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Workshop on the epidemiological analysis of ASF in Europe “Lessons learnt and further scientific actions” 10-11 October 2017

European Food Safety Authority

Abstract

African swine fever (ASF) is a devastating transboundary virus infection of domestic and wild pigs. No vaccines or drugs are available to prevent or treat ASF infection. The epidemiological situation on ASF in the EU represents a threat to the pig sector and causes trade disruptions from affected areas. For more than 3 years, ASF has spread throughout the Baltic countries, Poland, Romania and the Czech Republic. Following a request of the European Commission (M-2016-0048, EFSA-Q-2016-00152), EFSA provides technical and scientific assistance to the Commission and the ASF-affected Member States (MSs) by collecting and analysing ASF epidemiological data. These data were used by EFSA's ad hoc working group (WG) for a comprehensive epidemiological analysis of ASF, including a risk factor analysis, modelling the spread of the disease in Europe and an assessment of the effectiveness of the implemented measures by the MSs. In October 2017, EFSA organised a two-day workshop for representatives of the veterinary services, national laboratories and research institutions to receive feedback from participants on the report of EFSA's WG and to discuss possible scientific actions to improve the prevention and control of ASF in wild boar and domestic pigs in the EU. Round-table discussions identified key scientific topics which need to be further investigated in the near future to further support science-based advice to risk managers. Some recommendations were as follows. There is a need for better understanding of the wild boar population dynamics and ecology. The evaluation of the efficacy of control measures applied in an area after a single, focal ASFV introduction needs to be differentiated from the evaluation of control measures applied in a larger area, infected for several years. A more detailed risk-factor analysis using landscape information is needed. The concepts of feeding and baiting need to be agreed upon for different EU contexts. Guidelines for ASF surveillance activities in wild boar populations in the not-yet infected, newly infected and endemic areas are required for different surveillance objectives.

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Key words: ASF, epidemiological analysis, data collection, collaboration, EFSA, EU Member States**Question number:** EFSA-Q-2016-00154**Correspondence:** any enquiries related to this output should be addressed to alpha@efsa.europa.eu

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Summary

ASF entered into Estonia, Latvia, Lithuania and Poland in 2014 and has since June 2017 also spread to the Czech Republic and to Romania since July 2017.

EFSA currently assists Member States (MSs) affected by ASF in the collection, sharing and analysis of relevant epidemiological data in order to review the management options for wild boar. Since 2016 EFSA is collecting data from the laboratory information management systems (LIMS) of the ASF national reference laboratories of the ASF-affected MSs in the EFSA Data Collection Framework (DCF) in accordance with a common data model. For comprehensive epidemiological analysis (including risk factor analysis and mathematical modelling) EFSA is collecting additional epidemiological and populations data, as well as data on wild boar management options.

This cooperation with the Baltic countries and Poland enabled the preparation of the first scientific report on ASF that has been issued in March of 2017 which is [available](#) on EFSA's web-site. The report includes a basic epidemiological and risk factors analyses based on the data provided by the MSs.

On 10-11 October 2017, a workshop on the epidemiological analysis of ASF in the EU was held in the framework of collaboration between EFSA and ASF affected MSs and other countries at risk, including third countries.

Experts from reference laboratories for ASF and veterinary services, wild boar ecologists and leading scientists presented their experience. Participants discussed a number of practical aspects of data collection and epidemiological analysis of ASF in wild boar and domestic pigs. It was concluded that the discrepancies between the level of detail of the data collected by the MSs has to be identified and the minimum frequency and spatial resolution of the data items would need to be agreed upon first of all.

During the break-out session, 3 groups of participants discussed scientific priorities to help risk managers in prevention and control of ASF, as well as possible ways of collaboration between EFSA and the affected MSs.

Potential collaboration between EFSA and one or more MSs' institution(s) on providing immediate feedback, correction of submitted data, visualisation and descriptive epidemiology for different zones was considered to be useful.

In order to make the analytical epidemiology more useful for the affected MSs and MSs at risk, it is needed to differentiate the evaluation of the efficacy of control measures in new area with a focal ASFV introduction from those in a larger infected area affected for several years. More detailed, landscape risk factor analysis using local information of infected countries to supplement the simulation model and adaptation of the epidemiological model are needed.

