Epidemiology of the "Schmallenberg" virus

Ana Afonso
Animal Health and Welfare unit (AHAW)
OUTLINE

• **Schmallenberg virus: an overview**

• **EFSA mandate**
  – Epidemiological scenarios
  – Data needs
  – Data collection
  – Analysis of epidemiological data
  – Next steps
Dairy cows with sudden diarrhea, fever, milk production loss

Germany: no diarrhea, but painful gait

Sept 2011

Oct 2011

FLI, blood examination
CVI, Virus discovery microarray (faeces)
AHS, bact, parasit exam. (faeces)

FLI, whole genome sequencing (blood)
FLI: sequences orthobunyavirus
discovery SBV

Nov 2011

FLI, develop RT-PCR

Dec 2011

ECDC Assessment
No risk

SCOFAH

First lambs with malformations in NL

2012

No diagnosis

SBV positive

Notif to OIE

Full recovery dairy cows

Courtesy: Wim Ooms
Transparency

• Starting Dec 2011 there were 40 notifications at PROMED MAIL

• World Organization for Animal Health - all affected countries have reported

Emerging disease means a new infection resulting from the evolution or change of an existing pathogenic agent, a known infection spreading to a new geographic area or population, or a previously unrecognized pathogenic agent or disease diagnosed for the first time and which has a significant impact on animal or public health.
Collaboration

• Friedrich Loeffler Institut and Central Veterinary Institute
• European Commission and Member States
• European institutions: EC- DG SANCO, European Food Safety Authority, European Centre for Disease Prevention and Control, European Medicine Agency.
• No evidence that the Schmallenberg virus could cause illness in humans Preliminary assessment carried out by the European Centre for Disease Prevention and Control (ECDC) – 22 Dec 2011

• To continue field investigations and surveys on this virus - Develop a guidance document on surveillance as a matter of urgency

• The Member States invited the Commission to identify possible ways to provide financial support to the above investigations
EFSA was asked to provide scientific and technical assistance on the possible risks for animal and public health caused by the "Schmallenberg" virus by the European Commission.

Several outputs were requested, the first one as an urgent response.
A preliminary analysis of the *likely epidemiological scenarios* – Guidance on data collection in Member States, **6 February 2012**

An *analysis of the epidemiological data* already available, **31 March 2012**, first report, followed by regular updates every two months.

A report on the overall *assessment of the impact* of SBV on animal health, animal production and animal welfare together with a characterisation of the pathogen, **31 May 2012**
• "Schmallenberg" virus: likely epidemiological scenarios and data needs. EFSA 2012:EN-241. [31 pp.]. Available online:

www.efsa.europa.eu/publications
Summary of results

- Overview of current knowledge and uncertainties
- Epidemiological situation in Member states
- Possible period for detection of further cases of malformed ruminant foetuses
- Likely epidemiological scenarios
- Disease spread modelling
- Data needs/data collection guidelines
SBV unknowns and working assumptions

- SBV infection is the *cause* of the clinical syndromes reported. Its pathogenesis and transmission is similar to other virus of the same group, e.g. Akabane.

- SBV *Infection status* of European ruminant population is unknown. The European ruminant population is susceptible.

- SBV like other Simbu serogroup virus is a *vector-borne* infection.
Recommendations

• It is recommended that close monitoring of possible public health impact is continued by ECDC and EFSA and the situation reassessed in light of any further scientific/epidemiological findings.

• In order to assess the impact and spread of SBV infection at EU level surveillance data should be collected and shared between Member states. This should include data from serological surveillance in areas where SBV has yet not been reported.
Case definition proposal

Foetuses and neonates

**Suspect case**: Arthrogryposis hydranencephaly syndrome (AHS) in ruminants (stillbirths, premature births, mummified fetuses, and dysfunctions or deformities of foetuses or liveborn neonates including arthrogryposis, hydranencephaly, ataxia, paralysed limbs, muscle atrophy, joint malformations, torticollis, kyphosis, scoliosis, behavioural abnormalities and blindness)

**Confirmed case**: Confirmation of viral infection by RT-PCR, Viral isolation or other method of pathogen detection

Past Infection cases in dams

**Suspect case**: Ruminants with pregnancies resulting in AHS

**Confirmed case**: Confirmation of viral infection by ELISA or other method of indirect detection.

Adult animals

**Confirmed case**: Confirmation of viral infection by RT-PCR, Viral isolation, ELISA or other method of pathogen or indirect detection.
Output 1 - Minimum dataset

**Reporting period:** August 2011 to the date of transmission of data

**Animal species:** Ruminants

**Unique herd identifier:** Anonymised, unique at country level

**Geography:** Country and region

**Time point:** Date of first suspicious report

**Risk factors:** production system and animal movements

**Herd/flock level statistics:** number animals, females of breeding age, pregnant, live births, still births, abortions, dystocia, ahs cases, acute symptoms, deaths, animals tested, animals positive
Data Collection Framework

Access the Data Collection Framework (DCF)

The DCF is a secure web portal which supports the submission and validation of datasets transmitted to EFSA for use in risk assessment.
• Reporting officers from 21 MS and 2 EFTA (NO and SW)

