Report on

WG2| STSM2   Review data collection frameworks

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Introduction

SOUND-control aims to harmonise the outputs from different European Member States (MS) Control Programmes (CPs) for non-regulated cattle diseases. Several European countries have already implemented national or regional surveillance, control, or eradication programmes for these infections. However, these programmes also create difficulties for intra-community trade, as trade has the potential to introduce infectious agents into regions where disease freedom has been achieved. The difficulties relate to differences in disease status between countries, and the lack of agreed methodologies to assess and compare confidence of freedom among cattle that are being moved between countries and regions. Although for non-regulated diseases no regulations exist at European level, an understanding of equivalence with respect to disease freedom or more correctly termed 'freedom from infection' is important when seeking to facilitate interstate animal movements, whilst also managing the risk of infection.

STSM Aim
The aim of this STSM was: Designing a data collection matrix for collecting information useful to estimate disease freedom from different control programs (CPs) for a range of infectious cattle diseases.

The objectives of this STSM were a). Preparation of a short review of the current data collection
frameworks available using a list prepared by the WG2 members, and identify their main advantages and drawbacks, ii) Building a draft data collection matrix for each type of CP based on the outcome of the first STSM and the review, and iii) Presenting the first draft during the workshop organized in Switzerland in early November 2019.

The expected results were:

A draft data collection tool and a report on the findings of the STSM.

The results will be presented during the workshop in November 2019 of the SOUND control WG2.

In this document, an overview is presented of what disease control programme data is needed for modelling disease freedom. The lessons learned from the STOC free project and the previous STSM provided a solid base for including/excluding the variables in our final draft table / questionnaire.

STSM work description

Review data collection frameworks

Current data collection frameworks available

There is not yet a generic data collection framework available, however different data frameworks circulate, each of them with their own advantages and disadvantages. The data collection framework prepared and used within the STOC free project provides a solid base and good experience that may be adjusted and can be used for another cattle disease. They focused on BVDV and data of interest included information related with monitoring of the infection and information on factors that could influence the probability for a given entity to be free from infection. The data framework drafted within the first STSM of WG2 was focused on paratuberculosis and BVDV. Both platforms are useful; however, they have limitations such as: for the possibility of improving and adjusting according to diseases of interest, simplifying in order to make it realistic and becoming more friendly in use.

The STOC free data collection framework is divided into three main parts: 1) Cattle demographics, 2) Control Programmes, and 3) Management.

1. The demographic part considered 11 general parameters useful for any cattle population such as the number of cattle in a territory. However the availability of data is questionable for some parameters, especially for some Eastern European Countries (EEC).
2. The CP part considered seven parameters (Percentage of cattle herds that participate in the control programme, Percentage of animals tested, Number of herds that identified one or more PI's, Number of PI's identified in the country, Age at which PI animals were culled, Percentage of free cattle herds, Percentage of free cattle herds that had a breakdown) and required data for tree consequent years. Three out of seven question are very important for BVDV infection, however they are very specific and useful only for BVDV control programmes, and they do not fit in a multi disease data collection tool. What was not considered within the STOC free data tool is: disease

status, disease prevalence between and within herds, test sensitivity & specificity, test schemes and samples submitted. Within the STOC free project those data are collected by different means such as a questionnaire.

3. The management part is designated to collect data from seven subdivisions (1. Grazing, 2. Breeding, 3. Purchase, 4. Cattle shows, 5. Vaccination, 6. Housing, and 7. Biosecurity) each of it requires data for certain parameters.

    The variables related to grazing were: a). Percentage of cattle herds practicing zero grazing; b). Percentage of cattle herds involved in communal grazing; c). Percentage of cattle farms that are fragmented; d). Number of neighbours at pasture per herd; e) Percentage of herds where calves possibly have nose to nose contact with pregnant cattle on pasture. For the first three parameters the quality of data will be at a high level in developed countries, and at an acceptable level in some countries. The quantitative data for rest of variables is not easy to collect, therefore qualitative or semi-quantitative data may be required within the SOUND control project data framework.

    The variables related to breeding and participating in cattle shows were: a) Percentage of herds that have animals attending shows; b) Percentage of herds that use natural breeding and c) Percentage of herds that use artificial insemination (AI). Despite that those are straightforward questions, the quality of the data for certain countries will be not as reliable as for most of the western countries.

