

# Open session of the Standing Technical and Research Committees of the EuFMD

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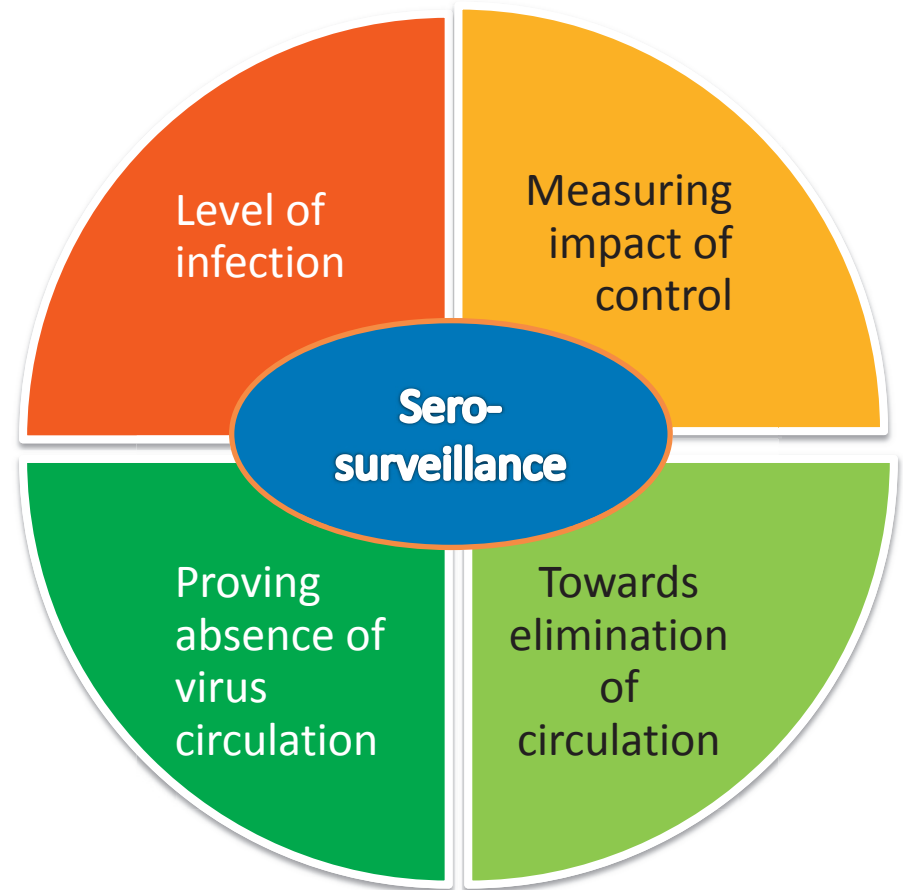
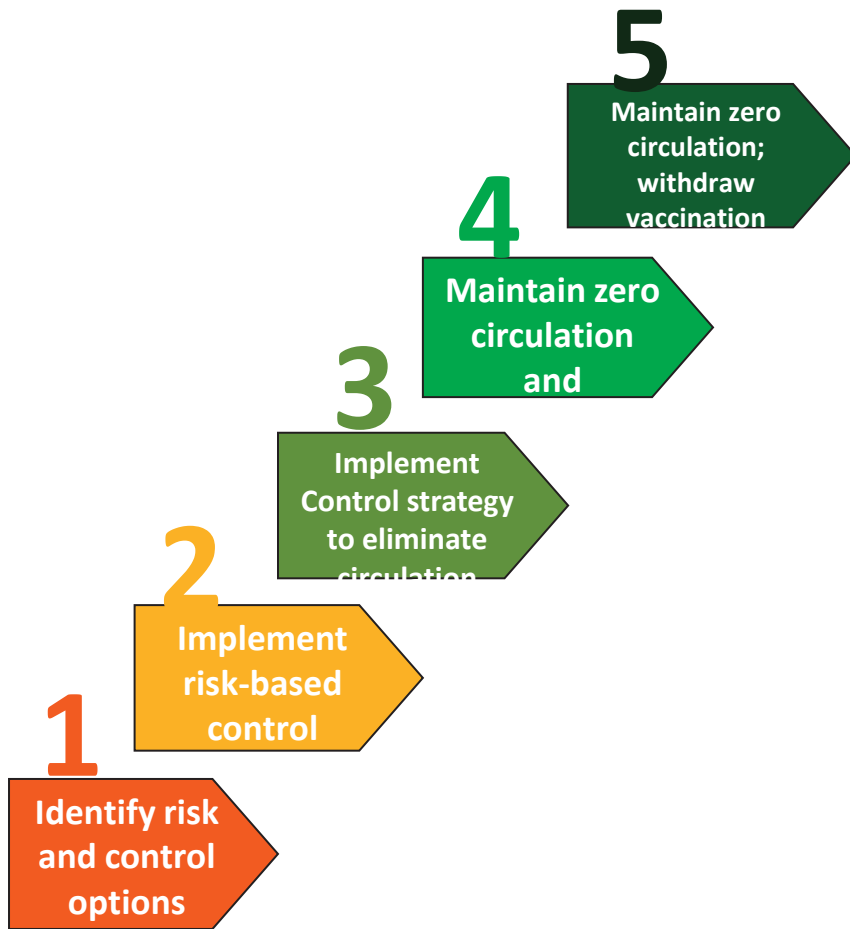
## Serosurveillance and the PCP-FMD