There is a need for better understanding of the wild boar population dynamics and ecology of wild boar. The protocols for collecting wild boar population data need to be further harmonised across the EU. Necessity of agreement on concepts of feeding and baiting was pointed out as a one of the scientific priorities. Moreover, guidelines for ASF surveillance activities in wild boar populations in the not-yet infected, newly infected and endemic areas are required.

The need for trainings for hunters, veterinarians and pig owners is indicated as a mandatory part of ASF control strategy.

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1. Introduction

African swine fever (ASF) is a highly contagious virus infection of domestic pigs, with the potential for very serious and rapid spread, irrespective of national borders. ASF has a socio-economic impact on people's livelihoods, on trade of animals and animal products, and on food security in areas where many pigs are kept for subsistence farming. European wild boars are equally susceptible to ASF, which makes the control of the infection very difficult if it becomes endemic in these populations.

ASF virus entered the EU in 2014 and it has spread both in the domestic pig sector and in the wild boar populations. The disease has entered into Lithuania, Poland, Latvia, Estonia, Romania and the Czech Republic affecting wild boar populations and domestic pigs since then.

EFSA has provided scientific advice on ASF well before it entered the EU territory. The last Scientific Opinion issued in 2015 recommended a number of possible measures to prevent introduction and spread of ASF virus through wild boar. Despite the efforts of the MSs in the implementation of these measures, ASF has continued to spread.

Since the incursion of ASF in the EU, EFSA has intensified its work on ASF, delivering updates of previous Scientific Opinions, and rapid advice to EU risk managers. Following a request of the EC, EFSA currently assists affected MSs in the collection, sharing and analysis of relevant epidemiological data in order to review the management options for wild boar. For this purpose EFSA is collecting data on wild boar and domestic pig distributions and data on laboratory monitoring of ASF in wild boar from the ASF affected MSs, from the non-EU ASF affected countries and from MSs at ASF risk.

In the framework of this request, a first scientific report on ASF was published in March 2017, (EFSA, 2017) focussing on the temporal and spatial patterns of ASF in wild boar and domestic pigs, and assessing the risk factors involved in the occurrence of the ASF virus (ASFV) in the wild boar population. A second scientific report, issued in November 2017, provided an update on these aspects thanks to the continuous epidemiological data provided by the ASF affected MS.

Collaboration between all ASF affected MSs is needed for comprehensive analysis of the ASF situation and to explore the prospects of its development. On 10-11 October 2017, EFSA organised a workshop on the epidemiological analysis of ASF in the EU, where outcomes from the analyses were presented and discussed. The outcomes of this discussion, as well as the recommendations for future scientific actions that can assist risk managers in their battle against ASF are presented in this report.

2. Presentations and discussions

2.1. Presentations

The objectives and agenda of the workshop were presented by the chair, Sofie Dhollander (EFSA) and were agreed upon by the participants. Andrey Gogin (EFSA) and Hans-Hermann Thulke (Helmholtz Centre for Environmental Research – UFZ) presented the results and conclusions of the Report on epidemiological analysis of ASF in Europe (EFSA, et al., 2017 and Helmholtz Centre for Environmental Research GmbH, et al., 2017) prepared by EFSA in collaboration with the MSs.

The participants from Estonia, Latvia, Lithuania, Poland, the Czech Republic and Romania shared their experiences with ASF prevention and control in their countries and provided feedback on the report and recommendations for the future collaboration with EFSA. More in particular, suggestions were made for further improvements of the data collection and the epidemiological analysis. Additionally, needs were identified for future research and for issues that need to be addressed in order to improve the knowledge on the ASF epidemiology and the measures to prevent and control the disease.

The participants from Hungary, Slovakia and Moldova presented their surveillance activities on ASF to early detect potential incursions of ASFV.

The participant of Sardinia presented the experience of dealing with an endemic ASF situation and provided suggestions for research priorities which could contribute to the control and eradication of ASF, especially focussing on endemic areas.

The participants of the European Reference Laboratory on ASF represented an analysis of the gaps in the ASF epidemiology and suggested priorities that need to be addressed.

The participant of the Friedrich Löffler institute (FLI) presented the web tool for data collection and visualisation of ASF.

2.2. Discussions

The discussions during the above presentations could be summarised as following.

