

DTU



Implementation of One Health WGS system in Denmark

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“EU initiatives towards the largescale use of Next Generation Sequencing (NGS) to tackle foodborne threat”

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Highlights of the Danish history of One Health or "from farm to fork approach"

Outbreak of *Salmonella* Infantis in 1993

- More than 500 cases were registered and traced back to pork from a specific slaughterhouse
- Intensive press activity with a "battle" between medical doctors and the veterinary authorities
- Recognition of the need for cross sectorial collaboration
- Establishment of the **Danish Zoonosis Centre** and the **Central Management Outbreak Group**

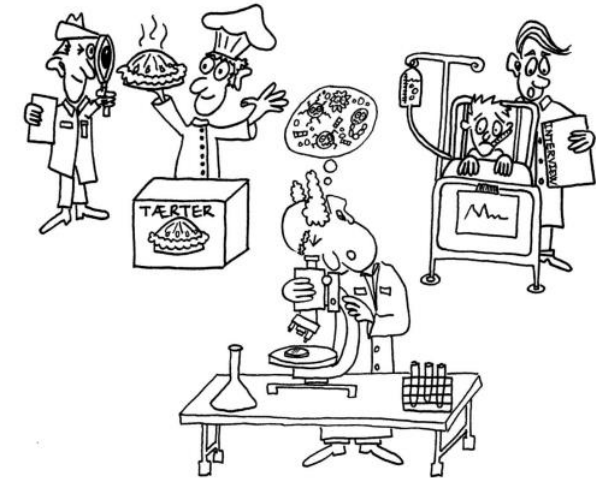
Outbreak of *Salmonella* Typhimurium U292 in 2008 and 2009

- A total of 1,452 confirmed cases with no identification of the source. The main hypothesis was that the outbreak was caused by a series of different foods and originated from a pig reservoir.
- Widescale public and political interest
- **Evaluation by The Danish Emergency Management Agency of the organization of CMOG**
 - Increased focus on roles, responsibilities, procedures
 - Steering group and operational group

Strength the CMOG's organisation and procedures - 2009

- The development of a **contingency plan** based on the principle for contingency planning and crisis management. The work was supported by The Danish Emergency Management Agency.
- Establishment of an **effective cross sectorial strategic management** of CMOG – setting up a steering group of heads for the involved organizations
- Strengthen the **CMOG's capability of emergency work** and **dedicate administrative support** functions
- Implement strategic **tools** for group management, internal communication etc.
- Establishment of a strategy for **targeted communication** to citizens, the press and other stakeholders.
- **Work in the EU** to promote surveillance and the outbreak response in the individual member states – also internationally.

Håndbog i opklaring af fødevarer- eller vandbårne sygdomsudbrud



Current organisation of the Danish OH monitoring and outbreak investigation network