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# Serosurveillance for FMD Infection

- Useful:
  - To define/monitor level of infection
    - Gives picture over time (cumulative)
  - To differentiate risk in different regions, populations & measure economic impact
- Complements outbreak surveillance (clinical FMD)
  - Advantages: Captures subclinical infection, unreported disease
  - Limitations: Resource intensive
- This study: Review use of serosurveillance globally
  - Survey objectives, methodology, results

# Serosurveillance and the PCP



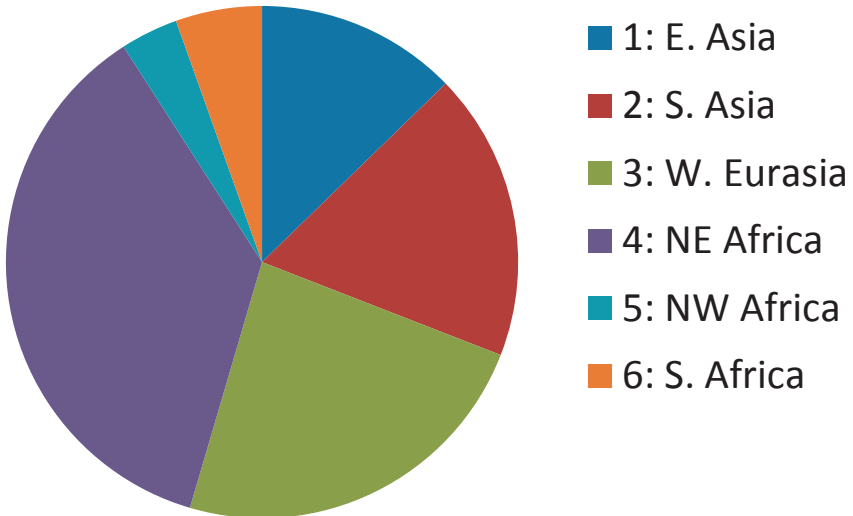
# Methods

- Literature review:
  1. Google Scholar search: (2005-2015)
    1. “foot and mouth disease prevalence (no hand)”
    2. “foot and mouth disease serological survey (no hand)”
    3. “foot and mouth disease serosurveillance”
  2. Look at references in papers
  3. Limit to domestic species, non-free countries
- Studies from colleagues (EuFMD, FAO, WRL)
- Develop database :
  - Study date, objective , species, number of samples, number epi-units, number regions, lab test used,
  - Adjust for Se/Sp, vaccination, age
  - Results: animal-level, epi-unit level, regional-level

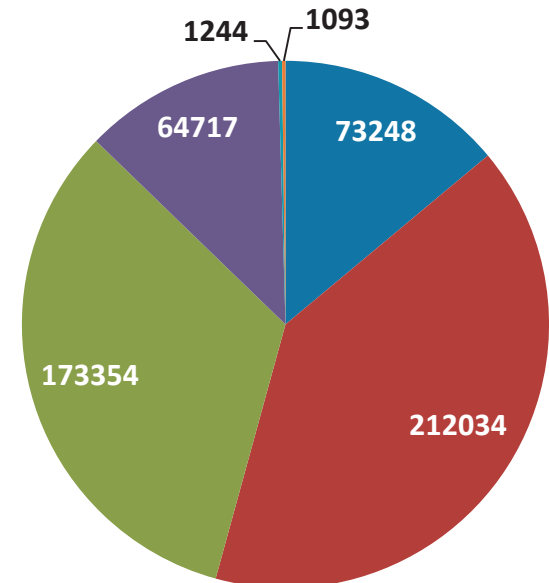
# Results

- 48 surveys identified:
  - 9 reported species-specific results separately → 57 studies to report
  - 22 different countries represented, virus pool 1-6

