



# Research Priorities in Support to the Global FMD Control Strategy

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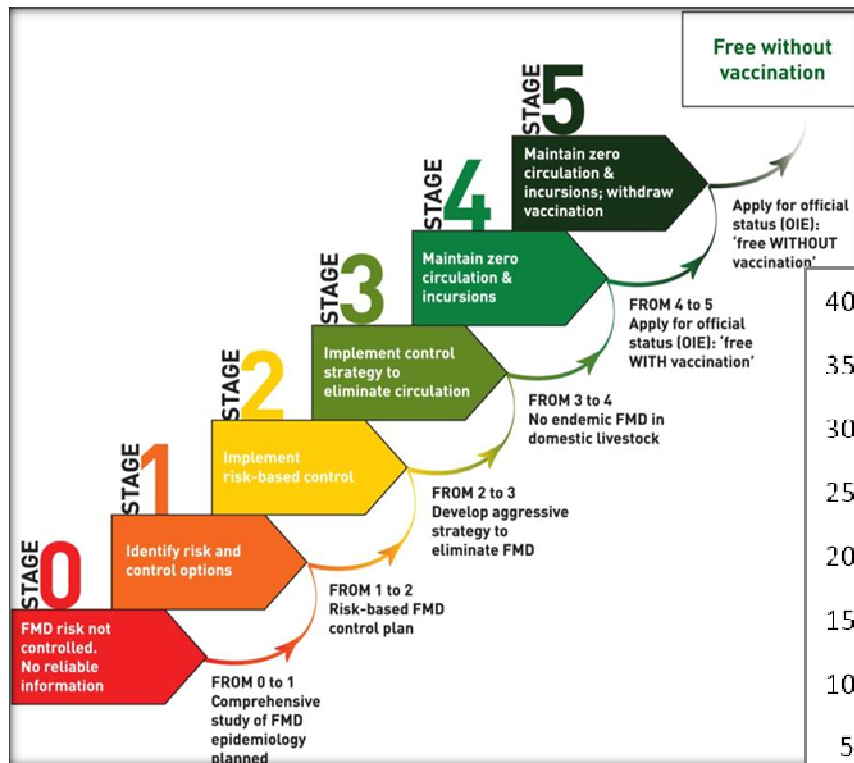
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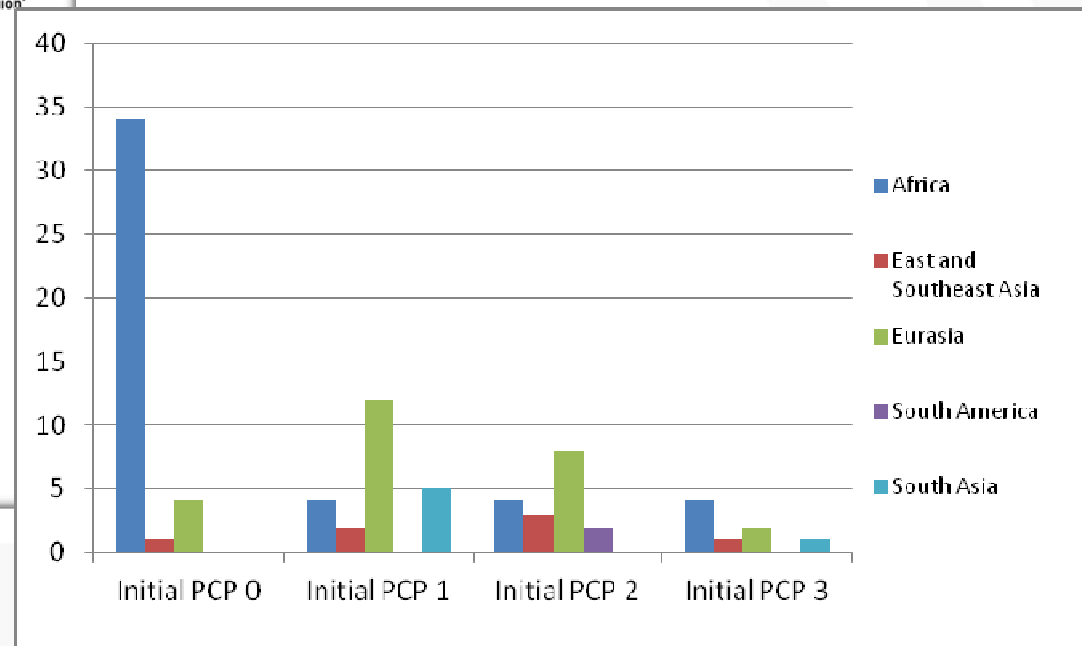




# PCP Stages (5)



Countries at PCP stages per region



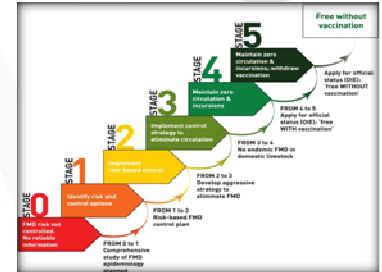
Source; GF-TAD FMD-WG , WB



- **Stage 0-1**: gain an understanding of the epidemiology of FMD in the country and develop a risk-based approach to reduce the impact of FMD

- **Missing Tools:**

- Develop and validate on-farm testing lateral flow device:
  - Universal antigen and serotype specific tests
- Develop and standardize methods for socioeconomic impact studies
- Develop and validate more sensitive and specific antigen and antibody typing ELISA (recombinant-based)- low cost
- Strategy of safe and effective vaccination in the face of an outbreak
- Share and develop farm biosecurity manual including disinfectants, carcass disposal ...etc



