<b>Guatemala</b>	Negligible to very low	Low to Moderate	Low	Moderate	Negligible to Low
<b>Honduras</b>	Negligible to very low	Low to Moderate	Low	Moderate	Negligible to Low
<b>Martinique</b>	Negligible to very low	Low to Moderate	Low	Moderate	Negligible to Low
<b>Nicaragua</b>	Negligible to very low	Low to Moderate	Low	Moderate	Negligible to Low
<b>Paraguay</b>	Negligible to very low	Low to Moderate	Low	Moderate	Negligible to Low

## Likelihood of entry estimates per country/territory and risk pathway addressed (cont.)

Pathways	Introduction through informal live pig importation	Introduction through informal importations of pork products	Introduction through food waste	Introduction through fomites	Introduction through importation of feed of animal origin
<b>Country/territory</b>					
<b>Peru</b>	Negligible to very low	Low to Moderate	Low	Moderate	Negligible to Low
<b>Belize</b>	Negligible to very low	Low to Moderate	Low	Low	Negligible to Low
<b>French Guyana</b>	Negligible to very low	Low to Moderate	Low	Low	Negligible to Low
<b>Guyana</b>	Negligible to very low	Low to Moderate	Low	Low	Negligible to Low
<b>Saint Lucia</b>	Negligible to very low	Low to Moderate	Low	Low	Negligible to Low
<b>Suriname</b>	Negligible to very low	Low to Moderate	Low	Low	Negligible to Low
<b>Trinidad and Tobago</b>	Negligible to very low	Low to Moderate	Low	Low	Negligible to Low
<b>Uruguay</b>	Negligible to very low	Low to Moderate	Low	Moderate	Negligible to Low
<b>Anguila</b>	Negligible to very low	Very low to Low	Very low	Very Low	Negligible to Low
<b>Antigua and Barbuda</b>	Negligible to very low	Very low to Low	Very low	Very Low	Negligible to Low
<b>Bahamas</b>	Negligible to very low	Very low to Low	Very low	Very Low	Negligible to Low
<b>Barbados</b>	Negligible to very low	Very low to Low	Very low	Very Low	Negligible to Low
<b>British Virgin Islands</b>	Negligible to very low	Very low to Low	Very low	Very Low	Negligible to Low
<b>Canada</b>	Negligible to very low	Very low to Low	Very low	Very Low	Negligible to Low
<b>Cayman Islands</b>	Negligible to very low	Very low to Low	Very low	Very Low	Negligible to Low
<b>Grenada</b>	Negligible to very low	Very low to Low	Very low	Very Low	Negligible to Low
<b>Montserrat</b>	Negligible to very low	Very low to Low	Very low	Very Low	Negligible to Low
<b>Saba</b>	Negligible to very low	Very low to Low	Very low	Very Low	Negligible to Low
<b>Saint Barthélemy</b>	Negligible to very low	Very low to Low	Very low	Very Low	Negligible to Low
<b>Saint Kitts and Nevis</b>	Negligible to very low	Very low to Low	Very low	Very Low	Negligible to Low
<b>Saint Martin</b>	Negligible to very low	Very low to Low	Very low	Very Low	Negligible to Low
<b>Saint Vincent and the Grenadines</b>	Negligible to very low	Very low to Low	Very low	Very Low	Negligible to Low
<b>Sint Eustatius</b>	Negligible to very low	Very low to Low	Very low	Very Low	Negligible to Low
<b>Sint Maarten</b>	Negligible to very low	Very low to Low	Very low	Very Low	Negligible to Low
<b>United States Virgin Islands</b>	Negligible to very low	Very low to Low	Very low	Very Low	Negligible to Low

## Discussion/Conclusion

- **Lack of data = high uncertainty** for several questions of the risk assessment
- **Questions with low uncertainty:** formal trade of live pigs, pork products, and genetic materials
- Nonetheless **major risk factors** were **considered** with **information from the field** with survey feedback
- Likelihood levels of entry and exposure were not combined to better reflect each segment of risk introduction
- Likelihood of exposure not addressed in details given the lack of data
- Important knowledge gaps existing = room for improvement
- Risk of ASFV introduction through informal importations from affected countries beyond the Americas not considered, however does exist



## Recent global ASF risk assessment as an attempt to quantify risk factors and potential geographic spread

Jiang D, Ma T, Hao M, Ding F, Sun K, et al. (2022) Quantifying risk factors and potential geographic extent of African swine fever PLOS ONE 17(4): e0267128. <https://doi.org/10.1371/journal.pone.0267128>

### Methodology could be discussed?

#### Spatial predictor variables

- ***Livestock factors*** - domestic pigs density
- ***Anthropogenic factors*** – human activity ( trade and travel)
  - ✓ Urban accessibility
  - ✓ Population density
  - ✓ Night time light
- ***Habitat factors***
  - ✓ Water vapour pressure
  - ✓ Land cover
  - ✓ Mean temperature
  - ✓ Elevation
  - ✓ Annual cumulative precipitation
  - ✓ Normalized difference vegetation index