Number of studies by virus pool:  
2005-2014

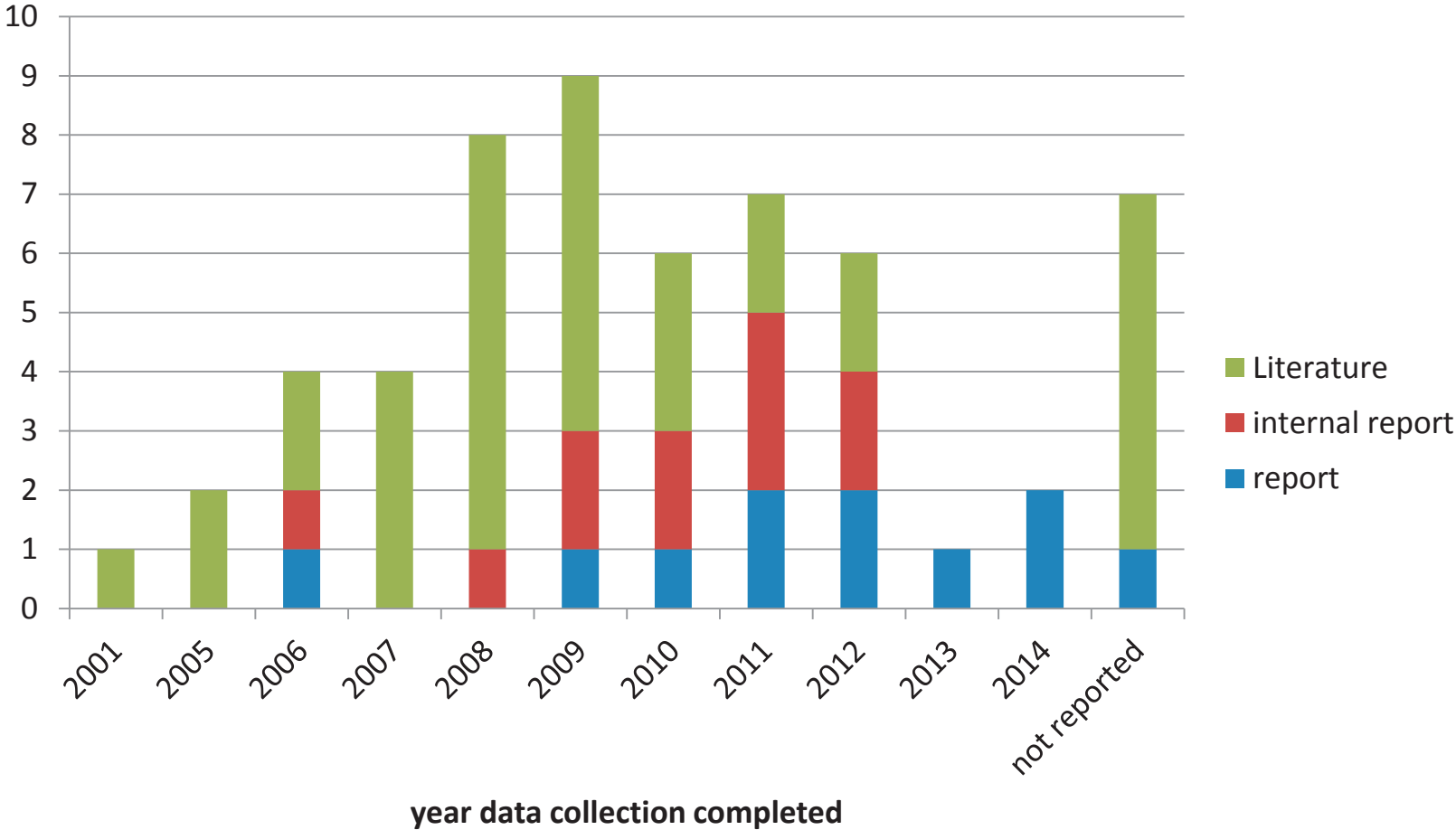


Number of samples per virus pool  
2005-2014



# Results

## Number of studies per year



# Results

## Survey objective:

- study epidemiology or measure “FMD prevalence”
  - At wildlife interface (3)
  - Inform plans for zoning (3)
  - Post outbreak (1)
  - Economic impact on exports to Arabic countries (Ethiopia)
  - Surveillance for eradication (Taiwan)
- 47% (27/57) were national surveys, rest focused on a particular region within the country
- 4 studies used sera from rinderpest eradication campaign

# Results

- Sample size varied from 46 to > 53,000

Species	Number Surveys	Sample size (mean, range)
