Use of milk production data to improve early detection of vector borne diseases

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Introduction

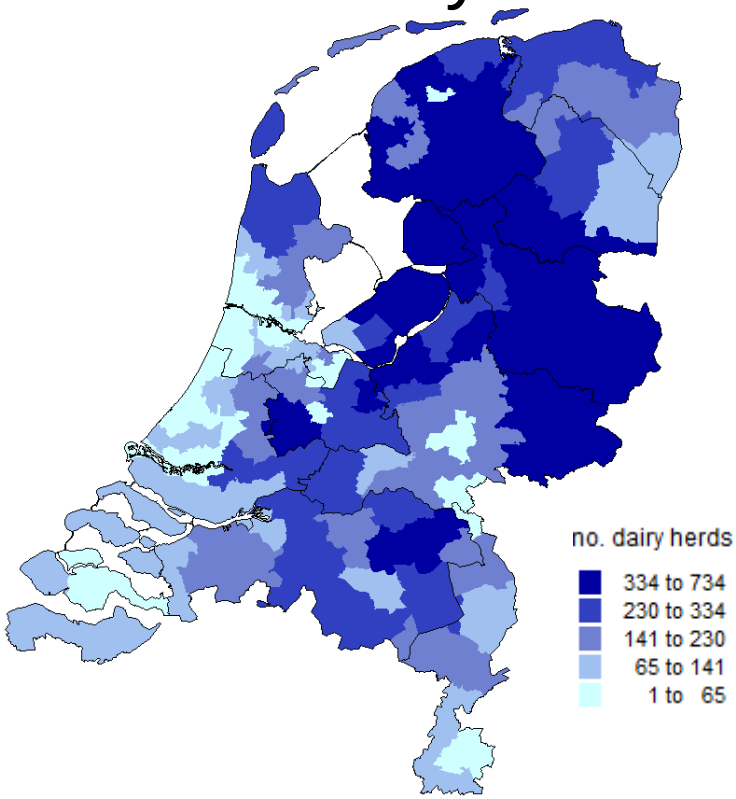
- Traditional detection of disease outbreaks based on specific disease symptoms or diagnostic results
- Dutch cattle health surveillance system
  - GD Veekijker
  - Pathology and laboratory
  - Sentinel studies

Introduction

- Syndromic surveillance focuses on elevations of non-specific disease indicators such as drop in milk production
- Milk production data on herd and test-day level are continuously available for 80-85% of Dutch dairy herds (n=16,983 herds)
- Real time analyses may allow detection of disease outbreaks

Aim of the study

Evaluate whether monthly milk recording data can be used as an indicator for early detection of emerging vector-borne diseases in a densely populated cattle area