- Data collection and epidemiological analysis
 - The data exchange of the affected MSs with EFSA through the data collection framework worked well and was perceived as an advantage by the participants as it facilitates harmonisation of data collection and epidemiological analysis across MSs. However, the participants requested to have easier access to their data at all points of time and to be able to view their data immediately after uploading. Further, they wished that it should become easier to perform immediate corrections on the uploaded data.
 - The participants would find it also an improvement if the tool would allow to perform basic descriptive epidemiological analysis within different regions, or to perform risk factor analysis also at regional level on their uploaded data.
 - Additionally, the participants would find it very useful if the tool would be able to show exact locations of cases on maps, if wanted by the data providers, which would facilitate an additional validation of the data entry and would also allow the use the downloaded maps in presentations.
 - Currently, the risk factor analysis was performed only for Estonia. It would be better, however, to perform this type of analysis also for the other MSs, as the risk factors may be different. Given an example, it would have been interesting to compare the occurrence and the speed of the propagation of the diseases in the different affected areas and to find out what could have been the reason for the fast spread of the disease in some areas of Estonia. Therefore, it would be necessary to obtain similar levels of detailed data collected by all the affected MSs.
 - It was suggested that a future collaboration on data collection and mapping of ASF surveillance data to assist MSs in epidemiological analysis and risk assessment with the FLI would be beneficial. It should be guaranteed that the data are shared only with the data-providers and EFSA, and cannot be used for further analysis by third parties without previous permission. Further, it should be stressed that this will not lead to double reporting or uploading of the same data twice, but that the data will be uploaded in EFSA’s DCF and automatically transferred to the FLI database.
- The simulation model
 - The simulation model was considered a very useful tool by the affected countries, even if the outcomes were not always very encouraging. It shows the need of very stringent control measures to halt the spread of ASF.
 - It was suggested that the outcomes of the model should also be shared with the hunters, to give them feedback on the effect of their actions.
 - It was suggested to include specific landscape components in the model in the future analysis.
- Evaluation of control measures applied in the Czech Republic
 - The control measures applied in the Czech Republic were discussed. Electrical fences have been put up around the high risk area where all PCR and ELISA antibody positive wild boar were found. It was highlighted that the fences have remained intact and no dogs were used for hunting within the fenced area but only targeted hunting of individual animals was implemented to limit wild boar movements in this high risk area. Outside this zone drastic depopulation is implemented.

- The participants suggested that we should learn from this experience. If the control strategy would prove to be efficient, this could be used as an example and not-infected MSs should be prepared for similar mitigation measures in case of a focal introduction.
- The participants suggested that it would also be useful if the simulation model would address this type of control measures applied in smaller areas after a single ASFV introduction. It was mentioned that simulations of focal introductions is ongoing work and previous investigations have looked into the performance of temporarily erecting mobile barriers as contingency measures against wild-boar mediated spread of ASF.
- Evaluation of control measures applied in endemic areas
 - The new EFSA report shows that the ASF incidence gradually declines after 6 months of the first observation in an area, but a low circulation of ASFV is still observed in some areas after more than 3 years. The participants discussed about this phenomenon and indicated that the role of the wild boar in maintaining of ASF is still not clear. The driving forces for ASF spread and perseverance in affected areas still needs to be better understood. What is the role of antibody-positive wild boar in those areas?
 - ASF appears to be self-limiting in some regions of Sardinia. Until present, there has been no evidence of circulation of low pathogenic ASFV in Sardinia. However, the human mediated spread has played a crucial role in the maintenance of the disease, and the traditional farming systems hamper the eradication of the disease.
 - The participants discussed about the need to keep going the surveillance activities in long-term infected areas to understand what is going on in these areas. PCR and antibody detections are crucial to understand the infection and immune status of wild boar, in particular to identify potential infections with low pathogenic ASFV.
 - The participants suggested also that the model needs to be adapted to simulate infections in endemic areas and that the epidemiological analysis has to discriminate measures implemented in newly-infected areas from those implemented in endemic areas.
- Wild boar population dynamics and ecology
 - In Europe, overall, a significant increase of the wild boar population has been observed. This has been the result of many factors, such as climate change, different management practices or changing availability of habitats and crops (e.g. more than half of the crops could not be harvested in Latvia due to harsh weather conditions). On the other hand, in the Baltic States, a decline of the wild boar population has been observed since the introduction of ASF. It would be important to better understand the population dynamics in order to prevent and control ASF, as well as to develop suitable surveillance allowing early detection in free areas. How many years would be need until the wild boar population will be back to its initial level in the Baltic States? The main lesson learnt from last years is that early detection is crucial to control ASF.
 - Feeding and baiting have both pro’s and con’s. It should be discussed and defined what is meant by feeding and baiting in different ecological contexts, but also with different objectives (e.g. differentiate the infected areas from the not infected areas).
- Surveillance activities
 - The participants discussed the need for detailed objectives and guidelines for ASF surveillance in wild boar populations in the not-yet infected, newly infected and endemic areas (e.g. the value of passive and active surveillance for the different objectives should be clarified and guidelines for surveillance should be established for declaration of freedom of disease, which are cost-effective).
 - It was suggested that more attention has to be paid to the backyard sector and that the current surveillance does not take into account the different faming system types. Additionally, many backyard farms are not registered.

