# "Schmallenberg" virus: likely epidemiological scenarios and data needs

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# Terms of Reference

1.A preliminary analysis of the likely epidemiological scenarios that could be observed in the next months, based on the existing knowledge on viruses of the Simbu virus serogroup and other vector borne epidemics in the region - **6 February**

2.An analysis of the epidemiological data already available, taking also into account the expected seasonal pattern of virus circulation. This analysis should also include the information on the transmission routes for the virus - **31 March**, regular updates every two months

3.Guidance on data to be collected in Member States. This may include the development of a case definition, data sets at both individual and herd level and minimum reporting guidance on epidemiological investigations to facilitate a future assessment of the impact of the infection and the risk of spread.

4. A report on the overall assessment of the impact of this infection on animal health, animal production and animal welfare together with a characterisation of the pathogen - **31 May**.

# Case Definitions in Affected MS

| MS | Adult animal | Offspring |
|---|---|---|
| DE | N/A | Increased occurrence of malformations of the arthrogryposis hydranencephaly syndrome (AHS) in calves and lambs |
| NL | Acute diarrhoea, dip in milk production, fever or any other clinical suspicion notified by farmers who ask for exclusion of SBV (as cause of the clinical problems) by diagnostic testing of (blood) samples. | Any malformed calf, goat-kid or lamb |
| BE | Bovins avec forte température, chute de la production laitière et diarrhée | Ovins, caprins, bovins: taux anormalement élevé de mortinatalité ou d'avortements, malformations à la naissance telles que malformations des articulations, hydrocéphalie |
| UK | N/A | Arthrogryposis or profound congenital nervous signs (obtundation ("dummy" presentation), blindness or marked paresis / paralysis) in a ruminant neonate or foetus and, in addition, for neonates and foetus from ruminant dams imported from mainland Europe in 2011, any stillbirth, weakness or disease with nervous signs. |
| FR | N/A | Cas clinique suspect dans le bandeau nord-est : Alsace, Lorraine, Nord Pas de Calais, Picardie, Champagne, Ardennes<br><br>Premier cas de bovin, ovin ou caprin, (i) avorton ou nouveau-né, malformé (arthrogrypose, raccourcissement destendons du jarret, déformation de la mâchoire, hydranencéphalie, torticolis…) ou (ii) nouveau-né présentant destroubles neurologiques (paralysie flasque, mouvements exagérés, hyperexcitabilité, difficulté à téter, ataxie,…).<br><br>Cas clinique suspect sur le territoire métropolitain hors bandeau nord-est<br><br>Deuxième cas (ou plus) de bovin, ovin ou caprin (i) avorton ou nouveau-né, malformé (arthrogrypose, raccourcissement des tendons du jarret, déformation de la mâchoire, hydranencéphalie, torticolis…) ou (ii)nouveau-né présentant des troubles neurologiques (paralysie flasque, mouvements exagérés, hyperexcitabilité,difficulté à téter, ataxie,…), survenant dans une même exploitation au cours d'un trimestre. |

# Holdings where SBV has been confirmed

| | NL | DE | BE | UK | FR |
|---|---|---|---|---|---|
| Cattle | 3 | 7 | 4 | | |
| Sheep | 85 | 263 | 75 | 11 | 50 |
| Goat | 5 | 10 | 1 | | |
| Locations | All provinces except for province of Utrecht | North Rhine-Westphalia, Lower Saxony, Schleswig-Holstein, Rhineland-Palatinate Baden-Wuerttemberg, Brandenburg, Thuringia, Saxony-Anhalt, Hamburg, Bavaria | Most provinces with a greater density in north west Belgium | Norfolk, Suffolk, East Sussex, Essex and Kent | North of France: Aisne, Aube, Calvados, Haute-Marne, Meurthe-et-Moselle, Meuse, Moselle, Nord, Oise, Pas-de-Calais, Bas-Rhin, Seine-Maritime, Somme, Vosges |

NL, DE, FR as of 3 Feb, UK as of 31 Jan, BE as of 1 Jan

# SBV Uncertainties

- SBV infection is responsible for the clinical syndromes reported.