## Relative contribution of livestock, anthropogenic and habitat factors to ASF risk

Relative contribution of livestock, anthropogenic and habitat covariates derived from the ensemble Boosted Regression Tree models

	Mean relative contribution $\pm$ SD	
	Domestic pigs	Wild boars
<b>Livestock*</b>	43.807	0.822
<b>Domestic pig density</b>	43.807 $\pm$ 6.533	0.822 $\pm$ 0.248
<b>Anthropogenic*</b>	16.377	4.163
<b>Urban accessibility</b>	11.512 $\pm$ 2.904	3.803 $\pm$ 2.391
<b>Population density</b>	2.811 $\pm$ 2.735	0.275 $\pm$ 0.096
<b>Night time light</b>	2.054 $\pm$ 0.725	0.085 $\pm$ 0.045
<b>Habitat factors*</b>	39.816	95.015
<b>Water vapour pressure</b>	13.678 $\pm$ 3.921	56.388 $\pm$ 6.399
<b>Land cover</b>	10.255 $\pm$ 4.126	2.191 $\pm$ 2.318
<b>Mean temperature</b>	6.173 $\pm$ 1.827	28.547 $\pm$ 2.848
<b>Elevation</b>	4.483 $\pm$ 1.496	3.097 $\pm$ 0.896
<b>Annual cumulative precipitation</b>	2.855 $\pm$ 0.757	0.655 $\pm$ 0.286
<b>Normalized difference vegetation index</b>	2.371 $\pm$ 0.573	4.138 $\pm$ 1.099

Source: Jiang D, Ma T, Hao M, Ding F, Sun K, et al. (2022) Quantifying risk factors and potential geographic extent of African swine fever PLOS ONE 17(4): e0267128.