Material & Methods

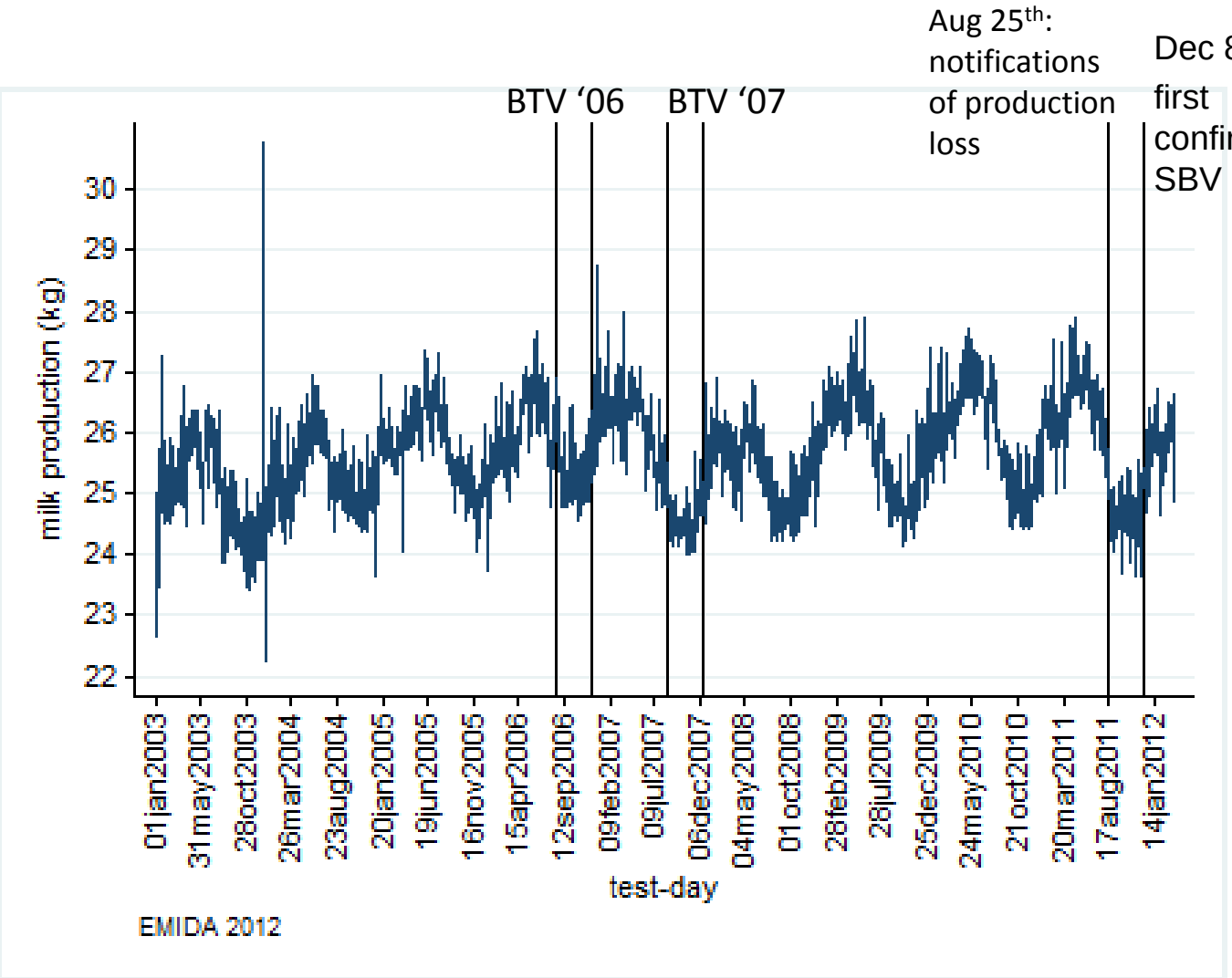
- Milk production data on herd and test-day level available from January 1st 2003-March 31st 2012
- Herd location on 2-digit postal code level (90 postal codes)
- Sensitivity (Se) and specificity (Sp) of real time analyses:
  - Detection of Bluetongue (BTV-8) in 2006 and 2007 and Schmallenberg virus (SBV) in 2011 (Se)
  - No. of false alarms in reference years 2009 and 2010, without emerging diseases (Sp)
- Methodology of Madouasse et al. (EAAP 2013) applied

Detection of BTV-8 and SBV with current surveillance components

Epidemic	The Netherlands	
	First report	Confirmation
BTV-8 in 2006	14-aug-2006	15-aug-2006
BTV-8 in 2007 (re-emergence)	20-jul-2007*	26-jul-2007
SBV	25-aug-2011	8-dec-2011

* The sentinel study showed seroconversions early July 2007

Results:
Mean milk production per cow per test-day



Clusters of low milk production in time and space: BTV-8 in 2006/2007

- Two significant clusters found in 2006, but 2-3 months later than passive surveillance components
- No significant clusters found in 2007

October 7th -13th 2006

November 11th-17th 2006

Clusters of low milk production in time and space: SBV in 2011/2012

Apr 22nd –May 19th 2011

Aug 5th -Sep 1st 2011

Sep 23rd –Oct 20th 2011

Dec 16th 2011- Jan 14th 2012

Jan 8th –Feb 4th 2012

- 5 significant clusters found in 2011/first quarter 2012
- 4 clusters associated with the SBV-outbreak
- First cluster on Sep 1st 2011, 1 week later than GD-Veekijker

Clusters of low milk production in time and space: reference years 2009/2010

- 9 significant clusters found

Discussion

- BTV-8 outbreak
  - First alarm in 2006 2-3 months later
  - No alarm in 2007
  - Confirms French results Madouasse et al.
- SBV virus outbreak
  - First alarm 1 week later
- Similar impact on milk production (Santman-Berends et al. 2010; Veldhuis et al. 2013)
- The spread of SBV >> BTV-8
- Impact ‘ = sensitivity passive surveillance ‘
- The specificity was good, few false alarms

Discussion

Usefulness of syndromic surveillance on milk production data depends on:

- Surveillance components in place
- Coverage in time and space
- Data quality
- Pathogen
- And, for vector-borne diseases
  - Ecological factors
  - Grazing management

Conclusions

Real time analysis of milk production data:

- can trigger an early signal in a surveillance program when milk production loss and/or spread of the disease are similar to SBV
- can have added value for early detection of (re) emerging diseases in addition to the current surveillance components

Thank you for your attention!