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Protecting Livestock – Improving Human Lives

RVF
Vaccination strategies, vaccine availability and quality control

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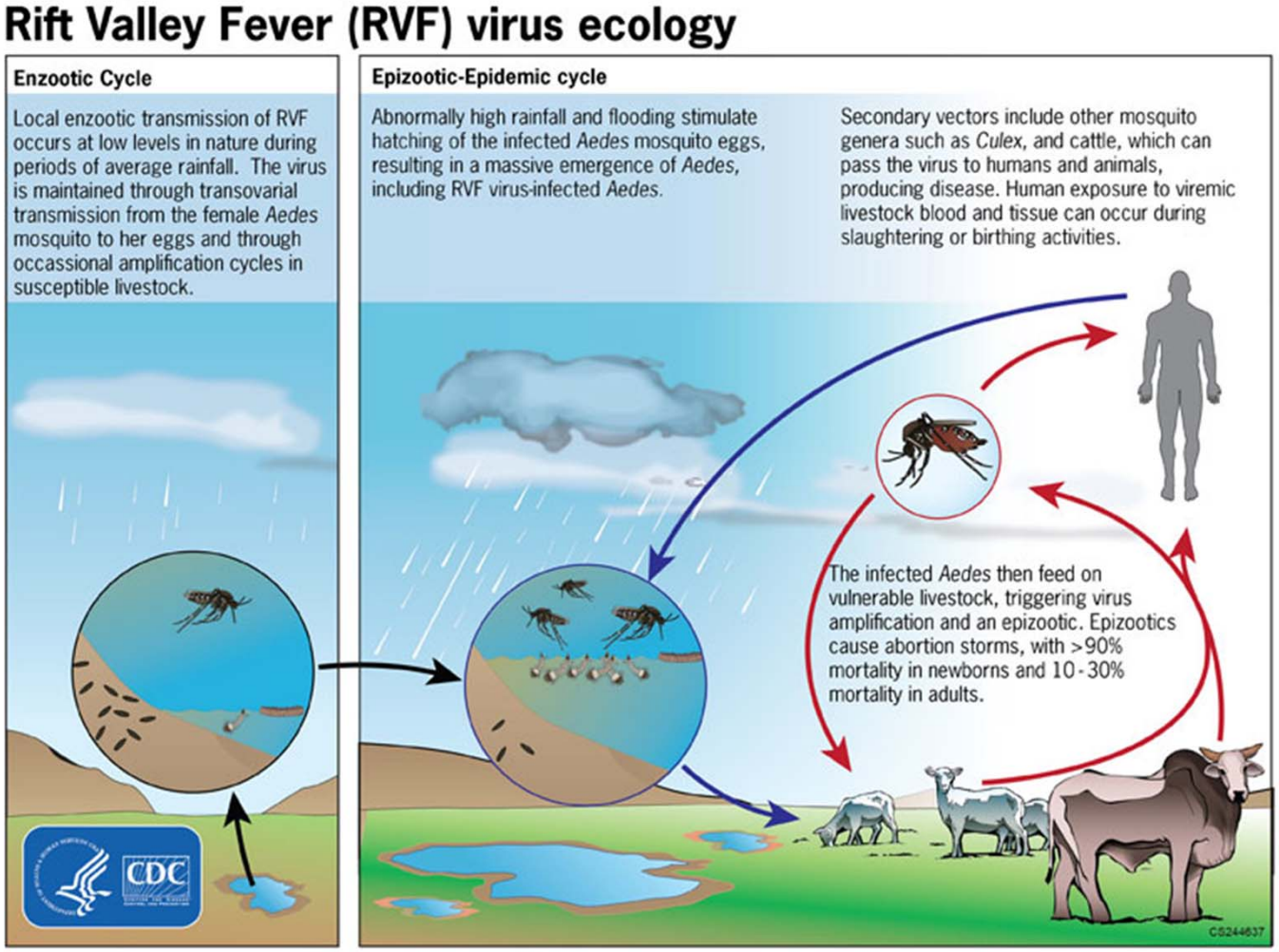
- Vaccination strategy
  - Epizootic versus endemic virus cycle and strategy
- Vaccine availability
  - Market aspects, vaccine/antigen banks,
- Quality control
  - Central versus decentral