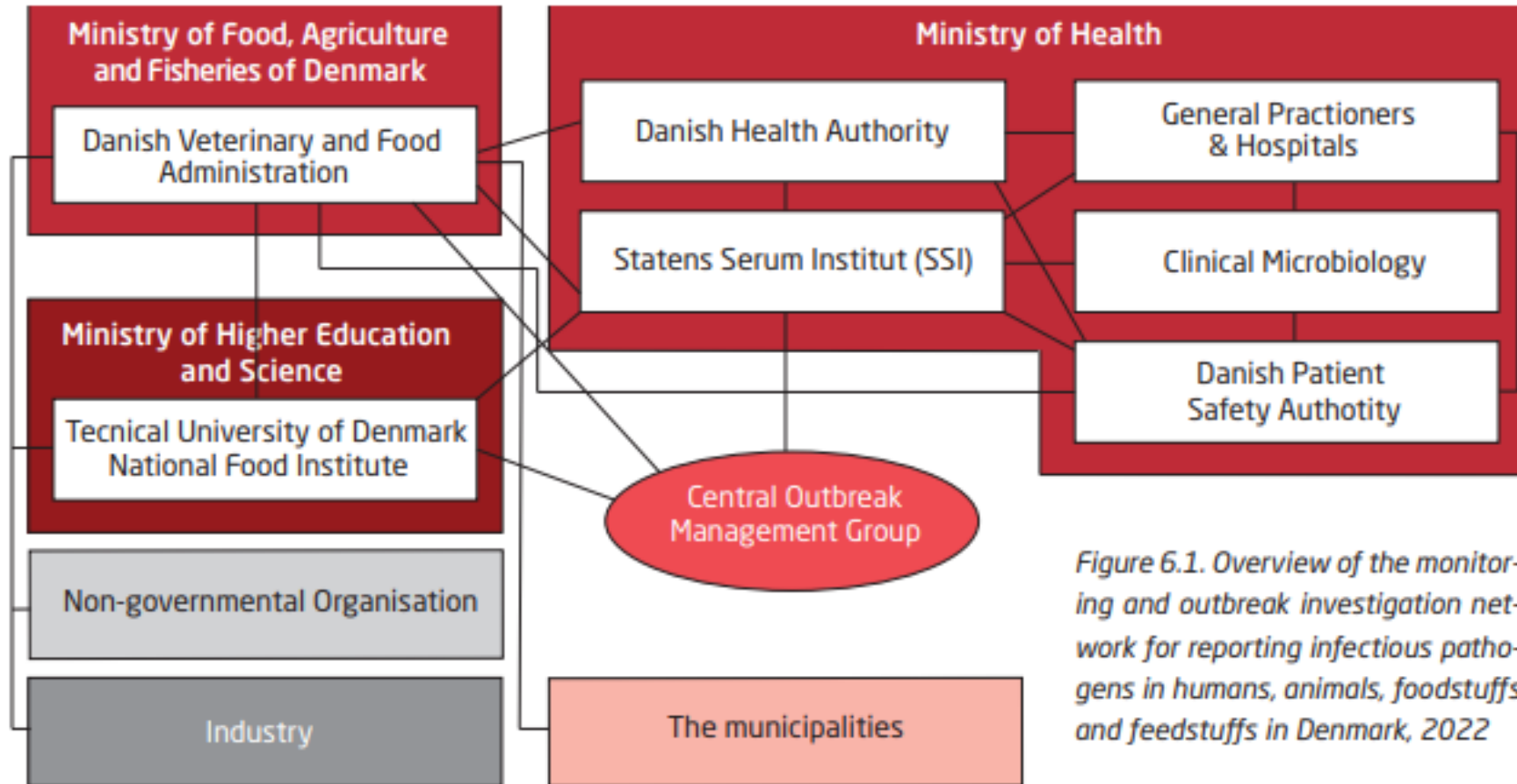


Figure 6.1. Overview of the monitoring and outbreak investigation network for reporting infectious pathogens in humans, animals, foodstuffs and feedstuffs in Denmark, 2022

Current practices of the CMOG

Goal of CMOG:

- To ensure an effective and coordinated effort through rapid communication and the establishment of necessary working relationships in the event of foodborne or waterborne illness
- Through a coordinated effort to detect, clarify and stop foodborne and waterborne outbreaks.
- The central outbreak work is organized at a strategic level, **the steering group**, the operative level, **CMOG** and the tactical level, which is the work of the underlying institutions.
- The operative CMOG meet every Thursday morning – virtual or physically
- Consists of representatives from
 - Statens Serum Institut
 - Danish Veterinary and Food Administration
 - DTU National Food Institute
- All members represent their own institution on the institutions mandate.
- The CMOG has no independent decision-making authority, but can recommend activities to the participating institutions

Sharing and comparing data

Integrated systems and legal agreements between the different partners that enables the sharing of data and other information. Bio-informatical and epidemiological analyses are performed by Statens Serum Institute as well as DTU FOOD