- The participants suggested that surveillance activities to identify potential genetic diversity of the virus are important, especially in those situations where the virus has been circulating in the same area for many years.

2.3. Break out session

The participants were divided in 3 groups and were asked to brainstorm on the following questions:

Epidemiological data collected from affected MS

- What can be improved in terms of the data collection itself?
- How can we make the analytical epidemiology more useful for the affected MSs and the MSs at risk?

Key scientific topics that need to be addressed to assist risk managers in ASF prevention and control

- Can you identify concrete and feasible scientific priorities to help risk managers in prevention and control of ASF?
- Can you identify needs for training or awareness building?

After merging the suggestions coming from the different round-table discussions, several recommendations were formulated and agreed during the workshop (see Section 4).

3. Conclusions

- The minimum level of detail, the frequency and spatial resolution of the data items collected from the ASF affected MSs into the Data Collection Framework would need to be agreed upon.
- To encourage data providers and make the data collection more useful for the MSs, the tool should allow immediate feedback, correction of data, the creation of maps and provision of descriptive epidemiology for different zones. Therefore, it was agreed that a connection with databases that already contain these features would be beneficial.
- There is a need to evaluate the efficacy of control measures in an area with a recent focal ASFV introduction and to differentiate these measures from those applied in a larger area affected for several years.
- There is a need for more detailed, landscape risk factor analysis using local information of infected countries to supplement the simulation model.
- There is a need to assess control strategies in endemic areas.
- There is a need to improve the knowledge of the wild boar population dynamics and ecology, to better understand the ASF epidemiology.
- There is a need to agree on concepts of feeding and baiting under different ecological conditions and to assess social aspects and management options of wild boar baiting and feeding. The recommendations should be differentiated for situations free of ASF and epidemic or endemic areas.
- The effect of climate change, extreme weather conditions and changing habitat on the ASF control measures (e.g. feeding ban) should be investigated.
- The risk posed by and management options for hunting waste should be investigated.
- Detailed objectives and guidelines for ASF surveillance activities in wild boar populations in the free areas, the newly infected and endemic areas are needed for the different surveillance objectives.
- Drivers to enable more detailed risk assessments for ASFV introductions and to strengthen regional collaborations (e.g. FAO involvement) should be investigated.
- Training/awareness for hunters, veterinarians and pig owners should be an integral part of ASF control strategies.

4. Recommendations

4.1. Epidemiological data from affected MS

What can be improved in terms of the data collection itself?

- To streamline level of detail collected between MSs, first of all the discrepancies between the countries have to be identified and a minimum level frequency and spatial resolution of the data items would need to be agreed upon. Already suggested areas for improvement were:
- Domestic pigs: map and streamline available data in MSs concerning type of holding and collection of potential epidemiological information (e.g. back-yard holdings often not registered, info on wild boar contact, biosecurity)
- Wild boar: agree on level of detail of population estimation methods, e.g. on the hunting ground, in spring, based on hunting bag, include sex and age class
- Visualisation of data collected: potential collaboration between EFSA and FLI to avoid double data entry, provide immediate feedback, correction of data, maps and descriptive epidemiology for different zones would be beneficial

How can we make the analytical epidemiology more useful for the affected MSs and the MSs at risk?

