



# BIOSECURITY ALONG THE VALUE CHAIN IN THE CONTEXT OF AFRICAN SWINE FEVER CONTROL

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Third Meeting of the Standing Group of Experts (SGE) on  
African swine fever (ASF) of the GF-TADs for Africa

Abidjan, Cote d'Ivoire, 1 – 3 August 2023





## Structure of a smallholder pig sector (ex. of Uganda)

- ▶ Mostly backyard systems, managed by women and children
- ▶ Low productivity (breeds, feeds & health constraints)
- ▶ Uncoordinated trade & transport
- ▶ Predominantly unsupervised slaughter slabs, with no meat inspection in local markets, road-side butchers, pork joints
- ▶ Few medium and large scale piggeries
- ▶ Few formal processors





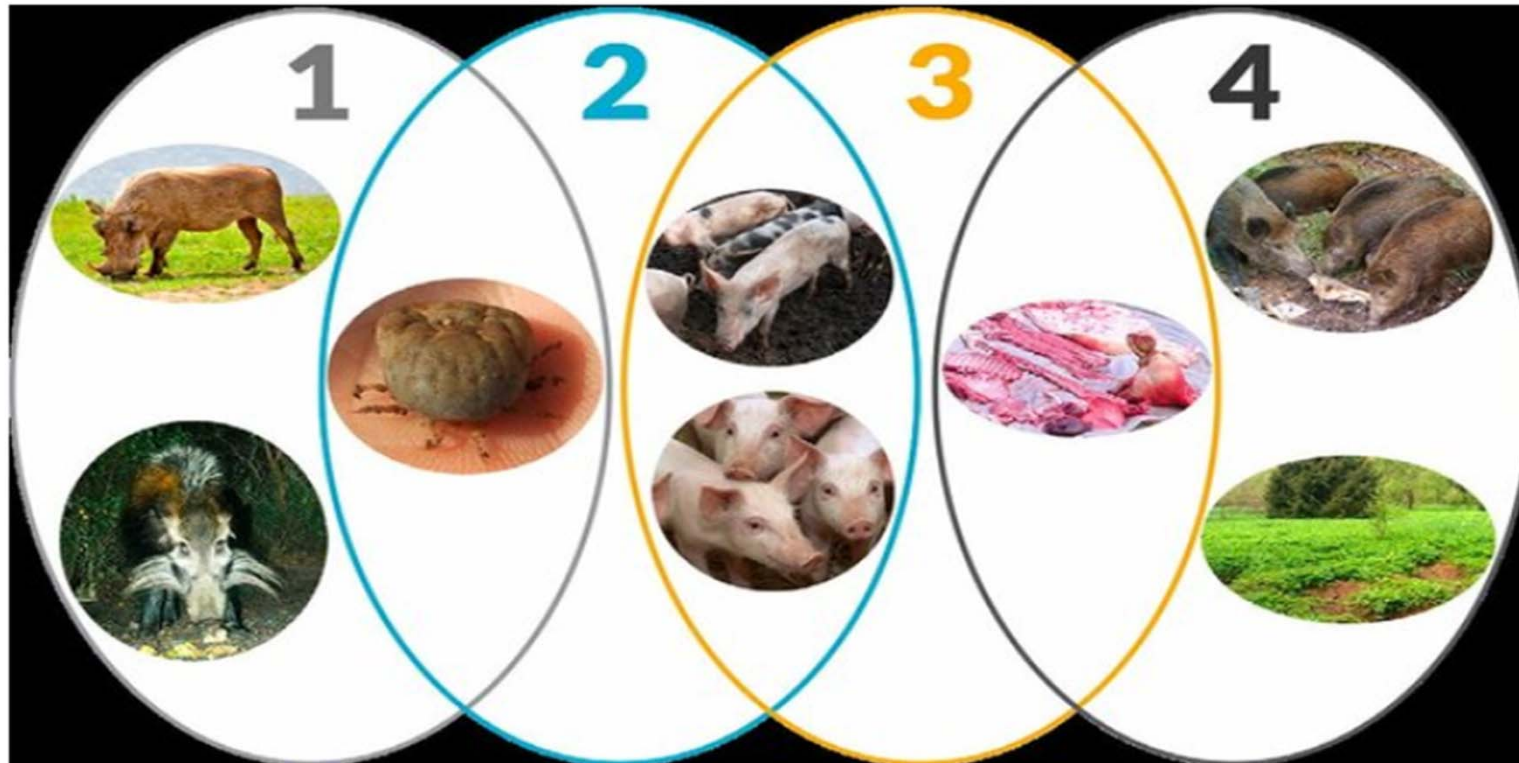
# Drivers of ASF virus spread



## Some properties of ASF virus

- The incubation period in domestic pigs ranges from 5 to 15 days
- The virus can survive in chilled meat or carcasses for up to 6 months, and at 4°C for two years; remain infective in smoked and salted pork.