- **Ownership of data and meta-data**
 - Human data is owned by Statens Serum Institute
 - Veterinary- and food data is owned by Danish Veterinary and Food Administration
 - DTU FOOD is by mandate from the Danish Ministry of Food, Fish and Agriculture responsible for research based advice (incl. tasks related to outbreak investigation and surveillance of zoonoses and AMR) to DVFA
- **Food- and waterborne Outbreak Database (FUD)** describe all outbreaks registered in Denmark
 - DTU FOOD has reading access to FUD
- Selected data (**WGS data and few related meta-data**) is stored in a shared database (Computerroom) where SSI and DVFA have shared data responsibility
 - DTU FOOD has access to this shared database
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Data sharing in Denmark – current and in the future

Standardized workflow and bioinformatic pipeline, cost effective

Hospital DCMs/SSI



Reference Laboratory



DTU FOOD



DVFA



Computerome, Secured high performance computer

- QC and bioinformatic pipeline
- Outbreak detection (*real-time*)
- Sharing of data (also internationally)

Data processing agreements between partners

- related to DTU FOOD's assess to and use of human, personal sensitive data.

- **Data processing agreement between DVFA, Statens Seruminstitut and DTU FOOD**
 - REGULATION (EU) 2016/679 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)
 - Describe specific procedures on who, where and how employees at DTU FOOD are allowed to access, analyze and communicate on human data registered in **FUD** as a member of CMOG and an scientific advisor for DVFA. Specifically the task as data rapporteur to EFSA is mentioned.
- **Data processing agreement between Statens Seruminstitut and DTU FOOD**
 - REGULATION (EU) 2016/679 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)
 - Describe specific procedures on who, where and how employees at DTU FOOD are allowed to access, analyze and communicate on human data stored in **Computerroom** as a member of CMOG and an scientific advisor for DVFA

Collaboration agreements

Collaboration between partners has been existing since 1994 and have through all years bene based on mutual trust and respect.

- DTU has entered into a **strategic framework agreement** with the Ministry of Food, Agriculture and Fisheries
 - lays down the overall strategic and organizational conditions for the collaboration between DTU and the ministries.
 - In addition, **a performance agreements** between DVFA and DTU FOOD as well as accompanying work programmes describes the specific scientific advisory service tasks
- A **collaboration agreement between all partners of the CMOG network** (across sectors) is under negotiation.
 - DVFA sees a need for formalization of the collaboration in DCUG in the form of legally binding agreements based on relevant agreement documents. This will be in addition to the contingency plan as this do not regulate all relevant matters.



Emergency drill of the Danish outbreak organization

– One Health EJP SimEx – May 2022

- The national objectives were:
 - ✓ To improve the existing collaboration in COMG and increase understanding about roles and responsibilities among the involved organisations.
 - ✓ To strengthen the national communication of foodborne outbreaks to different target groups and stakeholders.