Large ruminants	32	11,671 (228-52,224)
Small ruminants	14	6,000 (46-32,000)
Pigs	2	27,262 (766-53,759)
Mixed	5	3414 (448-9,241)
Not reported	2	1,716 (923-2,510)



# Results

- Test used:
  - NSP ELISA: 56% (32)
  - liquid phase blocking ELISA: 12 % (7)
  - LPB and NSP ELISAs : 28% (16) (NSP results reported)
  - virus neutralisation test: 4% (2)
- 4 studies reported adjustment for Se/Sp of test



# Results: How the surveys dealt with....

## 1. Vaccination:

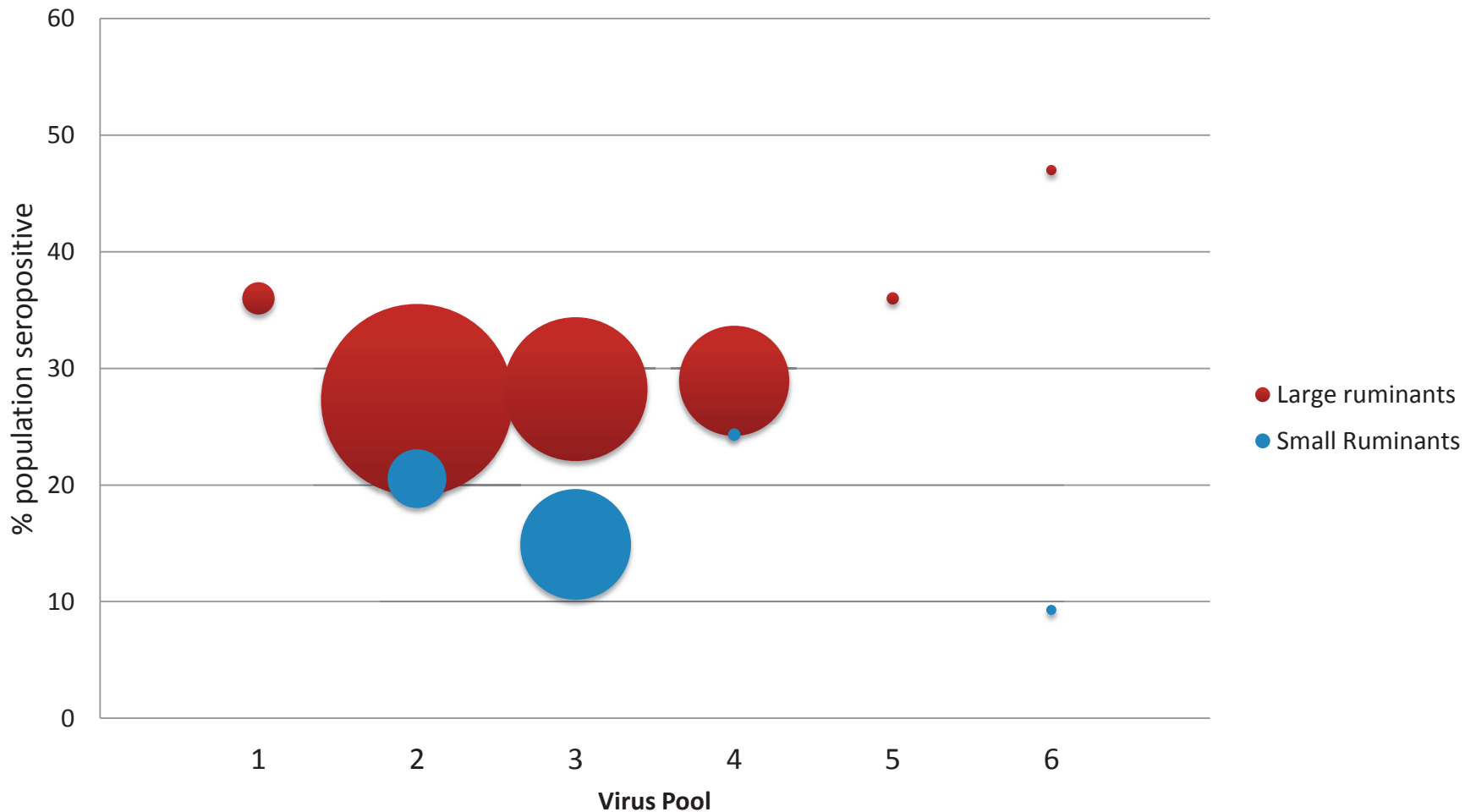
- 60% (34) studies did not report if animals vaccinated or not
- 19% (11) : animals not vaccinated
- 16% (9) mix of vaccinated and unvaccinated
- 5% (3) animals were vaccinated