- ASFV is highly resistant to putrefaction and can remain in feces for at least 11 days and in decomposed serum for 15 weeks
- Outbreak in Latvia was associated with failure to use simple biosecurity measures notably the feeding of virus-contaminated fresh grass or crops to naive pigs
- It has also been demonstrated that ASFV can survive in feed ingredients (under simulated transboundary shipping models)

## ASF virus transmission cycles



(1) **Sylvatic cycle:** the common warthog (*Phacochoerus africanus*) and soft ticks of *Ornithodoros* spp. The role of the bushpig (*Potamochoerus larvatus*) in the sylvatic cycle remains unclear.

(2) **The tick-pig cycle:** soft ticks and domestic pigs (*Sus scrofa domestica*).

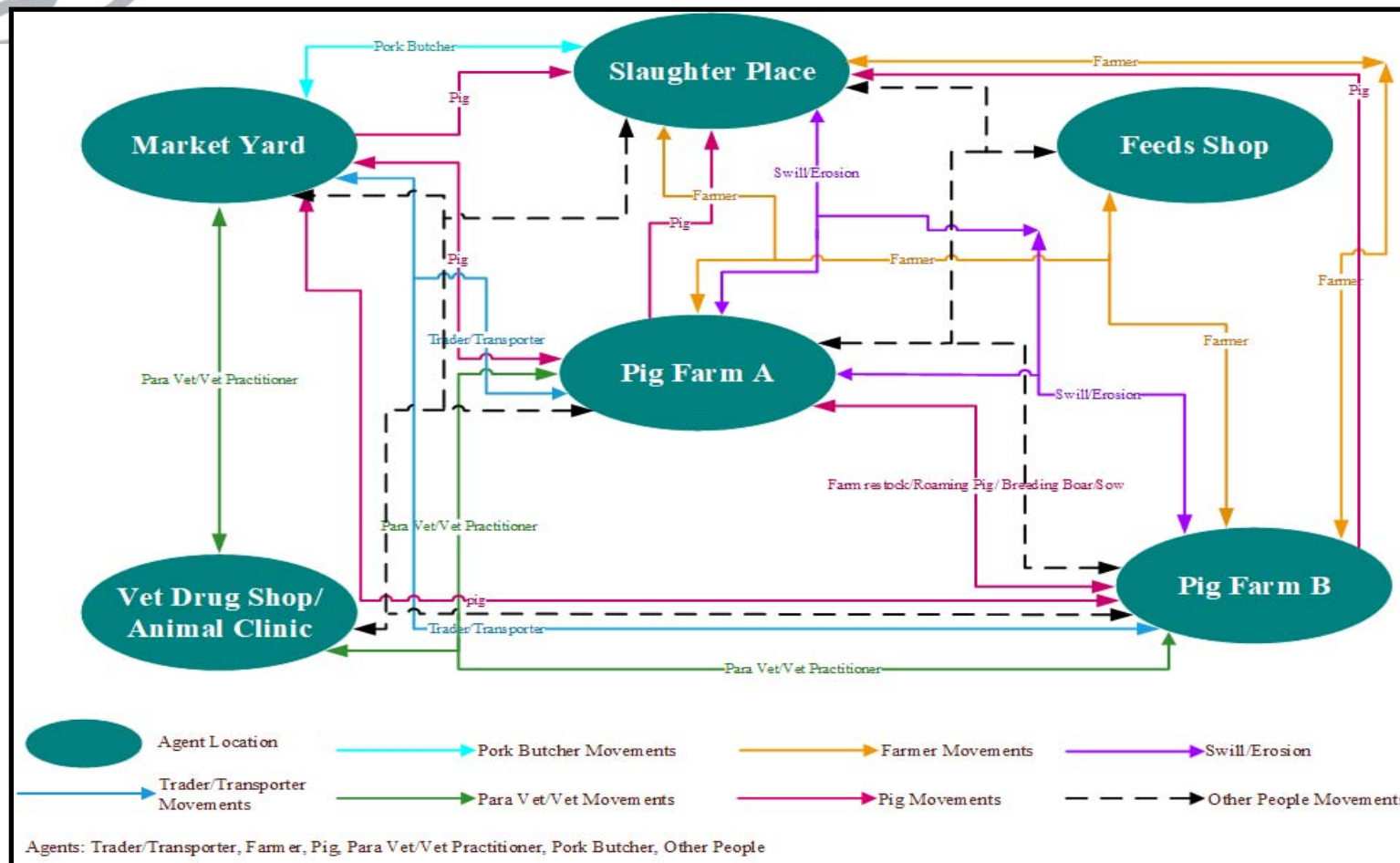
(3) **The domestic cycle:** domestic pigs and pig-derived products (pork, blood, fat, lard, bones, bone marrow, hides).