Table 1: Data submission by Member States

<table>
<thead>
<tr>
<th>Member State</th>
<th>Date of accepted submission</th>
<th>Submission of herd level dataset (Y/N)</th>
<th>Submission of animal level dataset (Y/N)</th>
<th>Submission of data on suspect cases (Y/N)</th>
<th>Submission of data on confirmed cases (Y/N)</th>
<th>Submission of data on number of tested offspring (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>2012-03-21</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
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<tr>
<td>France</td>
<td>2012-03-27</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>unknown</td>
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<tr>
<td>Germany</td>
<td>2012-03-27</td>
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<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
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<tr>
<td>Italy</td>
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<td>Y</td>
<td>Y</td>
<td>Y</td>
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</tr>
<tr>
<td>Luxembourg</td>
<td>2012-03-27</td>
<td>Y</td>
<td>N</td>
<td>N</td>
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<td>N</td>
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<tr>
<td>Netherlands</td>
<td>2012-03-28</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
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<tr>
<td>Spain</td>
<td>2012-03-27</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
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<tr>
<td>United Kingdom</td>
<td>2012-03-26</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
</tbody>
</table>

All Member States with infected herds reported data to EFSA
## Output 2 – Affected herds

<table>
<thead>
<tr>
<th></th>
<th>Confirmed Herds</th>
<th>RT PCR Neonates</th>
<th>RT PCR Adults</th>
<th>Serology Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bison</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheep</td>
<td>1910</td>
<td>1910</td>
<td></td>
<td>75</td>
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<tr>
<td>Goats</td>
<td>56</td>
<td>56</td>
<td></td>
<td>4</td>
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<tr>
<td>Cattle</td>
<td>393</td>
<td>383</td>
<td>8</td>
<td>52</td>
</tr>
<tr>
<td>Total</td>
<td>2360</td>
<td>2350</td>
<td>8</td>
<td>131</td>
</tr>
</tbody>
</table>
Confirmed herds by week of first report and country- All species
Output 2 – Affected herds

• All Member States have reported the number of **confirmed herds** following viral detection by PCR or serological confirmation, 2 MS have reported the number of suspect herds.

• The number of **confirmed cases by PCR** can constitute an underestimation of the number of infected herds, in particular for calves.

• The number of confirmed acute **cases in adults** with viral detection by PCR is limited to eight cases in Germany, most likely corresponding to infection during the period of viral circulation in summer/autumn 2011.
Concerns

- Under reporting
- Passive surveillance
- Test validation
Output 1 - Possible detection of AHS

<table>
<thead>
<tr>
<th>Animal species</th>
<th>Infection April 2011</th>
<th>Infection August 2011</th>
<th>Infection October 2011</th>
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</thead>
<tbody>
<tr>
<td>Lambs</td>
<td>August 2011</td>
<td>December 2011</td>
<td>February 2012</td>
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<tr>
<td>Calves</td>
<td>November 2011</td>
<td>March 2012</td>
<td>May 2012</td>
</tr>
<tr>
<td>Goat kids</td>
<td>August 2011</td>
<td>December 2011</td>
<td>February 2012</td>
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Considering an average gestation period of 150 days in sheep and goats and 280 days in cows

It could be expected that the majority of the deformed lambs would be born from December to February and the majority of deformed calves after March
Confirmed herds with AHS cases by week of first report and species

Cattle
Goats
Sheep
Output 2 - Temporal Spread

- Estimation of months of viral circulation including all species and countries, with adjustment for gestation period and vulnerable stage
Output 2 - Geographic distribution

Regions with at least one SBV confirmed herd

- Sheep herds
- Cattle herds
Output 2 – Impact

• For the purpose of this report, impact was defined as mortality and morbidity in the affected animal populations, the proportion of cases in the populations.
### Total number of animals in SBV confirmed herds (left panel) and SBV confirmed herds (right panel) by country and species.

**Animals**

<table>
<thead>
<tr>
<th>Countries</th>
<th>Bisons</th>
<th>Sheep</th>
<th>Goats</th>
<th>Cattle</th>
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</thead>
<tbody>
<tr>
<td>Belgium</td>
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<td>Germany</td>
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**Herds**

<table>
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<tr>
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</tbody>
</table>
Total number of sheep in SBV confirmed herds (left panel) and SBV confirmed herds (right panel) by country versus total number of sheep and herds per country.
Total number of goats in SBV confirmed herds (left panel) and SBV confirmed herds (right panel) by country versus total number of goats and herds per country.
Total number of cattle in SBV confirmed herds (left panel) and SBV confirmed herds (right panel) by country versus total number of cattle and herds per country.
What is next

Next reporting deadline 16/4/2012

- Confirmed/suspect/number tested
- Impact measures
- Extended data set
The modeling of the **hypothetical SBV spread** was done using a model developed for BTV 8 and assuming that the EU ruminant population is **susceptible**.

**Why?**

- BTV8 is primarily a vector-borne disease
- BTV8 and SBV are circulating in the ruminant population
- Information is available regarding BTV8 in Europe whereas there has only been one case report for viruses of the Simbu serogroup in Europe
- No information on the prevalence of infection in the EU
More information is needed on:

- **Serodiagnostic** tests to detect past exposure to SBV in animal populations in Member States

- Evaluation of **immunity status**, including an assessment of whether adult animals exposed to infection develop a strong and **long-lasting immunity** to SBV

- **Transmission routes**, including improved estimates of **viraemia duration, vector competency** and vertical transmission in vectors, as well as direct and transplacental transmission in ruminant hosts
What is next

**EFSA**

- Regular updates of epidemiological situation
- Report on the overall assessment of the impact of SBV on animal health, animal production and animal welfare *(31 May 2012)*

For further information or any additional questions,

sbv.ahaw@efsaeuropa.eu
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