

# The Role of Risk Attitude in Preference Rankings of Vaccine Use for Foot and Mouth Disease Eradication in the U.S.

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# The Role of Risk Attitude in Preference Rankings of Vaccine Use for FMD Eradication in the U.S.

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## Introduction

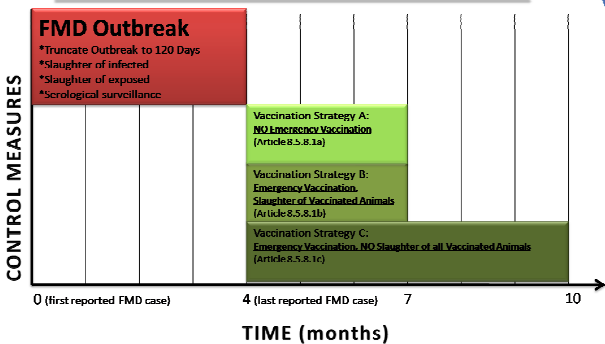
The increasing global incidence of outbreaks of foreign animal disease has renewed interest in the use of emergency vaccination as a means of suppressing disease spread, particularly in response to a foot and mouth disease (FMD) incursion. It would seem that, since a viable vaccine is available, vaccination would be an important part of a FMD response policy. The benefits of emergency vaccination are offset by significant costs, which cause emergency vaccination to be a cost inferior strategy. Here emergency vaccination is examined using FMD epidemic scenarios for the Texas High Plains and the Central Valley of California using a national agricultural sector economic model that includes an epidemic cost component and an economic choice component.

## Emergency FMD Vaccine Use

- ✓ "Emergency" vaccination used to slow disease spread, confining it to a smaller region.
- ✓ Inoculating animals in either a ring around infected premises or on targeted premises.
- ✓ High cost of implementation, including additional stress on scarce resources like skilled labor.
- ✓ Vaccinate to Die: leads to higher slaughter rates when inoculated animals must be euthanized along with infected animals.
- ✓ Trade implications can be extensive, but by slaughtering all animals vaccinated the trade implications can be reduced to the same level as with no vaccination.

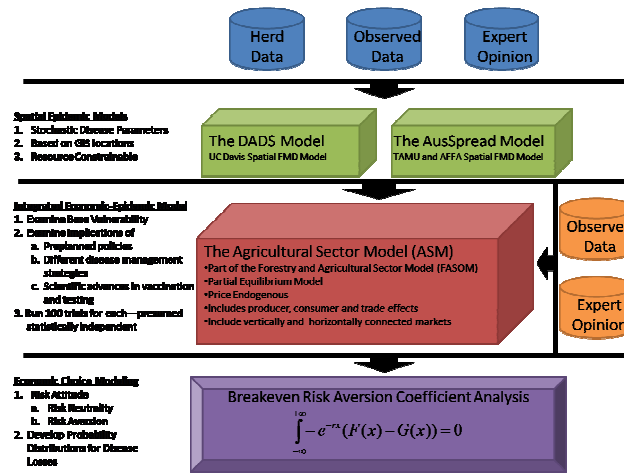
*Whether or not emergency vaccination is a part of the US disease response policy depends on whether it is both epidemiologically and economically sound in comparison to a policy of eradication through slaughter alone. We consider BOTH vaccination as a cost reducing strategy AND vaccination as a resiliency increasing (risk management) strategy (i.e. its ability to reduce the chance of an extreme outcome).*

## Time to Recover "FMD Free" Status<sup>1</sup>



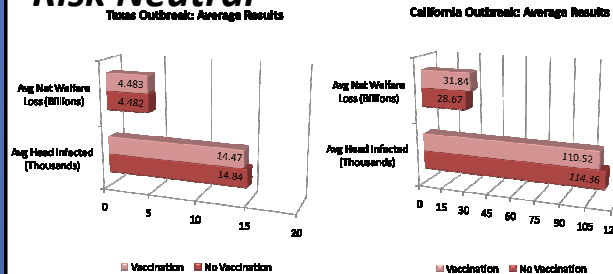
<sup>1</sup> OIE, 2009

## Integrated Modeling Method



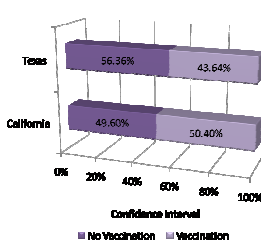
## Vaccine Preference Ranking

### Risk Neutral



### Risk Averse

Confidence Intervals for Decision Meters for Emergency Vaccination in Texas and California



Prior studies have used a metric of cost minimization to examine emergency vaccination, but this makes a risk neutrality assumption in the face of a risk management exercise. We consider the possibility of risk aversion. In a national economic modeling and international trade implications setting we find that vaccination is not preferred based on cost minimization but becomes so as the degree of risk aversion increases in both the California and Texas cases.

## Discussion

- ✓ Emergency vaccination does reduce disease related slaughter
- ✓ Emergency vaccination also increases total disease eradication cost and total economic cost
- ✓ Emergency vaccination does result in smaller incidence of high loss outcomes in the probability distribution of economic loss outcomes



Emergency vaccination was found to be a viable option for increasing resiliency but not a cost minimizing policy. The results differed in strength in dairy as opposed to feedlot regions. Namely, when animals are not slaughtered after vaccination then we find in a dairy, where the benefits are a flow of milk that may need to be dumped, that vaccination is more valuable than where the animals continue to grow and are then sold (as in a feedlot).

## Conclusions

*Emergency vaccination when vaccinated animals are eventually slaughtered is more costly than slaughter alone for FMD eradication. If the goal is to reduce the risk of extremely large losses, emergency vaccination is more appealing. Thus emergency vaccination would not be a cost minimizing strategy, but would be a risk averse, resiliency maximizing strategy.*

## Supporting Documents

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- Ward, M.P., L.D. Highfield, P. Vongseang, and M.G. Garner. 2009. "Simulation of Foot-and-Mouth Disease Spread Within an Integrated Livestock System in Texas, USA." *Preventive Veterinary Medicine* 88: 286-297.

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