    At the purchasing part, the considered variables are: a) Percentage of herds that purchased cattle; b) Percentage of herds that purchase and purchased all animals within the territory; c) Percentage of herds that purchase that purchased at least one animal from markets/traders; d) Number of cattle that was purchased; e) Percentage of cattle that was purchased within the territory; f) Percentage of cattle that was purchased from markets/traders; g) Number of purchase moments in the territory; h) Average number of cattle purchased at each purchase moment; i) Territories where most cattle was purchased from; j) Percentage of purchased animals that were a calf at the moment of purchase; k) Percentage of purchased animals that were pregnant at the moment of purchase; l) Percentage of herds that use quarantine for their purchased animals that have not been tested before arrival in the herd.

The data collection framework designed during the previous WG2 STSM is a data collection tool filled in for Denmark and it is provided as an Excel file. There are several parts: General; Overview on Paratuberculosis; Data requirements for Paratuberculosis: Overview BVD Data requirements for BVD; References.

The general part contains a short overview, abbreviations, parameters and definitions. For each disease (Paratuberculosis and Bovine Viral Diarrhoea) there are two worksheets; one for general background and one for data collection. At the end there is a list of references provided.

Both data collection tools provide a solid base for compiling a new rational data collection matrix appropriate for the SOUND control project. However, they are too detailed and data availability may be a problem in some countries, particularly from Eastern European countries.

WG2 STSM data collection tool

To overcome the limitations of currently available data collection tools, a data collection excel table is drafted and is ready for final discussion in the forthcoming meeting in Zurich Switzerland, November 2019. The overall aim was to compile a data matrix which ensures data availability form as all participating countries; data relevant to different non-regulated cattle diseases; data that are suitable and sufficient for modelling; and easy to fill in. In addition, the work was discussed with WG1 to avoid duplication work. In our data collection tool, with the focus was on quantitative data.

Describing the final draft table compiled during WG2 STSM

This data collection framework is composed by three parts: (a) Demographics, (b) Control programmes and (c) biosecurity & management. In the control programme part extra attention was paid to diagnostic test performance and risk factors which could interfere with disease control.

Demographics

The parameters concerning animal demographics are presented in Table 1. Twelve parameters are listed. For the first seven parameters all six countries involved in STOC free indicated they have quantitative data available, most of the countries indicated that they have this quantitative data available for the subcategories dairy, non-dairy and beef breeding. Only three of the partner countries in the STOC free project have data available for the variable "The percentage of dairy cattle herds that have also beef cattle on the same location". The variables related to contacts between cattle with small and wild ruminants is important, especially for Paratuberculosis, but will be difficult to collect as indicated by the countries within the STOC free project.

Table 1 – General quantitative data: Animal demographics

Variable	Definition	Type of data	Comment
3. Number of cattle	All cattle older than 1 year	Number of individual animals	
4. Number of cattle herds	Total number of cattle herds	Number of herds	
5a. Average number of cattle per herd	Only cattle older than 1 year	Mean	
5b. Average number of cattle per herd in categories	Describe categories relevant for your territory and give % of cattle herds that belong in each category. See word explanatory document	Percentage of herds per category	
6. Number of births in the territory	Number of individual births within a year	Number of individual births	
7. Number or percentage of herds where calves are born within the year		Number or percentage of herds	
8. Average number of births per herd	The average number of births per herd of herds where calves are born within the year	Mean	
9a. Calving pattern (seasonal or no seasonal calving)	Seasonal calving: when most calves on the farm are born during a certain period in the year.	Select option: Yes/No	
9b. If there is seasonal calving, provide starting + ending month of the high calving period		[Starting month]; [Ending month]	
10. a. Cattle density	The number of cattle per km2	Mean	
10.b. If it is possible specify the cattle density of a high- and low-cattle density area within the territory	The number of cattle per km2	Mean	
11. What is the percentage of mixed farms?	All dairy herds that also have a type of beef cattle such as veal calf, suckler cattle etc.	Percentage of herds	
12. Number of small ruminant herds	Goat and sheep herds	Number of herds	
13. Percentage of cattle herds that also have goat and/or sheep on the same location	Cattle herds with goat and sheep on the same location	Percentage of herds	
14. Estimation of cattle herds that could possibly have contact with wild ruminants	Such as wild ruminants, badgers etc.	Provide percentage or estimation: low, medium, high.	

Control Programme

In order to collect quantitative data on existing control programmes for JD, IBR and BVD a set of parameters was taken in consideration. We started with 25 parameters, but finally selected only 13 parameters. Table two shows the variables concerning the disease control programmes that may be in place in each country. One of the aims of the WG2 workshop in Zurich will be to decide if all variables in this table are important to include in the SOUND control framework.

