African Swine Fever (ASF) Outbreak Investigation in Neverland, September-December, 2021

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Objectives & Expected outcomes

1. To identify likely **source of ASFv introduction** to the regions
2. To find out the **transmission routes** between households/villages/regions
3. To identify possible **risk factors** associated with the ASF outbreak, and **types of farms** and regions are at **higher/lower risk** of ASF
4. To estimate approximate **economic loss** may be due to ASF
5. To propose recommendations for control and prevention of the outbreaks

Target group and case definition

- A cross-sectional survey was conducted between September - December 2021 in **3 administrative regions** (assumption) with 10 ASF outbreaks ongoing

- **Target group**
  - Backyard households
  - Commercial farms
  - Wild pigs
- **Case definition**
  - **Animal level:**
    - Acute haemorrhagic fever (>40°C), reddening of the skin (white pigs) – tips of ears, tail, distal extremities, ventral aspects of chest and abdomen, severe lethargy, diarrhoea (sometime bloody), vomiting and eye discharge, sudden death, high mortality rate
    - OR/AND take blood samples for virus detection – positive result
  - **Household level:** Farm has at least one ASF positive pig confirmed

oach of investigation

CSF

ing questionnaire to collect information

- Differential diagnosis
  - Classical swine fever (CSF)
  - Porcine reproductive and respiratory syndrome (PRRS)
  - Porcine dermatitis and nephropathy syndrome (PDNS)
  - Erysipelas
  - Aujeszky's disease
  - Salmonellosis (and other bacterial septicaemias)
  - Poisoning

Pig suffering from mycotoxin poisoning

FAO, 2017: African Swine Fever: Detection and Diagnosis – A manual for veterinarians

Study size: Household/farm level

epitools.ausvet.com.au/output/f1a78eddfaaa1e826c874300e489415a_result.xls

```
Sample size to estimate a simple proportion (apparent prevalence)
Wed Dec  8 08:52:23 2021

Inputs
"Estimated Proportion"  "0.01"
"Desired precision of estimate" "0.05"
"Confidence level"      "0.95"
"Population size"       "30000"

Results
Sample size required for specified inputs
""      "V1"
"Large population"      16
"Population = 30000"    16

Sample sizes for varying prevalence and precision values
""      "AP = 0.01"     "AP = 0.02"     "AP = 0.05"     "AP = 0.1"      "AP = 0.2"      "AP = 0.5"
"Precision  = 0.01"     381     753     1825    3458    6147    9604
"Precision  = 0.02"     96      189     457     865     1537    2401
"Precision  = 0.05"     16      31      73      139     246     385
"Precision  = 0.1"      4       8       19      35      62      97
"Precision  = 0.2"      1       2       5       9       16      25
```

- Pigs from 3 assumed regions
- No of HH to be investigated will be calculated by Epitool
- No of HH: **381**

Study size: Animal level

Use this matrix to determine:

Minimum Sample Size Required For Detecting Disease at its Expected Prevalence within Herd or Flock

Confidence Level (α) default is 95.00% [ ] — Input a value only if different than default

Diagnostic Test Sensitivity (Sn) 95.00% — Input value is required.

Example: For a premises with 90 animals, testing 29 individual animals with a 86% sensitive test, at least one test should be positive (with 95% confidence) if disease prevalence is 10%.

Sample sizes in blue meet the statistical detection qualifications as described in the example above.
Sample size in black font = prevalence of disease is less than one infected premises for that zone size
= Minimum number of individuals to sample is the same as the total number of individuals available to sample in the herd or flock

Select this number of animals to

Herd or Flock Size	Prevalence of Disease																									
	0.01%	0.10%	0.50%	1.00%	2.00%	3.00%	4.00%	5.00%	6.00%	7.00%	8.00%	9.00%	10.00%	11.00%	12.00%	13.00%	14.00%	15.00%	16.00%	17.00%	18.00%	19.00%	20.00%	21.00%	22.00%	23.00%	24.00%
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	7	7	7	7	7
9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	8	8	8	8	8	7	7	7
10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	9	9	9	9	8	8	8	8	8
11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	10	10	10	9	9	9	9	8	8	8	8
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	11	11	11	10	10	10	9	9	9	9	9	8	8
13	13	13	13	13	13	13	13	13	13	13	13	13	13	12	12	12	11	11	11	10	10	10	9	9	9	9	8
14	14	14	14	14	14	14	14	14	14	14	14	14	13	13	12	12	12	11	11	11	10	10	10	9	9	9	8
15	15	15	15	15	15	15	15	15	15	15	15	14	14	13	13	12	12	12	11	11	11	10	10	9	9	9	9
16	16	16	16	16	16	16	16	16	16	16	16	15	15	14	14	13	13	12	11	11	11	11	10	10	9	9	9
17	17	17	17	17	17	17	17	17	17	17	16	16	15	14	14	13	13	12	12	11	11	11	10	10	10	9	9
18	18	18	18	18	18	18	18	18	18	17	17	16	16	15	14	14	13	13	12	12	11	11	10	10	10	10	9
19	19	19	19	19	19	19	19	19	19	18	18	17	16	15	15	14	13	13	13	12	12	11	11	10	10	10	9
20	20	20	20	20	20	20	20	20	20	19	18	17	16	16	15	14	14	13	13	12	12	11	11	10	10	10	9
21	21	21	21	21	21	21	21	21	20	19	19	18	17	16	15	15	14	13	13	12	12	11	11	11	10	10	10