## 2. Age:

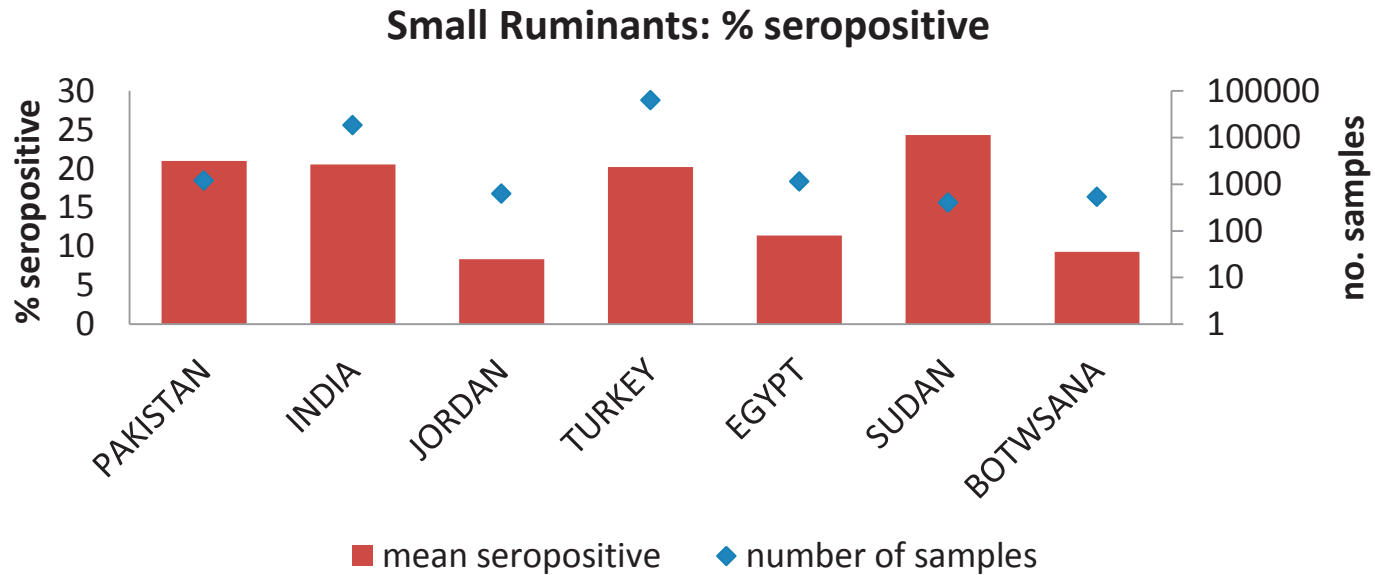
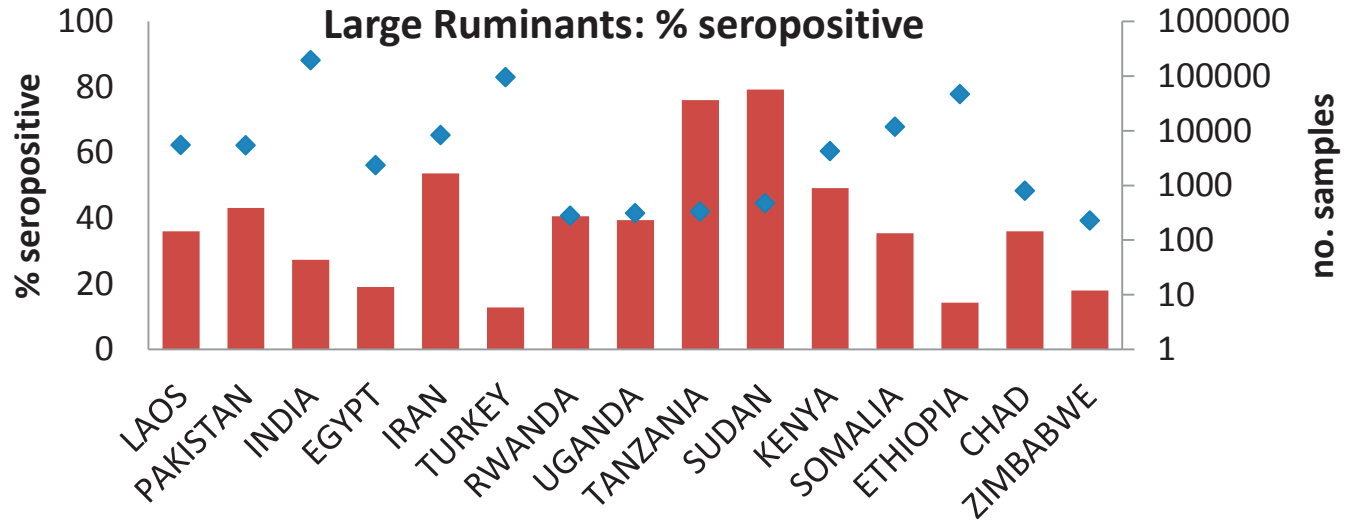
- 49% (27) did not report
- 31% (17) included in risk factor analysis
  - 27% (15) found higher seroprevalence in adults; 4% (2) found no difference
- 16% (9) young animals only
- 2% (1) only adult animals