- Clinical signs similar to the ones caused by infection by other Simbu serogroup virus eg Akabane and Aino - Impact on animal health and welfare

- SBV is similar to Akabane and induces strong immunity in infected animals.

- SBV is like other Simbu serogroup virus a vector transmitted infection

# Period for detection of further cases of AHS

| Animal species | Infection April 2011 | Infection August 2011 | Infection October 2011 |
|---|---|---|---|
| Lambs | August 2011 | December 2011 | February 2012 |
| Calves | November 2011 | March 2012 | May 2012 |
| Goat Kids | August 2011 | December 2011 | February 2012 |

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

# Likely epidemiological scenarios

• A: Areas where a recent incursion might have occurred in a **naïve population** causing clinical disease in adult animals and malformation in lambs and calves.

•B: Areas where incursion occurred in the past and part of the ruminant **population is immune** and where congenital malformations are not observed or observed at a low level (mainly not reported).

•C: Areas where no virus incursion has occurred and a **susceptible population** is present.

# Disease spread scenarios

Representation of the transmission process and its relation with the basic reproductive number. P is referring to a primary case and S to a secondary case.



○ Susceptible

⬤ Immune

🔴 Clinical
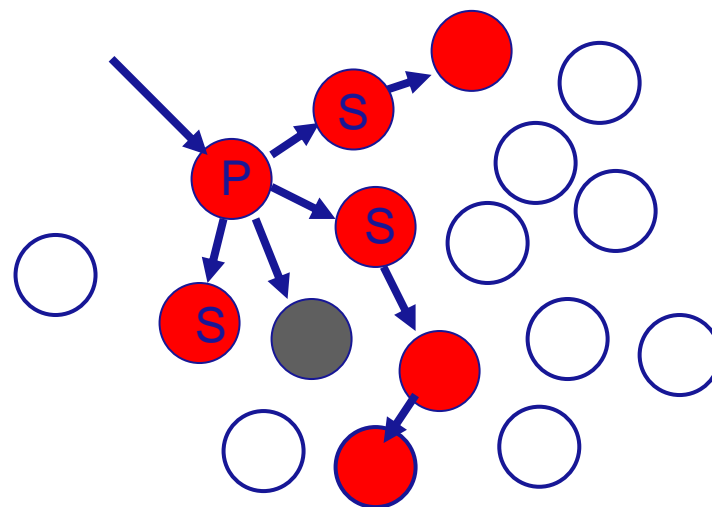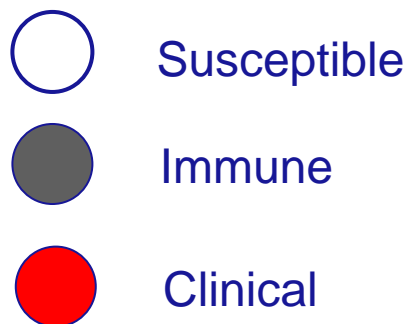
The threshold conditions that determine whether an infectious disease will spread in a susceptible population when introduced are characterized by the so called R0 (basic reproduction number)
- if R0 < 1, the modelled disease dies out
- if R0 > 1, the disease spreads in the population

Rationale behind the use of BTV8 information and model to construct epidemiological scenarios:

•BTV8 is an exclusively vector transmissible disease as are other Simbu group viruses

•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 group in Europe.

# Hypothetical SBV spread scenarios

In order to generate possible epidemiological scenarios in relation to the spread of the virus, several modelling assumptions were made:

- The EU ruminant population is susceptible.

- SBV infection is assumed to be exclusively vector-transmitted and the transmission is similar to that of BTV8.

