The need for the application of vaccination in different species – small ruminants

Gideon Brückner
President OIE Scientific Commission for Animal Diseases

Wilna Vosloo
CSIRO, Geelong, Australia
FMD – current status of reporting to OIE

[World map showing the status of FMD reporting by country, with color codes indicating no information, never reported, not reported in this period, suspected, clinical disease, disease limited to one or more zones, and specific serotypes.]
FMD – vaccination as reported to OIE
FMD – Vaccination of pigs

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FMD - Vaccination of small ruminants

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In countries/zones officially free with vaccination – applied annually/bi-annually
Seldom/selectively applied in countries endemically infected
Emergency vaccination in the event of disease threat/disease introduction
Cattle species of choice – sheep and pigs selectively vaccinated and mostly to counteract threat or perceived risk
High potency vaccines for emergency vaccination
High purity vaccines when moving towards disease free status and for demonstration of DIVA
Mostly bi-valent or poli-valent vaccines
FMD – perceptions on the role of small ruminants

- Do not play a role in the epidemiology/dissemination of the disease
- Can be used as sentinels in high risk areas
- Vaccination not cost effective
- Vaccination will not prevent spread of the disease
- Due to inapparent infections/sub-clinical infections or low virus shedding – role in disease dissemination insignificant
Research/experimental findings on the role of small ruminants and FMD (1)

- Clinical signs of FMD in sheep are frequently mild or inapparent
- Sheep incriminated for spread of disease – in and in-between countries (Greece, Morocco, Canada, North Africa, Turkey, UK)
- High excretion of virus in first 5 days and before clinical signs
- Sharp decline of virus excretion on 4th to 5th day after onset of clinical disease
- Development of carrier state (>50% persistent infection for 9 weeks and carrier ± 9 months)
- Carrier state develops irrespective of vaccination status but less in vaccinated animals
Research/experimental findings on the role of small ruminants and FMD (2)

- Vaccination of sheep in buffer/protection area and to protect disease free area
- Rather increase vaccination coverage of cattle to lessen transmission from carrier sheep to cattle
- Infection in sheep is self limiting especially in mixed sheep/cattle populations where cattle are vaccinated (decrease $R_0$ rate to <1 – Donaldson)
- If FMDV strain exotic to country – high attack rate but less transmission from sheep to cattle if vaccinated
- Severity of disease in sheep dependent on FMDV strain – SAT2, O
If FMDV strain endemic then low virulence in small ruminants -> low dissemination to cattle

In high density cattle/small ruminant populations – higher probability of cross-species transmission

Vaccination does not reduce the chance for the development of a carrier state

Vaccine applied in small ruminants must especially be effective against ruling field strain to lessen the transmission to other species
Research/experimental recommendations for the application of vaccines in small ruminants

- Oil adjuvant vaccines give better antibody response than aluminium hydroxide gel saponin vaccines
- Vaccination indicated when disease is endemic; an eradication program is underway and with high livestock density
- Alternative for mass culling of small stock
- Decrease virus excretion, development of a carrier state and local virus replication
- In the event of disease threat – use high potency, high antigen mass vaccines with longer vaccine-to-challenge intervals
OIE recommendations for the application of vaccines in small ruminants

- In a protection zone where source of disease is not apparent – vaccinate small ruminants and pigs – to protect free zone – until disease situation is stabilised
- In the event of disease threat or threat of introduction of new strain – use high potency vaccines
- In high small stock/cattle density areas – vaccinate small ruminants
- Export from endemic area – advisable to vaccinate – reduce viral shedding from carrier state
- Irrespective of vaccine – must be effective against ruling field strain
- If small stock are vaccinated only in emergency – ensure sustainable high vaccine coverage in cattle
Acknowledgements

Dr Kris de Clercq
Dr Wilna Vosloo
Dr Lea Knopf
Dr David Paton
Marie Tessier
Thank you very much!

Thank you for your attention!

World Organisation for Animal Health (OIE)
12 Rue de Prony 75017
Paris

www.oie.int