(4) **The wild boar-habitat cycle:** wild boar (*Sus scrofa*), pig- and wild boar-derived products and carcasses, and the habitat.

The figure is reproduced from Chenais et al. (2018)



# Social networks and movement of agents of the value chain





## Risk associated to ASFV spread at Farm level

- Pig keeping practices
  - Tethering
  - Free range
- Feeding practices (swill)
- Farm entry/exit without footbath
- Farm tools sharing
- Use of communal village boar
- Knowledge gaps of farmers (management of carcasses of dead pigs or pigs recovered from ASF)
- Input supplies (feed quality and movement of veterinarians)





## Risk associated to ASFV spread at transport-market level

- Traders, butchers & transporters: highest risk:
  - Illicit trade in pigs / pork
  - Indiscriminate wastes disposal
- Panic sales by farmers during outbreaks
- Movement from farm to farm without proper hygiene and biosecurity
- Mixing of pigs of unknown ASF status
- Trade of sick pigs Purchase of pigs from outbreaks areas
- Poor cleaning and disinfection of pig transportation means vehicles/clothing/shoes/boots
- Lack of capacity to identify sick pigs
- Poor knowledge about good biosecurity practices







## Risk associated to ASFV spread at slaughter slab and butcheries levels

- Slaughter of sick pigs
- Sale meat from sick pigs
- Absence of inspection
- Lack of reporting of outbreaks
- Poor disposal of offal
- Poor self-hygiene during meat processing
- Presence of stray dogs





# Risk associated to ASFV spread at slaughterhouse level



Viscera



Bulk waste (blood, pig feaces) not disposed systematically, could lead to public health risks, direct exposure of workers to waste.

Blood and GIT contents disposed into public water bodies - environmental and public health problems.



Blood from the slaughterhouse released into the waterway





## Risk associated to ASFV spread at consumer level (“pork joint; maquis”)

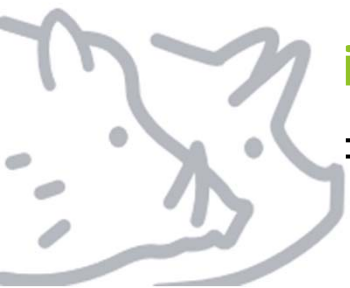
- Disposal of waste (borne, skin)
- Hygiene of cooking material
- Hygiene of the environment (existence of stray dog)





## There is other than ASF: Impact of parasitic infections and other pig diseases

#



- High burden of gastrointestinal parasites: 61.4% of pigs positive for one or more gastrointestinal helminths (*Strongyle*; *Metastrongylus* spp., *Ascaris suum*, *Strongyloides ransomi* and *Trichuris suis*, Coccidia oocysts)
- High prevalence of pathogens of production and public health importance (*Streptococcus suis*, *Leptospira* spp., PCV2, APP, *M. hyo.*, Influenza A, PPV, PRRVS)
- Impact of multimorbidity on pig health and productivity (vs. losses due to acute illness for instance ASF)







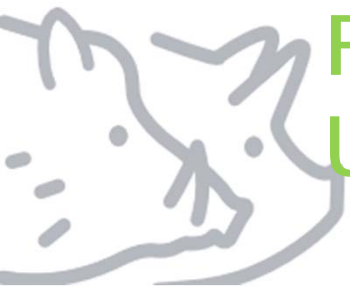
## Which actor earns most profits from biosecurity interventions