Intraherd_Sample_Size_Matrix

- Pigs from 3 assumed regions
- No of pigs to be sampled will be calculated by using the APHIS/USDA spreadsheet
- Prevalence of ASF in the regions estimated: 20%?

Animal sample size is calculated using an electronic spreadsheet available at https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/ceah-toolbox/animal-sample-size-calculator

Stakeholder involved

- **Investigation team:**
  - 5 trained epidemiologists
  - Veterinarians from regions
  - Village paravets
  - Head of villages

- Who provides information, who are local people to be involved
  - Farm/HH owners or farm workers
  - Pig traders
  - Farm neighbors
  - Vet drug shops
  - Abattoirs
  - Forest official/wildlife group representative
  - Sales men (meat saler/supplier) (swill?)

Source and transmission

- **ASFV source:** Wild pigs contacts (**Q4**), blood, tissues, secretions and excretions of sick and dead animals, soft ticks of the genus Ornithodoros
- **Farm locations:** Distance to main roads, river, markets, slaughterhouse, pig farms, infected/suspected farms, animal disposal area
- **Biosecurity practices (Q5)**
  - **Fence** surrounding the farm
  - **Net** to prevent insects (e.g. flies)
  - **Disinfection bath** at the main entrance
  - **People** enter farm daily
  - **Changing shoes or clothes** before entering farm
  - Farm keep **pets** or other animals?
  - **Boot/equipment** disinfection
  - **Disinfectants**: Kind of disinfectants/How to use? When?
  - **Workers** live inside/outside farm

Source and transmission

- **Feed and water used (Q8)**
  - Source of **drinking/cleaning** water
  - Water treatment
  - Commercial/mixed feeding
  - **Swill feeding?**
  - Transportation feed to farm
  - Distance from feed stock to pig pen
  - Workers using pork in farm (bought from markets)?
- **Pig sources (Q6)**
  - Introduction of piglets from a breeding farm in the last 30 days?
  - Mating methods? Directly boar or insemination
- **Vaccination records (Q10)**
  - Types of vaccines (CSF, FMD, Mycoplasma, PVC2, PRRS, for each type of pigs); coverage

Production loss

DESIGNATED QUESTIONNAIRE (Q11)

- Morbidity/production losses
- No of sick pig: Body weight:_____ kg
- No of dead pig: Body weight:_____ kg
- Cost for treatment:
- Cost for disinfection:
- Cost for culling and disposal:
- Other loss:

Estimate cost for study

No	Activity	No of people involved	Quantity	Unit (USD)	Cost per unit (USD)	Total cost (USD)
1	**PILOT SURVEY (10 HH in 1 region)**					**1,835**
	Cost for epi team					
	Travel for 2 epidemiologists to 3 regions (return-airtickets/car rental)	2	1	Lump sum	600	1,200
	Daily Allowance	2	2	Day	60	240
	Accommodation	2	2	Lump sum	50	200
	Cost for local team (3 vets/region + paravets + head villages)					
	Car/motobike rental	5	1	Lump sum	20	100
	Daily Allowance	5	1	Day	15	75
	Cost for interviewee	1	10		2	20
2	**REL SURVEY (381 HH in 3 regions)**					**16,162**
	Cost for epi team					
	Travel for 5 epidemiologists to 3 regions (return-airtickets/car rental)	5	1	Lump sum	800	4,000
	Daily Allowance	5	12	Day	60	3,600
	Accommodation	5	12	Lump sum	50	3,000
	Cost for local team (3 vets/region + paravets + head villages)					
	Car/motobike rental	5	12	Lump sum	50	3,000
	Daily Allowance	5	12	Day	30	1,800
	Cost for interviewee	1	381	Questionnaire	2	762
3	**DATA ANALYSIS AND REPORT**	2	5		150	**1,500**
	TOTAL					**19,497**

Summary/discussion

- Summary
  - Need to design a good questionnaire
  - Conduct pilot questionnaire to adjust if neccessary
  - Identify risk factors associated with ASF in Neverland >>> recommend control measures

- Discussion
  - Sampling wild pigs? How to manage?
  - Sample size calculation: some epitool available
  - ELISA test – possible to always detect ASFv or only when the animals in fever period?

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THANK YOU FOR YOUR ATTENTION