- Vectors are evenly distributed over the whole of Europe.

n1 Vectors

spread unlikely
spread likely

n3 Vectors
- spread unlikely
- spread likely

# Scenario III - spread of SBV, n2 vectors per host, average temp in May, 6 days viraemia



n2 Vectors
- spread unlikely
- spread likely

# Uncertainties
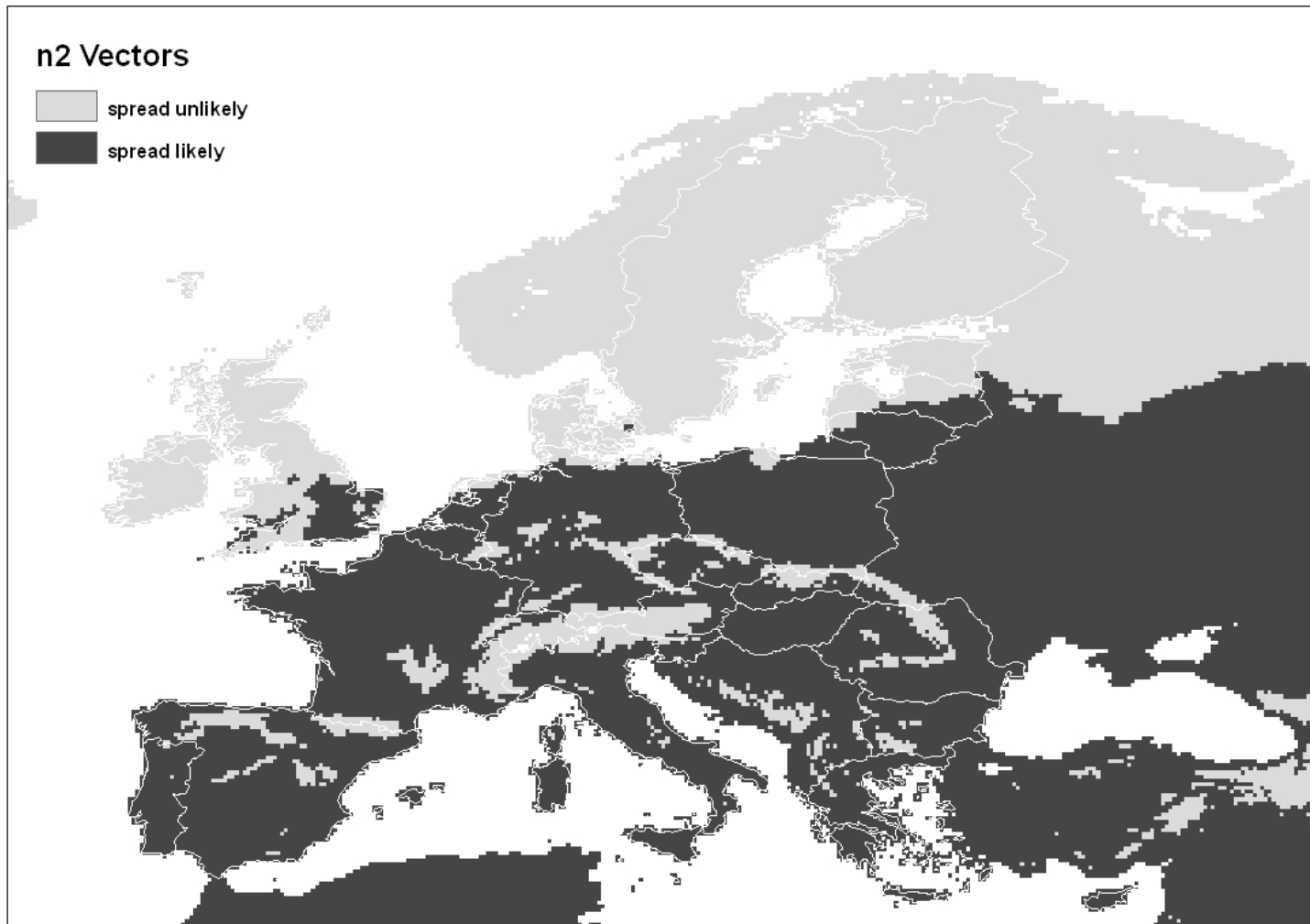
Viraemia duration in naturally infected animals and the range of susceptible species is currently unknown

Other routes of transmission such as direct transmission cannot be excluded and the epidemiological role of transplacental transmission is unknown

Risk factors related to animal production and management such as exposure to vectors or gestation period at the time of infection are also not fully understood

Antibody detection is restricted to the virus neutralisation test and indirect immune-fluorescence test, no high throughput antibody detection serological tool for large scale surveys is not available.