In the STOC free project only seven parameters (% of herds participation in CP, % of animal tested, number of infected herds, number of PI identified animals, % of free cattle herds, % of free herds that experienced an outbreak, and age of PI animal culling) were included, as other parameters were not important for modelling freedom of disease or there was no data available.

In the first draft we considered additional parameters such as true prevalence, apparent prevalence, true herd prevalence, true prevalence between herd, true prevalence within herds, apparent prevalence between herds and apparent prevalence within herds. All those parameters could be important and would be nice to have, but the question is, is the data available and what is the quality of the data?

Furthermore, if we could collect data on the number of tested animals and diagnostic test parameters, we could calculate the parameters we need. Consequently, we excluded a range of parameters and for parameters regarding diagnostic test performance and test strategy we decided to draft separate tables for each disease. For each disease detailed information is collected with separate Excel worksheets.

Table 2 – Variables their definition and type of data required under Control Programme section

Variable	Definition	Type of data	JD	IBR	BVD
15.a. Presence of a control programme	Official name of control program	yes/no and name of control programme			
15.b Is the programme voluntary or mandatory for a) dairy, b) beef		Voluntary/mandatory	Dairy: Beef:	Dairy: Beef:	Dairy: Beef:
16. Disease status	Disease status in the territory	Choose from the options: Believed to be absent, Confirmed absent; Endemic, Sporadic, Recently introduced, Unknown			
17. Animal level prevalence	Proportion of animals tested positive at a certain point in the year	Percentage			
18. Herd level prevalence	Proportion of herds which had at least one infected animal	Percentage			
19a. Percentage of dairy cattle herds that participate in the control programme	Percentage of dairy herds that participated in the control programme at the beginning of the year	Percentage of herds			
19b. Percentage of beef cattle herds that participate in the control programme	Percentage of beef herds that participated in the control programme at the beginning of the year	Percentage of herds			
20. Percentage of herds that has a free status for each specific disease	Percentage of cattle herds participating in the CP that has any free status according to the control programme, at the beginning of the year	Percentage of herds			
21. Percentage of cattle herds that vaccinate cattle against each specific disease	During the year	Percentage of herds			
22. Testing schemes					
23. Number/percentage of herds tested in the territory	During the year	Percentage of herds			
24. Number/percentage of animals tested in the territory	During the year	Percentage of animals			
25. Number/percentage of herds participating in the CP that	During the year	Percentage of herds			

identified one or more positive animals?					
26. Number/percentage of positive animals identified in the territory?	During the year	Percentage of animals			
27. Is culling policy part of the control programme?	-	Yes or no			

Factors related to introduction or persistence of the disease

The identified risk factors that may play a significant role in the introduction or persistence of the disease in the herd, region or country are presented in Table 3 to 5. The variables that were considered important are: purchase, grazing and co-grazing, breeding, participation in cattle shows, housing, a range of factors related to contact between farms, sharing equipment, control of rodents and insects, manure and colostrum management.

In all tables it is foreseen to collect quantitative data, expressed either as number or percentage, however if it is not possible semi-quantitative data may be accepted.

In Table 3 there are eight questions for collecting quantitative data about purchase and grazing practices. Most variables for purchase are included as purchase itself is considered one of the most important risk factors for the introduction of infectious diseases in cattle. Additionally, most territories/countries have quantitative data available. The variable "percentage of purchased animals that were pregnant at moment of purchase" is considered important but it could be difficult for countries to obtain quantitative data. Grazing is a proxy for neighbourhood risk.

Table 4 shows variables concerning breeding, cattle show participation, housing and colostrum management. It was decided to include six variables as important risk factors for introducing cattle diseases, however further discussion is needed during the next Sound Control meeting in Zurich to evaluate data availability and quality in different countries.

Table 5 shows seven variables for factors related with additional risk factors: disinfection, equipment & vehicles sharing, vector and rodent control programmes, manure management. The listed risk factors are important for spread of cattle diseases and persistence of the infections in the herd, territory/country, but further discussion is needed during the next Sound Control meeting in Zurich to evaluate data availability and quality in different countries.