Benefits accrue for both ASF control and farmers margins when biosecurity and business hub interventions are implemented together

*Average annual % change of value chain actors' cumulative profit relative to baseline*

Scenario	Pig value chain actors				
	Producers	Butchers	Traders	Collectors	Wholesalers
ASF biosecurity Vs baseline	-6.2	8.1	10.3	8.6	8.0
Pig business hub Vs baseline	11.3	5.3	8.8	7.3	4.0
Combined ASF biosecurity and pig business hub	6.5	13.1	21.2	17.4	10.4

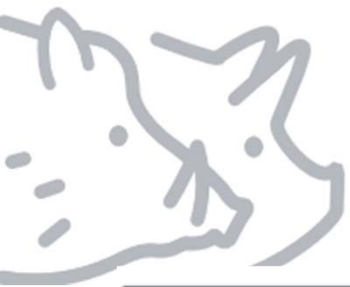




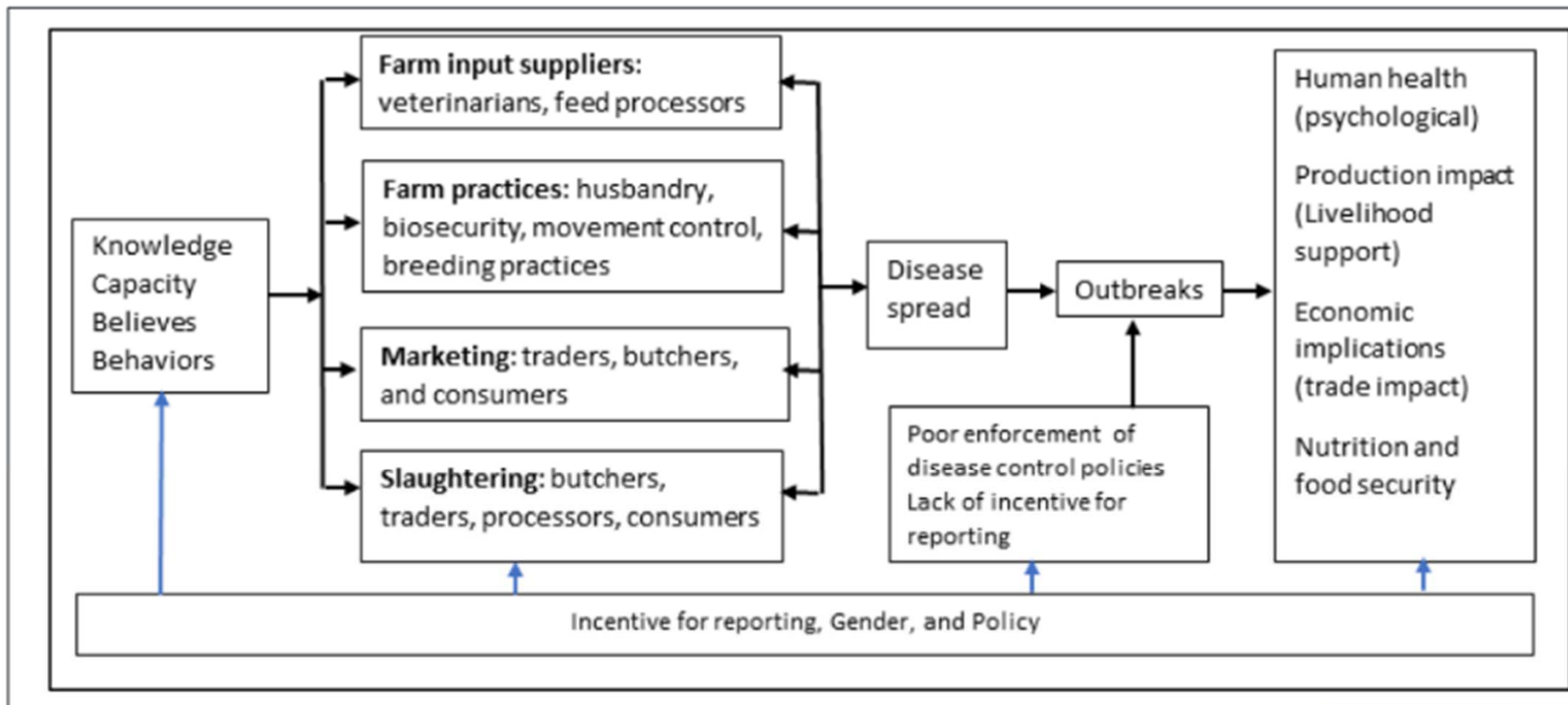
# Factors Likely to Influence the Uptake of Biosecurity Measures