# Results: animal level

Mean survey seroprevalence, by virus pool  
(Bubble size proportional to number of samples)



# Results: animal level

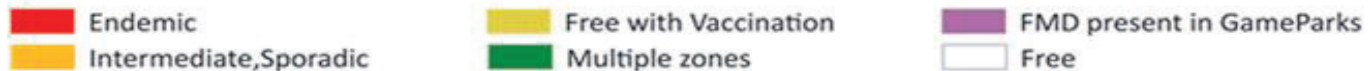
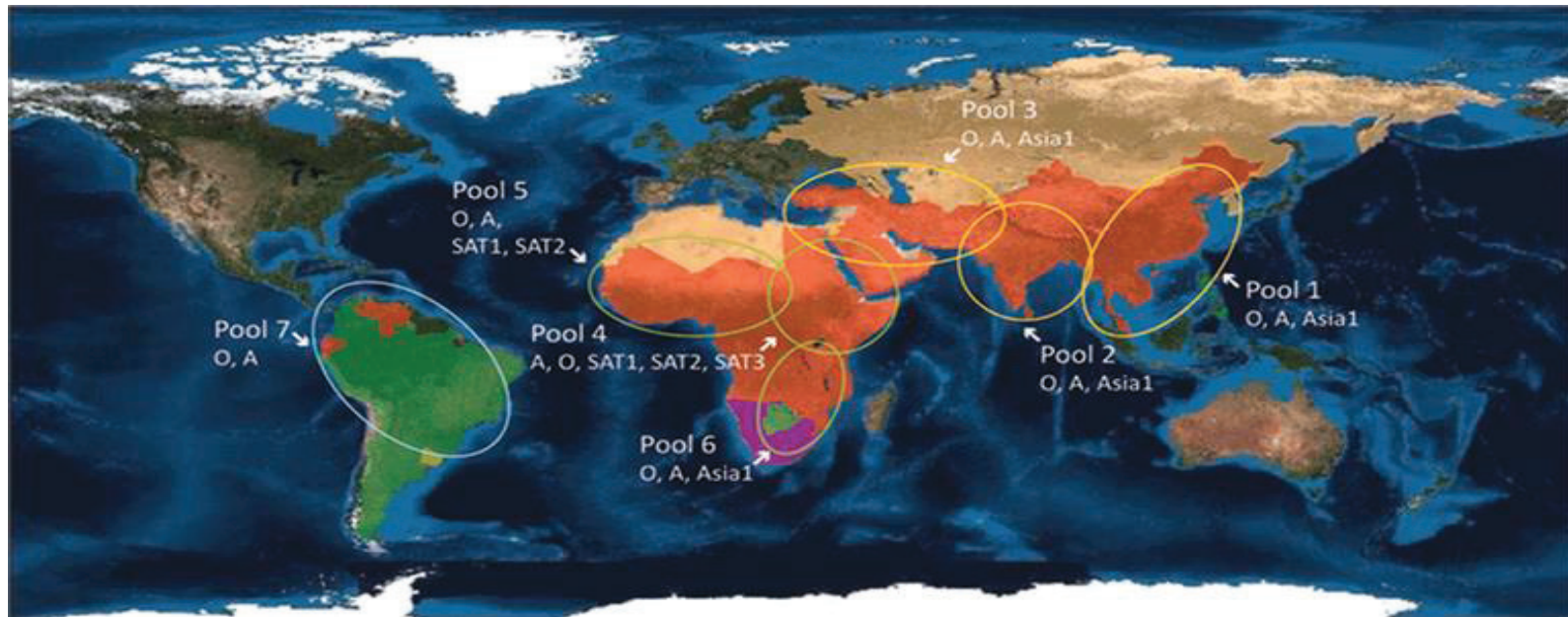
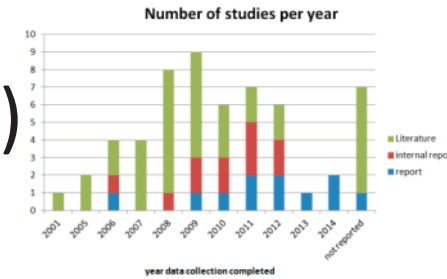