Table 3 –Data required for purchase and grazing risk factors

Variables	Definition	Type of data	JD	IBR	BVD
28. Percentage of herds that purchased cattle	Percentage of cattle herds that purchased cattle within the year	Percentage of herds			
29. The total number of cattle that was purchased	Total number of cattle that was purchased	Number of individual animals			
30. Percentage of purchased animals that were a calf at the moment of purchase	Calf: an animal in its first year	Percentage of individual animals			
31. Percentage of purchased animals that were pregnant at the moment of purchase	Percentage of purchased animals that gave birth within nine months after purchase	Percentage of individual animals			
32. Percentage of cattle herds practicing zero grazing	Zero grazing: no grazing during the whole year	Percentage of herds			
33. Percentage of cattle herds involved in communal grazing	Communal grazing: grazing animals from different cattle herds together	Percentage of herds			
34. Percentage of cattle farms that are fragmented	Fragmented farm: a farm where two or more geographically separated tracts of lands are operated	Percentage of herds			
35. Percentage of herds where cattle can have possibly nose to nose contact with cattle from neighboring herds		Percentage of herds			

Table 4 – *Data required for breeding, cattle shows, housing and colostrum management*

Variables	Definition	Type of data	JD	IBR	BVD
36. Percentage of herds that applies natural breeding of all herds that breed	Percentage of herds that breed. All herds that used at least once natural breeding during the year	Percentage of herds			
37. Percentage of herds that have animals attending shows		Percentage of herds			
38. Percentage of herds that house calves separately from pregnant cattle	Percentage of herds that breed and house calves separately from pregnant cattle.	Percentage of herds			
39. Percentage of herds that house calves in individual pens	A farm that use calf pen system	Percentage of herds			
40. Percentage of herds where calves possibly have nose to nose contact with adult cattle in the barn	A calf is cattle up to 1 year old.	Percentage of herds			
41. Proportion of herds that use colostrum from their own dams		Percentage of herds			

Table 5 – Data required for factors related to additional risk factors: disinfection, equipment & vehicle sharing, vector and rodent control programmes, manure management

Variables	Definition	Type of data	JD	IBR	BVD	
42. Percentage of herds that share transport vehicles with other cattle herds		Percentage of herds				
43 Percentage of herds that share equipment with other cattle herds		Percentage of herds				
44. Percentage of herds that provide clothing for visitors		Percentage of herds				
45. Percentage of herds that apply compulsory disinfection procedure at farm entrance		Percentage of herds				
46. Percentage of herds that applied rodent control program		Percentage of herds				
47. Percentage of herds that applied vector control program		Percentage of herds				
48. Percentage of farms that applies manure from other farms on their land		Percentage of herds				

Main achieved results

A draft version of the data collection matrix for collecting data useful to estimate disease freedom from different CPs for a range of infectious cattle diseases is available. Also an explanatory word document is prepared, which will support data entry and will improve the data quality. This version of the data collection tool will be presented during the WG2 workshop in Zurich in early November 2019. Sound control members will be asked to indicate data availability and quality for their country and discuss the results in small groups.

This STSM allowed me to be in contact with academic and professional staff at the University of Utrecht in Utrecht and GD Animal Health in Deventer, the Netherland. This will be used for further joint project applications.

A short presentation about the results of the STSM was given during the WG1 meeting in Inverness, Scotland. An abstract is drafted for submission to an international conference and we discussed the opportunity to prepare a manuscript for publication in which we compare data availability and quality between Albania and the Netherlands.

Workflow during STSM

Travelling
It was planning to travel on August 18 From Tirana – Amsterdam through London, but the flight was overbooking, so I arrived at Utrecht on Monday 19 after midnight.

Tuesday, 20 2019 August 2019

According to plan I reached the building Yalelaan 7th around 08:18, where I met *Msc. Annika van Roon* who introduced me with her experience in the framework of the STOC free project.

Wednesday 21 August 2019
Arrival at 08: 08 Meeting Annika

Meeting with Prof. Gerdien van Schaik, Dr. Inge Berends and Annika van Roon.

After disccusion with the group we started working on drafting a data matrix collection table in excel.

I was introduced by Gerdien to another quantitative epidemiologist of the Farm Animal Health Department, Prof. Dr. Arjan Stegeman.

Thursday 22 August 2019
Working on table data collection framework

Friday 23 August 2019

Working on table data collection framework

Skype meeting at 10-11:30

Saturday and Sunday 25 &26 August 2019. Weekend working at hotel

Monday 26 August
Travelling from Utrecht to Deventer to Royal GD. Arriving at GD at 12:00, introduced to people of epidemiology unit and department of ruminant health.

Discussing the progress and the week plan for work.

Tuesday 27 August 2019. Travelling Utrecht to GD, Deventer. Working on Data collection table.

Wednesday 28 August 2019. GD, Deventer. Working on Data collection table.

Thursday 29 August 2019. GD, Deventer. Working on Data collection table.

Friday 30 August 2019. GD, Deventer. Working on Data collection table

Saturday 31 August 2019

Travelling to UK and preparing for Inverness Meeting.