Our knowledge on the geographical distribution of the disease is based on the reported cases, mainly of lambs, calves and kids showing malformations of the AHS type with laboratory confirmation of SBV infection by RT-qPCR.

**It cannot be excluded that a much larger geographical area is affected due to under reporting**

# 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.

- It is recommended that a harmonized case definition is used in all MS in order to facilitate data comparison and analysis at the European level.

# Recommendations

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

# Data needs

- Factors that could influence the spread of the disease

- Serological surveillance data in areas where SBV has yet not been reported

- Data on animal health and welfare impact of SBV

- Quantification of the numbers of newborn malformed animals and its relation to the number of infected mothers during the gestation period

# 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.

# 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

PRAPeR/MRL workspace : IT WG : Advisory Forum : BIOHAZ Workspace : Statistical Network : Library and Archives : Scientific Cooperation Workspace : PRAPeR Workspace : Proofreading Task Force : Mission Order & Reimbursement, Chrono-In Workflow : Joint Science Workspace : Assessment Methodology Workspace : DOI Survey Community : NOVEL INFLUENZA VIRUS : Administrative information : Executive Directorate : 02.SCUBA DIVING : Future Challenges to EFSA : Information Exchange Platform : GIS Community : Expert Database Efsa : INTRANET :

You are here : PRAPeR/MRL workspace > MRL Enforcement

Pilot for XML Data Submission

## 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
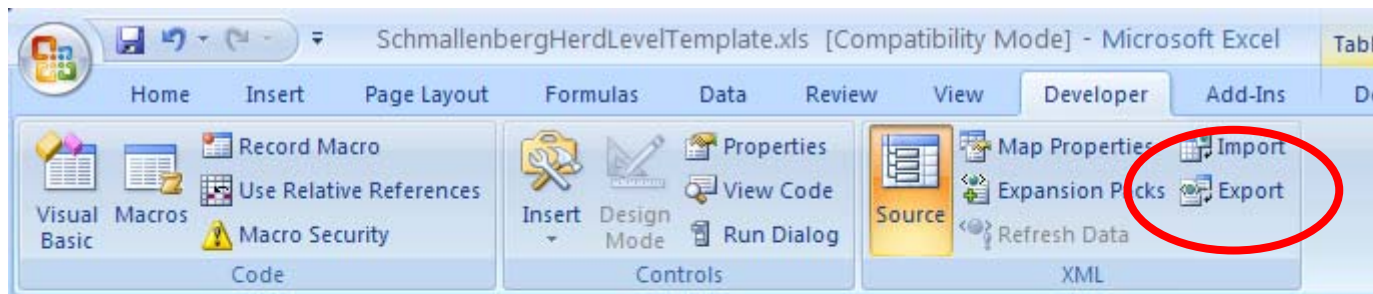
# Excel template



XML schema mapped within workbook

Drop down list for controlled terminologies

XSD available to support automated data transfers

# Export Data



Click on the export button in the Developer tab of Excel and select the location on the local PC to save the XML file
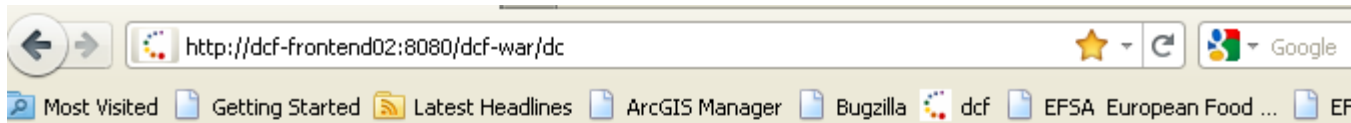
# DCF login



**URL for DCF: https://dcf.efsa.europa.eu/dcf-war/dc**
**Login with user name and password**

# Select data collection



1) Click on + button to view data collections
2) Click on SBV_12
3) Click on "new transmission"