- Lack of Knowledge and Lack of Awareness about good practices by Value Chain Actors
- Financial Limitations of Smallholders in Sub-Saharan Africa
- Socio-Cultural Factors





## Framework for the drivers of ASF spread







## Candidate interventions to enhance biosecurity along the pig value chains



# Capacity building of value chain actors on biosecurity



- 960 farmers involved in the study in Uganda
- Improved knowledge of pig farmers on biosecurity
- Reduced outbreaks in some areas following training
- Farmers are willing to take preventive action as they have observed the positive outcomes.



- Participatory training for butchers (47) has enhanced hygiene, carcass handling and biosecurity practices in Mukono Municipality, Uganda.
- Improved knowledge on good hygiene and sanitation, personal hygiene, and management of sick pigs and "abnormal pork"
- Some butchers have reported an increase in sales of pork as a result of adoption of best practices



Training of live pig collectors and traders of good biosecurity practices

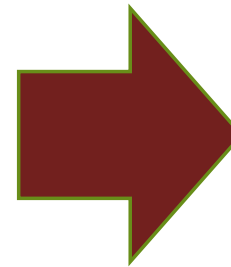
Training of veterinary services on good biosecurity practices and live pig management and meat inspection protocols





## Integrated biosecurity protocols

- Develop biosecurity protocols targeting ASF and other diseases (respiratory, parasites, malnutrition)
- Combine productivity (ASF/parasite control) and public health outcomes (ex. porcine cysticercosis)
- Animal welfare - better housing and live transportation of pigs
- Integrated interventions (feeds, breeds and health) for productivity outcomes



- Herd Health packages
- One Health Approach





## Important approaches to enhance adoption of good biosecurity practices

Stakeholder engagement and community-based approaches to biosecurity



Leverage from digital innovations to improve communication and learning



### ILRI launches mobile phone-based interactive voice advisory service for pig farmers in Uganda

Posted on 28 May, 2018 by Paul Karaimu

By Edwin Kang'ethe and Michel Dione



Nagadya Berna, a pig farmer in Zimwe Village, Masaka District, using the new interactive voice advisory service on her mobile phone (photo credit ILRI/Michel Dione).

Preventive Veterinary Medicine 151 (2018) 29–39

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**African swine fever control and market integration in Ugandan peri-urban smallholder pig value chains: An ex-ante impact assessment of interventions and their interaction**

Emily Ouma<sup>a,\*</sup>, Michel Dione<sup>a</sup>, Rosemirra Birungi<sup>a,b</sup>, Peter Lule<sup>a</sup>, Lawrence Mayega<sup>c</sup>, Kanar Dizyee<sup>d</sup>

Preventive Veterinary Medicine 135 (2016) 102–112

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**Qualitative analysis of the risks and practices associated with the spread of African swine fever within the smallholder pig value chains in Uganda**

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International Livestock Research Institute, P.O. Box 24384, Kampala, Uganda

frontiers in Veterinary Science

published: 02 August 2021  
doi: 10.3389/fvets.2021.00000

**The Context of Application of Biosecurity for Control of African Swine Fever in Smallholder Pig Systems: Current Gaps and Recommendations**

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Michel Dione<sup>1</sup>, Adediran Adeniyi Samuel<sup>2</sup>, Angie Colston<sup>2</sup>, Emily Ouma<sup>1</sup>, Peter Lule<sup>1</sup> and Delia Grace<sup>3</sup>

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Transboundary and Emerging Diseases

Original Article

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M. M. Dione ✉, J. Akol, K. Roesel, J. Kungu, E. A. Ouma, B. Wieland, D. Pezo

First published: 12 December 2015 | <https://doi.org/10.1111/tbed.12452> | Citations: 44

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Front. Vet. Sci., 27 April 2021  
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Front. Vet. Sci., 28 June 2021  
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First published: 20 April 2020 | <https://doi.org/10.1111/tbed.13587> | Citations: 17