## Results: Regional level, Epi-unit level

1. Regional level (= animal level prevalence in different regions)
  - 49% (27) studies measured prevalence in different regions
  - Regional difference reported varied enormously:
    - 3-100% absolute difference (18% on average)
2. Epi-unit level: % farms or villages “positive”  
(definition of positive varies from 1-5 infected animals)
  1. Assessed in 20% (11) studies
  2. % positive epi-units ranged from 20-87%

# Discussion

- Number of studies increasing over time (?)
  - Pools 5, 6, 7 (W. & S. Africa, S. America seem under-represented)...
  - BUT many studies may be unpublished



# Discussion

- Study design will influence results enormously
  - Age of animals, vaccination status, study area, diagnostic test
    - Not consistently reported or analysed
  - Reporting of results: animal vs epi-unit level
    - Epi-unit level analysis appropriate because FMD is so infectious
  - Impacts interpretation and comparability of results
- Need for guidelines??
  - Objectives: when to do serosurvey, why?
  - Study design, including how to minimise bias/confounding
  - Data analysis: animal level, epi unit level
  - Interpretation of results

# Discussion: Value of serosurveys

- Address specific policy or research questions:
  - Strategy development (eg zoning), role of different species incl. wildlife
  - Demonstrate subclinical disease, under reporting, freedom from disease
- Some countries invest large amount annually
  - detailed tracking and analysis at subnational level





# Discussion: Serosurveys and the PCP

<b>PCP Stage</b>	<b>Stage 1 FOCUS</b> Getting an understanding about FMD virus transmission and impact	<b>Stage 2 FOCUS</b> Implement risk-based control to reduce impact of clinical FMD	<b>Stage 3 FOCUS</b> Implement control targeted at eliminating FMDV circulation	<b>Stage 4 FOCUS</b> Zero-tolerance of FMD outbreaks, with vaccination	<b>Stage 5 FOCUS</b> Keeping zero-tolerance of FMD outbreaks, without vaccination
<b>Use of Serosurvey</b>	<b>Define risks</b>	<b>Monitor risk and FMD as RBSP is implemented</b>	<b>Demonstrate reduced virus circulation</b>	<b>Demonstrate FMD freedom</b>	<b>Demonstrate FMD freedom</b>

**With appropriate design, analysis and interpretation!**

Thank you for your attention!