# Upload file



1) Locate file on local PC with browse button
2) Select XML file type
3) Click on "send"

# Viewing transmissions



1) Click on transmissions to see all files submitted by your organisation
2) Check status of transmission
3) In case of validation errors contact EFSA data managers
SBV.AHAW@efsa.europa.eu

# Regular updates
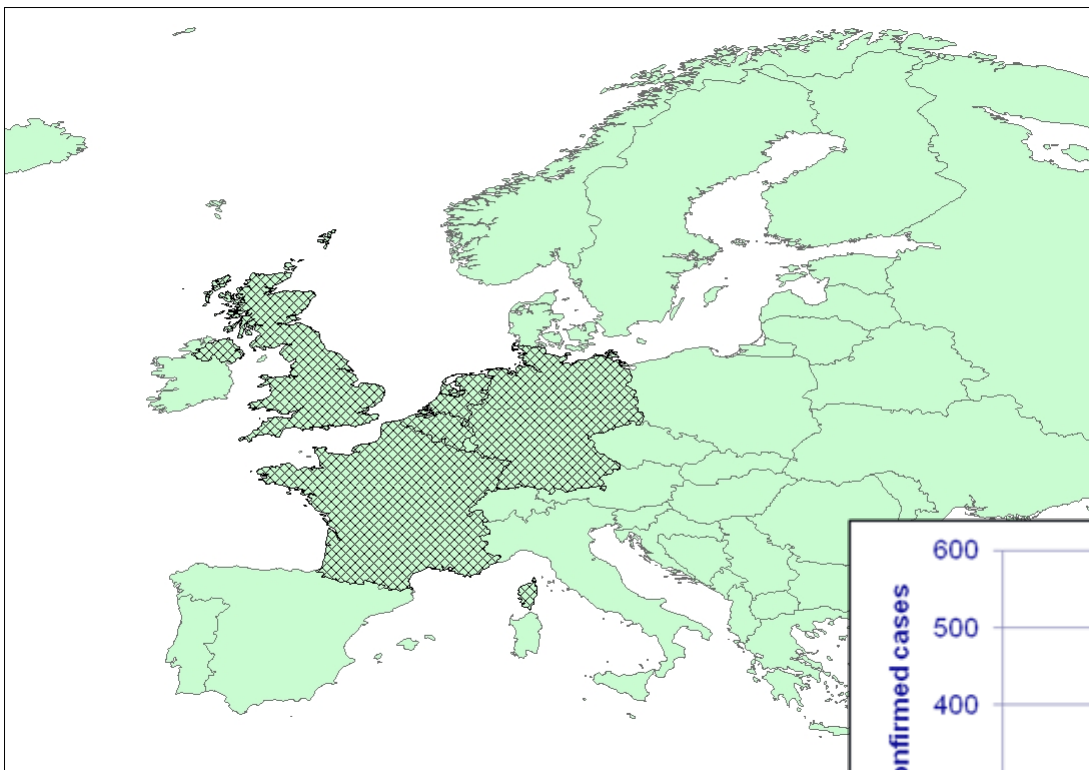
Areas affected
Confirmed cases in holdings by date of first suspicion
Morbidity and mortality rates