<https://doi.org/10.1371/journal.pone.0267128>



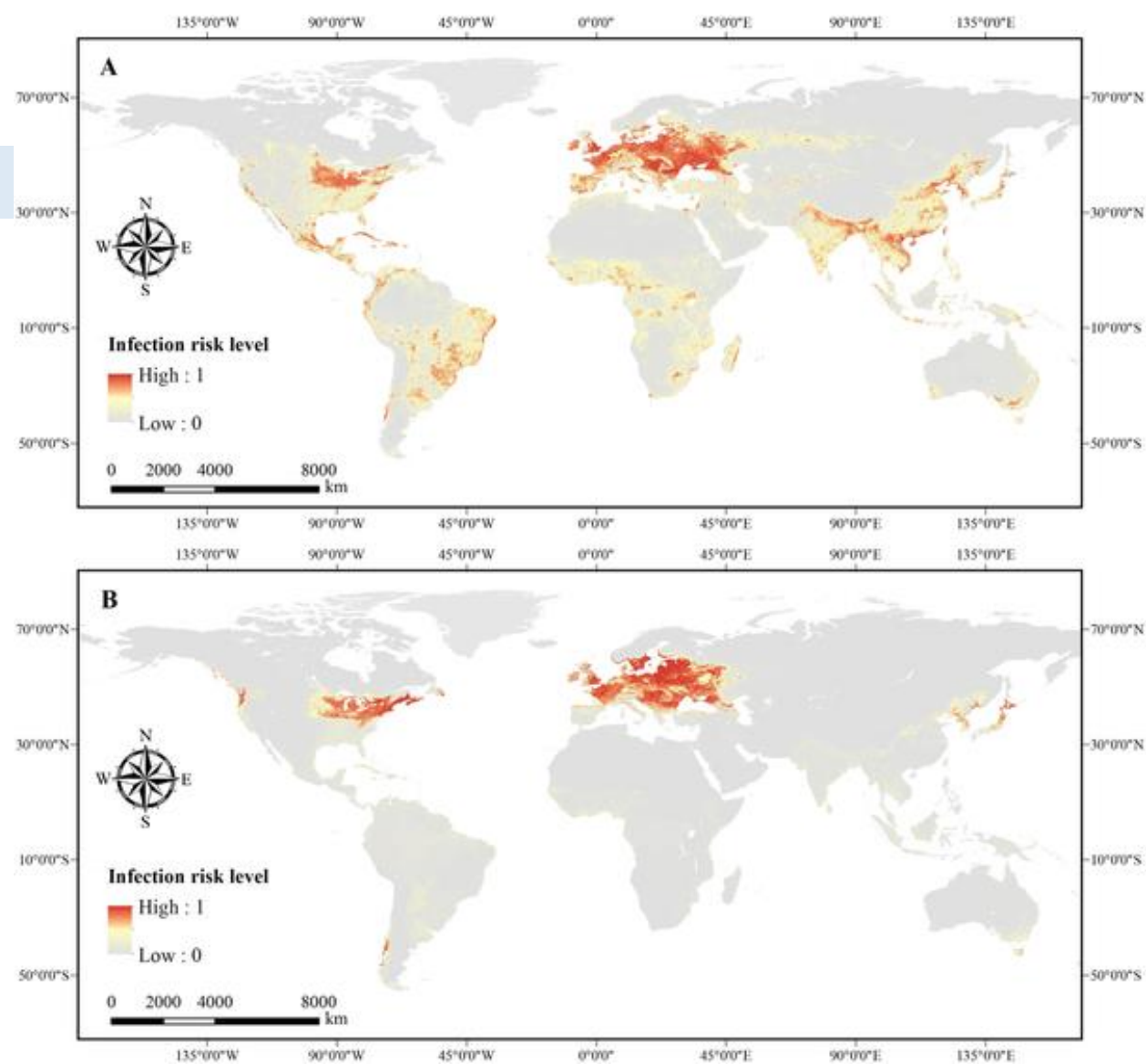


Figure 4 .Jiang D, Ma T, Hao M, Ding F, Sun K, et al. (2022) Quantifying risk factors and potential geographic extent of African swine fever across the world ranging from 0 (grey) to 1 (red), which were derived from **domestic pigs (A)** and **wild boar (B)** respectively. PLOS ONE 17(4): e0267128. <https://doi.org/10.1371/journal.pone.0267128>

## Key conclusions and messages

- Model predicts potential geographic scope of ASF spread could affect half of the world 's domestic pig population
- Model does not attempt to predict where the spread is likely, it just looks at the potential geographic niche of ASF
- Model is not perfect and had limitations, but importantly highlights that high risk area for ASF can be found in the Americas

### Acknowledgement

“Jiang D, Ma T, Hao M, Ding F, Sun K, et al. (2022) Quantifying risk factors and potential geographic extent of African swine fever PLOS ONE 17(4): e0267128. <https://doi.org/10.1371/journal.pone.0267128>



# Acknowledgement



Andriy Rozstalnyy, Xavier Roche, Damian TagoPacheco, Akiko Kamata, Daniel BeltranAlcrudo, Sergei Khomenko, Caryl Lockhart, José Urdaz, Gisela Gioia, Andres Gonzalez Serrano, Sophie VonDobschuetz, Madhur Dhingra, and Keith Sumption

## **External reviewers**

USDA APHIS: Ms María Celia Antognoli, Ms Sherrilyn Wainwright, Ms Gericke Cook, Mr Kevin Spiegel and, Ms Katheleen O'Hara

CFIA: Ms Sharon Calvin, Ms Janessa Brown, and Ms Lorne Jordan

Dirk Pfeiffer, Professor, City University of Hong Kong, Hong Kong, SAR, China and Royal Veterinary Colleague of London, UK

## **Internal reviewers**

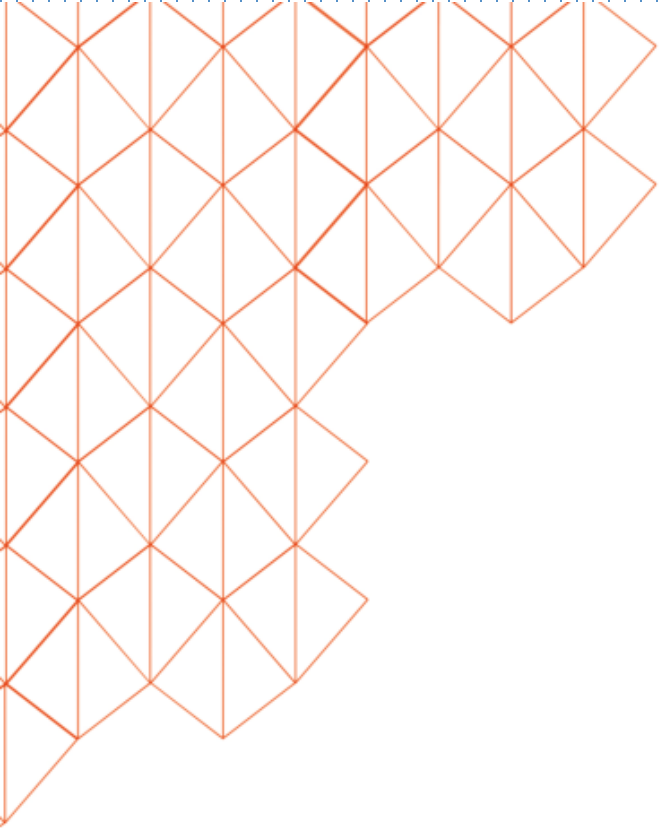
Katinka De Balogh, FAO Senior Animal Health Officer, Investment Center

Julio Pinto, FAO Animal Health Officer

Fairouz Larfaoui, FAO Animal Health Officer

Hernan Rojas, FAO Expert

**GF-TADs Americas to assist to reach out countries**



**THANK YOU**