- Need to differentiate the evaluation of the efficacy of control measures in new area with a focal ASFV introduction from those in a larger infected area affected for several years
- Need for more detailed, landscape risk factor analysis using local information of infected countries to supplement the simulation model
- Adapt model to assess control strategies in endemic areas

4.2. Key scientific topics that need to be addressed to assist risk managers in ASF prevention and control

- Concrete and feasible scientific priorities to help risk managers in prevention and control of ASF
 - Better understanding of the wild boar population dynamics
 - Better understanding of the proportion of carcasses found, by involving more stakeholders/ provide incentives and tools/ develop apps for reporting
 - Effect of climate and extreme weather conditions and changing habitat on the ASF control measures (e.g. feeding ban)
 - Understand better the ecology of wild boar, i.e. natural depopulation/repopulation intervals and the influence of the mortality due to ASF
 - Integrated monitoring of wild boar populations (denominator data) and wild boar ASF (numerator data) is duly needed. For denominator data, current information derived from hunter-declarations or harvest statistics, which are not homogeneous and not sufficiently detailed
 - Agree on concepts of feeding and baiting under different ecological conditions and assess social aspects and management options of wild boar baiting and feeding. Differentiate recommendations for situations of free of ASF, epidemic or endemic areas.
 - Assess the extent and effects of behaviour, reproduction, and disease transmission
 - Need to improve our understanding of wild boar mortality, both regarding mortality rates (by age classes, by region, depending on feeding/not feeding) and mortality causes: not only ASF, which other diseases are relevant, how does this affect ASFV epidemiology and control?
 - Assess the extent, risk posed by and management options for hunting waste

- Effect of feeding and risks related to disposal of feed
- Molecular epidemiology: need to link epi-database with sequence database.
- Need for detailed objectives and guidelines for ASF surveillance activities in wild boar populations in the not-yet infected, newly infected and endemic areas (e.g. identify the value of passive and active surveillance for the different objectives, and establish guidelines for surveillance for declaration of freedom of disease, which are cost-effective)
- Need for more detailed information on pig movements and market study (price fluctuations) to identify drivers to enable more detailed risk assessments for ASFV introductions and strengthen regional collaborations (e.g. FAO involvement)
- Better understanding of the mechanism leading to the low incidence (AB-ELISA positive animals) observed in long-term infected areas (i.e. by testing seropositive hunted WB for virus presence in different organs). Need for continuous monitoring in these areas for increasing our understanding of ASF epidemiology
- Need for update on the possibility for introduction through infected straw
- Need to strengthen collaboration with different stakeholders (e.g. environment/fish and game authorities) in the fight against ASF and other wildlife diseases which are a problem that goes beyond the animal health sector
- Human mediated spread: understand better the drivers and risk factors
- Survival of ASF virus in different matrices. (it was mentioned that Poland and Germany are carrying out studies on the persistence of ASFV in different matrices).

4.3. Training/awareness/behaviour

- Communication to hunters in terms of the impact of the work and data collections, and provide feedback to them of the analysis done,
- Provide additional training for field veterinarians, especially in not yet infected areas to facilitate early detection. They could learn from the experience in the affected MSs.

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Abbreviations

ASF	African swine fever
ASFV	African swine fever virus
MSs	Member States
CSF	Classical swine fever
DB	Database
DCF	Data collection framework