Vaccination strategy and transmission cycle



Emergency vaccination as response to epidemic outbreak

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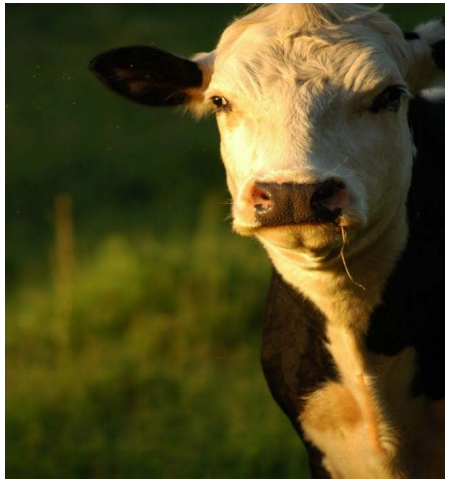
- Early detection (prediction) of the outbreak is crucial to allow timely response.
- Media attention high because of human cases
- Quick delivery of large stocks of vaccine necessary
- Freeze-dry capacity (live vaccines) can be limiting factor
- Production capacity (inactivated vaccines) can be limiting factor
- Vaccine or antigen banks ?
  - Regional or national solution
  - Vaccine banks (rolling stock?)
  - Antigen banks (time to freeze-dry or formulation capacity?)
  - Who pays?

Emergency vaccination during epidemic remains a very challenging solution

Preventive vaccination during endemic cycle

- Disease impact far less obvious during endemic cycle
- Economic cost/benefit justification difficult to the farmer
- Who will pay for the vaccine/veterinarian/vaccination?
- Cheap vaccines will still be quite expensive



Preventive monovalent RVF vaccination difficult to justify from economic benefit (farmer)

Development of monovalent RVF vaccines difficult to justify from Market perspective (manufacturer)

Inactivated versus live vaccines?

- Inactivated vaccines pro:
  - Safe (no live RVF virus)

- Inactivated vaccines contra:
  - Shorter Duration of immunity
  - Booster vaccinations necessary
  - More costly to produce

- Live vaccines based on attenuated RVFV
  - Risk of residual virulence, depending on level of attenuation and stability
  - One shot
  - Most likely life long protection
  - Considerably cheaper to produce

Combination vaccines as vaccination strategy

- Combination of live attenuated vaccines
- Live combination vaccines can be produced far more economically (FD)
- Cost/benefit ratio of combination vaccine far more attractive from the farmer perspective
- Overall long duration of immunity and early onset with live attenuated vaccines
- Clear incentive for farmers to vaccinate against live-threatening diseases (PPR, SGP, LSD, CBPP, CCPP..)
- Why not piggy-back on increased global attention to PPR control? (killing 2 / multiple birds with one stone)

Small and large ruminant combination vaccines should provide the possibilities for preventive vaccination

Combination vaccines (continued)

Currently under development

- RVF-LSD
- RVF- SGP
- RVF- PPR

Challenges for multivalent combination vaccines in development;

- Yields in production to be sufficiently high
- Freeze-dry process to be optimized with good stabilizers
- Good stability of all components crucial
- Lack of interference to be demonstrated
- Risk of failure of one component discriminates the batch

Which vaccine to use?
Which characteristics do we need for control?

- Available licensed live vaccines
  - Smithburn strain
  - Clone 13
  - MP-12 (USA and Canada)

- Inactivated vaccines
  - Smithburn strain

- Live vaccines under development
  - DDVax (rZH 501Δ NSm-NSs)
  - ND vector (NDV-GnGc)
  - Ar MP12-Δ-NSm
  - NSR-Gn

Quality control of RVF vaccines

- Performed by manufacturer and in compliance with specifications developed during vaccine research and development process (minimum titer, safety profile..)
- Release criteria as laid down in the registration dossier
- Additional central role of Quality control by PANVAC
  - Monitoring role
  - “Watchdog” to keep an eye on quality and compliance

Main criteria for batch release;

minimum release titer (potency) or potency for inactivated vaccines

stability (minimum titer during entire shelf life)

sterility, mycoplasma

Safety?

OIE release criteria

Thermostable vaccines?

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- “Thermostable” or better vaccines of “improved thermostability” really made a difference at the end of the Rinderpest eradication
- “Thermostable” or “properly freeze-dried”?
- Freeze-dry technology (sugars, stabilisers, FD programs) greatly improved over time
- Several existing vaccines show already great (thermo)stability

- Some Currently produced Good quality vaccines include Good Quality freeze-drying and improved thermostability

What means “good quality vaccines” in the case of RVF?

- Proper control of raw materials and production parameters
- Suffiently high titer in the vaccine (will depend on the vaccine strain)
- Proper freeze-dry technology (residual moisture %, stabilizers…)
- Good stability vaccines (e.g. no need to be kept frozen after freeze-drying)
- Produced and released at high quality standards

- Good vaccines to control the disease already exist (Clone 13) and others are under development

The focus should probably be on how to

Implement control programs and to increase

Incentive for vaccination

Topics for further consideration and R&D?

- Mass vaccination during the winter/colder period (PPR analogy)

- Intranasal vaccination (no needles, mucosal immunity, early protection in the face of MDA?)

- Needleless vaccination (no risk of transmission during viraemia)

- Improved diluents (virus protectants to preserve titers after reconstitution)

Thank You!