

The effect of vaccination on bluetongue serotype 3 associated mortality in dairy cattle

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Acknowledgements: this study was funded by the Cattle industry and the Dutch Ministry of Agriculture, Fisheries, Food security and Nature

Background

- In 2023 >5,000 Dutch livestock farmers notified BTV-3 infection
- In May 2024, three vaccines became available, but BTV-3 still spread massively infecting livestock in >10,000 farms in 2024

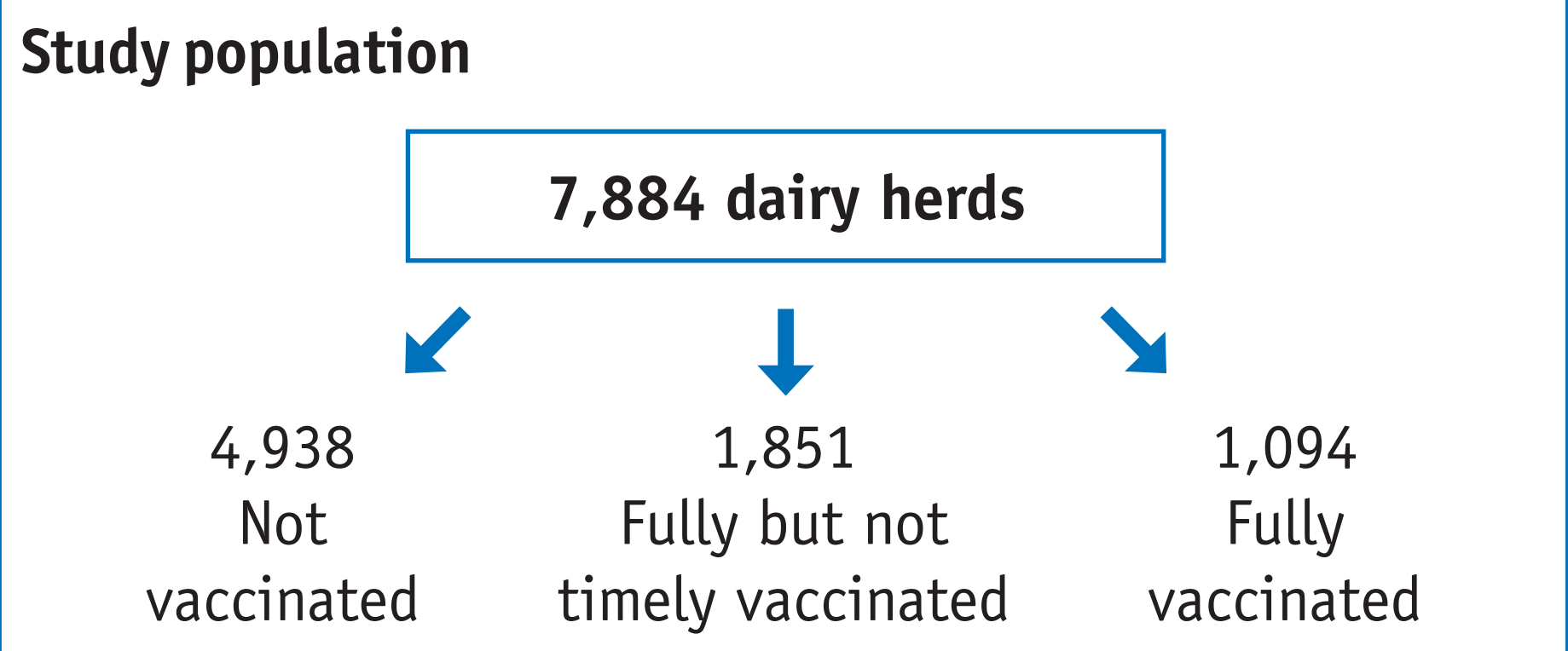
AIM

Quantify the effect of vaccination on BTV-3 associated mortality in 2024

Methods

- Data**
- 2020 – Oct 2024
 - Animal movement data, including mortality
 - BTV notification data
 - BTV-3 prevalence data in spring 2024 based on bulk milk ELISA testing
 - BTV-3 vaccination data

- Analyses**
- Negative binomial multivariable regression model with mortality as independent variable.
 - Variable of interest: combined BTV-3 variable with natural acquired immunity and vaccination status.
 - Other explanatory variables: herd size, season, location, herd health status, milk production, purchase, trend in time.

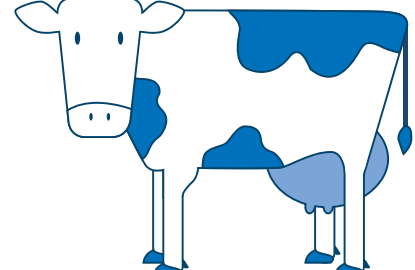
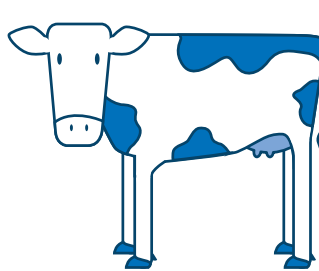


- Definitions**
- **Not vaccinated:** no vaccination
 - **Fully vaccinated:** all cattle were vaccinated 2x & in time
 - **Fully but not timely vaccinated:** Full vaccination, but BTV-3 circulation occurred in the area before full protection could be expected.



Results

Incidence rate ratios describing associations with mortality during the BTV-3 epidemic in 2024 compared to the mortality in BTV free years

	Within herd BTV-3 anitbody status after 2023	BTV-3 vaccination status 2024			BTV-3 vaccination status 2024		
		Not vaccinated	Fully but not timely vaccinated	Fully vaccinated	Not vaccinated	Fully but not timely vaccinated	Fully vaccinated
 Cows (≥2 year)	No antibodies in the bulk tank milk	↑ 1,6x	↑ 1,3x	↑ 1,2x	↑ 1,3x	↑ 1,2x	● Not increased
	Estimated prevalence <50%	↑ 1,4x	↑ 1,2x	↑ 1,1x	↑ 1,2x	● Not increased	● Not increased
	Estimated prevalence ≥50%	↑ 1,1x	● Not increased	● Not increased	↑ 1,2x	● Not increased	● Not increased
 Young stock (1-2 year)	No antibodies in the bulk tank milk	↑ 1,5x	↑ 1,3x	● Not increased	↑ 1,6x	↑ 1,3x	● Not increased
	Estimated prevalence <50%	↑ 1,4x	● Not increased	● Not increased	↑ 1,5x	↑ 1,2x	● Not increased
	Estimated prevalence ≥50%	● Not increased	● Not increased	● Not increased	↑ 1,1x	● Not increased	● Not increased

*Arrows describe the significant direction of the association, the colour presents the magnitude (no association=green, IRR <1.2=yellow, IRR 1.2-1.4=orange, IRR>1.4=red).

TAKE HOME

- Vaccination significantly reduced mortality, but was unable to completely prevent all BTV-3 associated deaths.
- The combination of acquired immunity and vaccination can prevent all BTV-3 associated mortality in dairy herds.



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