Appendix A – Participants list

Last name	First name	Affiliation	Country
Depner	Klaus	FLI	DE
Dhollander	Sofie	European Food Safety Authority (EFSA)	
Falkauskas	Rimvydas	National Institute for Food and Veterinary Risk Assessment	LT
Feliziani	Francesco	CEREP – CEREL, IZS Umbria e Marche	IT
Gogin	Andrey	European Food Safety Authority (EFSA)	
Gallardo	Carmina	CISA-INIA (Animal Health Research Centre)	ES
Gortázar Schmidt	Christian	SaBio (Sanidad y Biotecnología) Research Group IREC – Universidad de Castilla – La Mancha & CSIC	ES
Iglesias Martín	Irene	CISA-INIA (Animal Health Research Centre)	ES
Korytarova	Daniela	State Veterinary and Food Institute, Veterinary Institute in Zvolen	SK
Kocsis	Melinda	National Food Chain Safety Office	HU
Mihaita	Maria	Veterinary and Food Safety Authority of Romania	RO
Nurmoja	Imbi	Estonian Veterinary and Food Laboratory	EE
Podgorski	Tomasz	Mammal Research Institute, Polish Academy of Sciences	PL
Pule	Daina	Institute of Food Safety, Animal Health and Environment “BIOR”	LV
Rozstalnyy	Andriy	FAO	
Sauter-Louis	Carola	Friedrich-Loeffler-Institut /Institute of Epidemiology (FLI)	DE
Šatrán	Petr	State Veterinary Administration	CZ
Seržants	Mārtiņš	Food and Veterinary service of Latvia	LV
Sirbu	Maxim	National Agency for Food Safety (ANSA)	MO
Thulke	Hans-Hermann	Helmholtz-Centre for Environmental Research	DE
Viltrop	Arvo	Institute of Veterinary Medicine and Animal Sciences/Estonian University of Life Sciences	EE
Woźniakowski	Grzegorz	National Veterinary Research Institute	PL

Appendix B – Agenda of the workshop

Tuesday 10/10/2017

Time	Topics	Participants
Morning - Internal session		
9.00-13.00	Final working group meeting	ASF WG Members
Afternoon - Objective 1: To finalize the epidemiological analysis of ASF in the Eastern EU, carried out under EFSA's mandate received from the EU commission) and agree on the way forward.		
14.00-14.30	EFSA: <ul style="list-style-type: none"> - Introduction of workshop objectives - Presentation of the conclusions of ASF Report II 	Andrey Gogin/Sofie Dhollander
14.30-15.30	Practical experiences and scientific needs of risk assessors and risk managers <ul style="list-style-type: none"> - Czech Republic - Estonia - Latvia - Lithuania - Poland 	Petr Šatrán Arvo Viltrop Mārtiņš Seržants Rimvydas Falkauskas Grzegorz Woźniakowski, Tomasz Podgorski
15.30-16.00	■ Coffee break	
16.30-17.00	Practical experiences and scientific needs of risk assessors and risk managers <ul style="list-style-type: none"> - Romania - Moldova - Hungary - Slovakia 	Maria Mihaita Maxim Sirbu Melinda Kocsis Daniela Korytarova
17.00-17.30	- Discussion: discuss and agree on the way forward for the future collaboration between EFSA and the affected Member States: focusing on ways to make the tools and report more fit for purpose and useful.	Groups work
17.30-18.00	■ Present conclusions from groups work	Group's representatives

Wednesday: 11/10/2017

Time	Topics	Participants
Morning – Objective 2: To identify possible next scientific actions at EU level to improve the prevention and control of ASF in wild boar and domestic pig populations		
9.00-10.00	<ul style="list-style-type: none"> - Expectations and needs of the risk assessor for scientific advice pertaining the prevention and control of ASF - Sardinia: Research priorities which could contribute to the control and eradication of ASF. - Gaps in African swine fever epidemiology: Analysis and priorities - Collaboration on data collection and mapping of ASF surveillance data to assist Member States in epidemiological analysis and risk assessment 	Sofie Dhollander on behalf of Francesco Berlingieri Francesco Feliziani CEREP – CEREL, IZS Carmina Gallardo (CISA-INIA) Carola Sauter-Louis (FLI)
10.00-10.30	How can we further develop science-based advice to risk managers <ul style="list-style-type: none"> - What are the remaining scientific questions that need to be addressed to improve prevention and control of ASF in Europe? - Which of the previously identified research questions are the most helpful for the risk managers in terms of contributing to prevention, control, eradication and declaration of freedom from disease? 	Groups work
10.30-11.00	■ Coffee break	
11-12.30	- Identify the different stakeholders in the EU who could contribute to answering these priority scientific questions and	Groups work

	identify possible niches for collaboration and networking - Presentation of groups work	Group's representatives
12.30-14.00	■ Lunch	
14.00-14.30	Wrap up of the previous discussions to identify possible next scientific actions at EU level - EFSA/MS collaboration for epidemiological analysis (Obj 1) - cooperation network - agree on priority research questions	EFSA
14.30	Closure of the workshop	