Refinement of epidemiological scenarios
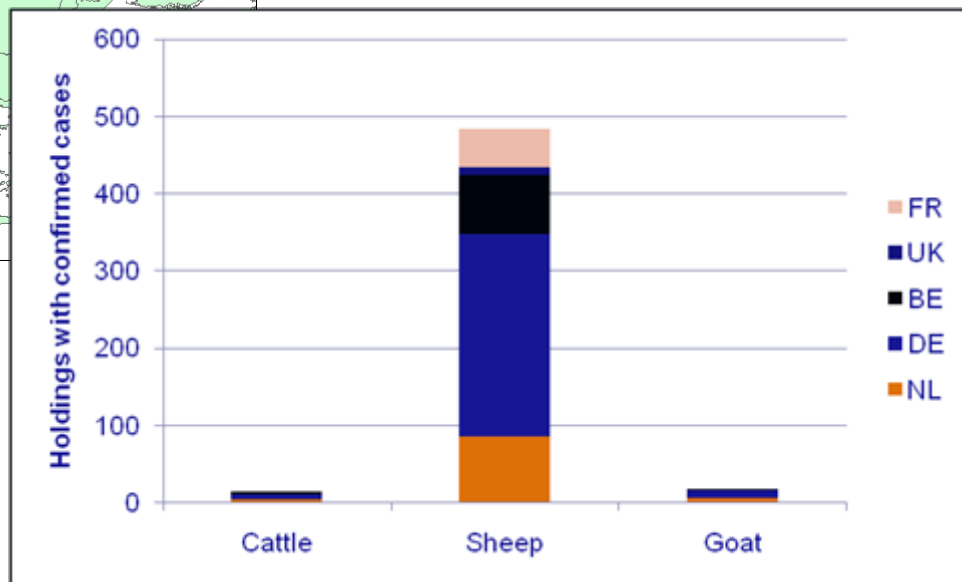
Case level – linked results for dams of AHS births and resulting AHS cases, birth cohorts

To facilitate future epidemiological research including a better understanding of morbidity, the case fatality rate, duration of symptoms, risk period for infection during pregnancy, role of transplacental transmission and other risk factors.
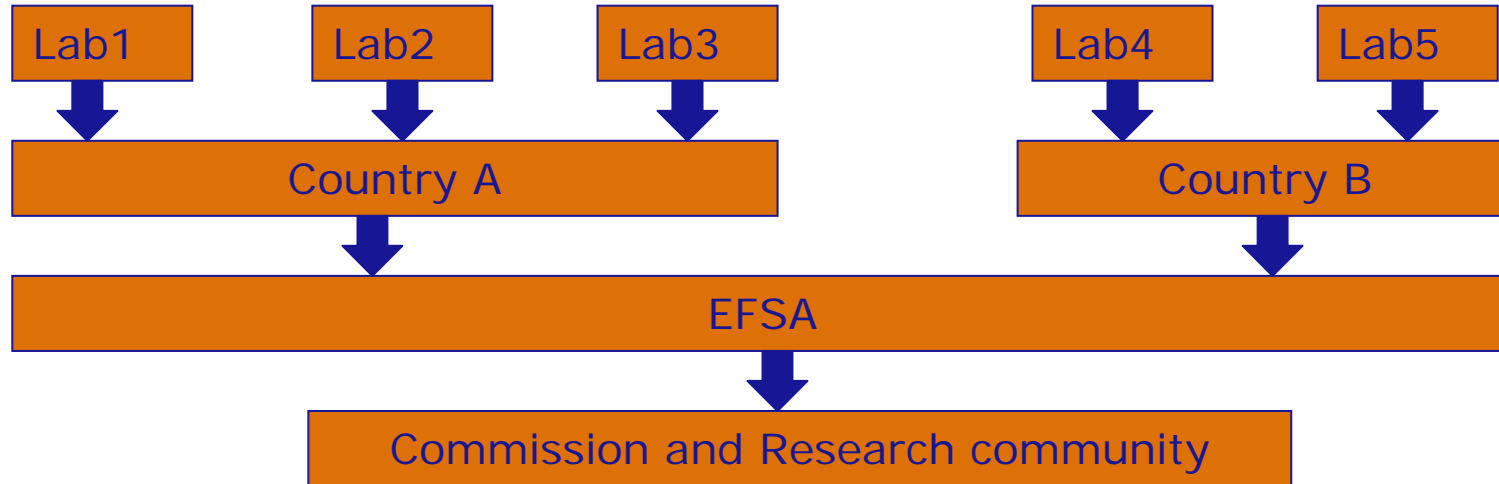
# Data sharing



DCF can act as a data hub for sharing validated epidemiology datasets

Access according to national data access policies
All affected holdings must be anonymised

Committed *since 2002*
to ensuring that Europe's food is safe

# Acknowledgements

# Points for discussion

Harmonised case definitions

Links to other EU datasets (EUROSTAT, TRACES)

Case level data

Access rights

Official reporting organisations