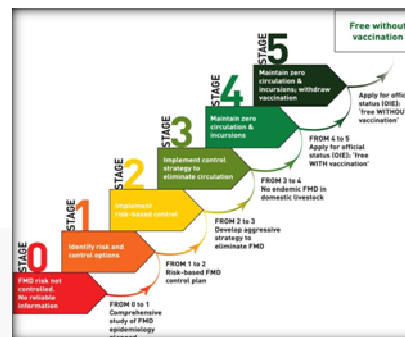
- **Stage 1-2:** “implement risk based control measures such that the impact of FMD is reduced in one or more livestock sectors and/or in one or more zones”
- **Missing Tools:**



- Develop and validate molecular serotype-specific assays
- Designing control programs and conducting applied research relevant to regional and national FMD control programs,
- Establish reliable method for sample preservation,
- Non-invasive samples for surveillance such as oral fluids and meat juice for swine and cattle,
- Carrier buffalo: Improved methods of VI and viral sequence, identify sites of virus localization in buffalo,
- More studies to understand the efficiency of carrier buffalo in transmitting the virus,

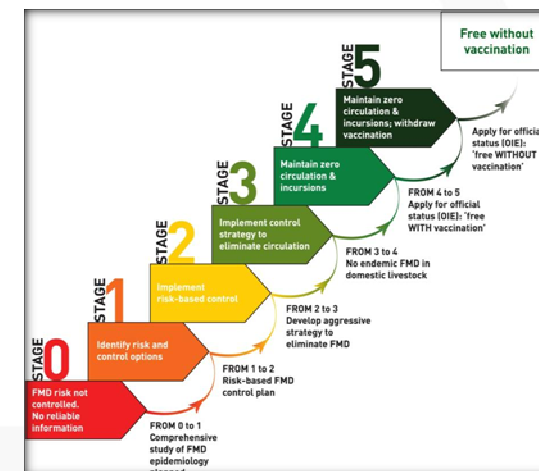


- **Stage 2-3:** “Progressive reduction in outbreak incidence, followed by elimination of FMD virus circulation in domestic animals in at least one zone of the country”
- **Missing Tools:**
  - Validated computer-based models to delineate possible vaccination zones which are required to aid decision-making during outbreaks
  - Establish warning system for early detection and reporting





- Stage **3-4**: “To maintain ‘zero tolerance’ of FMD within the country or zone and eventually achieve OIE recognition of FMD-free with vaccination”





# Post Vaccination Monitoring (Why)

- One of the most important components of FMD control is vaccination;
  - Vaccine cost \$ 0.7-1.0/dose and vaccination is up to \$ 0.7
  - Vaccination represents the highest cost of FMD control ~90% (12:1)
- Timely needed for global FMD control initiative
- Cost-benefits to vaccination = effectiveness of the vaccine
- Outbreaks have been reported in vaccinated animals
- Effectiveness of vaccine is complicated to measure because it is affected by a number of crucial elements



# Goals and Outcomes

- Design PVM system to evaluate FMD vaccine effectiveness
  - Universal
  - Country/region - specific
- Publish guidelines for PVM with associated SOPs and protocols for field use
  - FMD specific
  - With modification, this can be used for other vaccines
- Identify cause(s) of vaccine inadequacy or failure for timely improvement of control program
- Evaluate vaccine performance and provide feedback to manufacturer
- Create field data for correlation between field protection and SP antibody titers



# PVM working group (Jan 13, 2012)

virologists, diagnosticians, epidemiologists, statisticians, field vets



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- Bernd Haas

- **Merial and MSD**

# PVM:

## Elements contribute to vaccine effectiveness

- ❑ Vaccine quality including potency; low vs. high  $PD_{50}$
- ❑ vaccine performance characteristics in relation to circulating virus strains, r-value..etc
- ❑ strategic vaccination dictated by epidemiological setting
- ❑ vaccine coverage
- ❑ age of vaccinates
- ❑ vaccine shelf-life





## PVM: (continued)

### Elements contribute to vaccine effectiveness

- ❑ vaccination program: cycle, time of the year and frequency
- ❑ Vaccine availability during campaign
- ❑ health condition of vaccinates
- ❑ vaccine storage at recommended temp (cold chain)
- ❑ training of vaccinators for proper vaccine delivery
- ❑ Vaccination campaign and taskforce for PVM





# Parameters for PVM

- desired percent protection
- desired percent coverage of vaccinates
  
- Protective antibody titer to structural protein
  - Some published data showed strong correlation between in-vivo protection and virus neutralization test
  
- NSP at herd level
  - NSP best used in PCP stage 0 to determine FMDV prevalence at the country or regional level
  - In population vaccinated with pure vaccine, NSP can be used towards the end of PCP stage 3 to proof absence of virus circulation



# Design of PVM

- serological surveillance:
  - population selection based on farming system
  - animal identification (retention of tags) for serological surveillance
  - sample collection post vaccination;
    - day post vaccination
    - sample size at standard error of 5% &  $\geq$  95% confidence interval,
  - dx assays to use for SP and NSP analysis
- Clinical and passive virological surveillance:
  - conduct regular field investigations for early detection and characterization of circulating virus isolates
- data analysis:
  - Front end information on vaccine and vaccination
  - Serological and virological surveillance



- **Gaps of PVM:**
  - Vaccine quality control centers
  - Validated PVM screening tools; using vaccine virus strain in SP ELISA and VNT
  - Producers awareness and incentives



**Thank You for Your Attention**

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