Sharing and comparing data at EU and global level

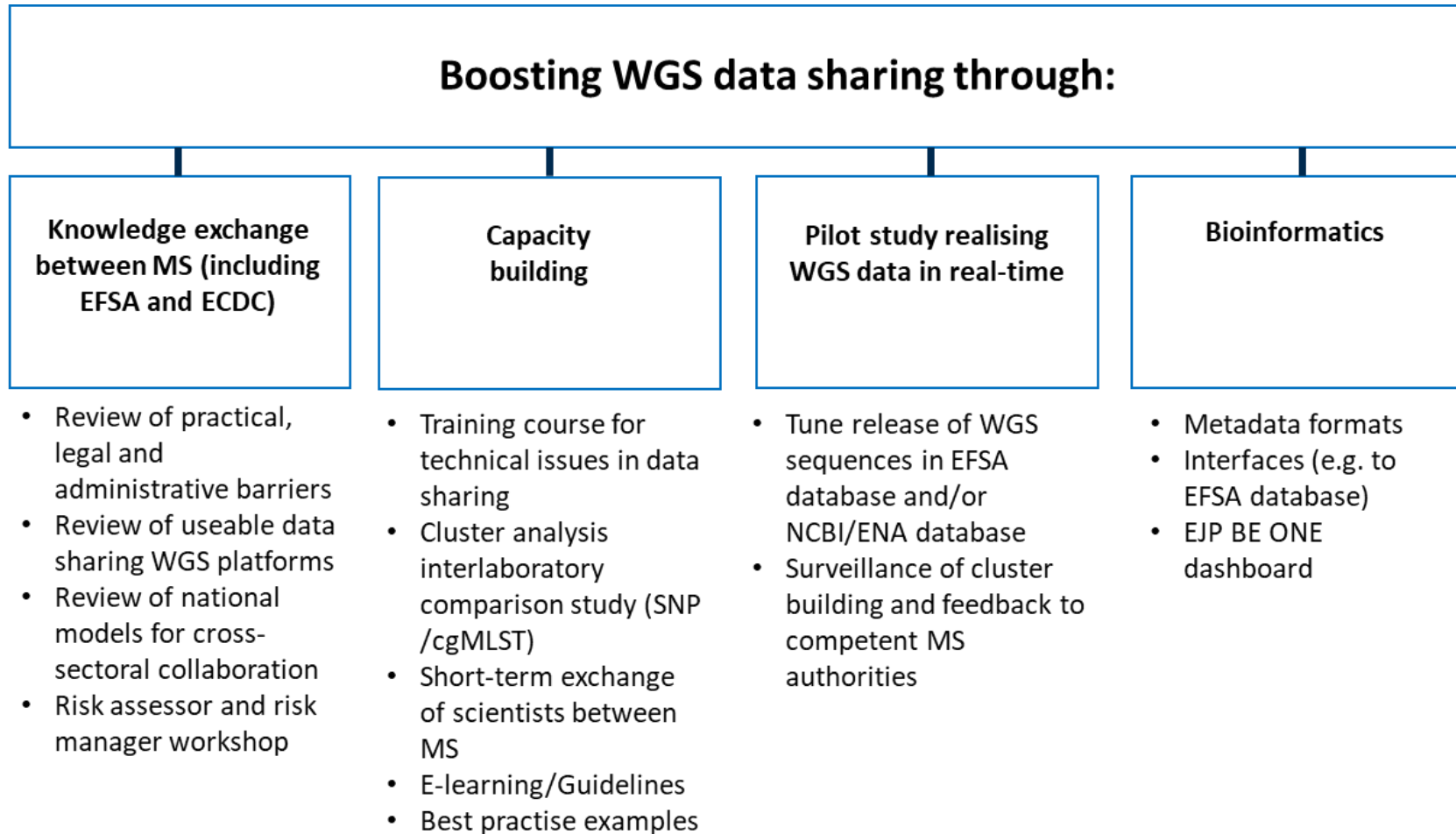
- Denmark contribute to the monitoring and investigation of multi-country outbreaks at European Union (EU) level
 - SSI is responsible for collaboration with and reporting to ECDC
 - DVFA and DTU FOOD is responsible for collaboration with and reporting to EFSA
- DTU FOOD acts by mandate from DVFA as country officers of the WGS Subgroup of the Zoonoses Network
 - Selected data (sequence and few metadata) from official control samples are uploaded to EFSA One Health WGS system
- Sharing of official data in global databases is limited to data published in scientific papers as requested by the publishers. Data are shared in an anonymous form.

Future perspectives for the Danish OH WGS system – outbreak response and surveillance

- Expand WGS analyses of more isolates/more agents from animal and food monitoring – include isolates from environment and wildlife.
- Include isolates from industry own control programmes – dialog with industry on the possibility to use private data for surveillance and outbreak investigation including sharing data in closed or public databases
- Optimize the methods for large scale use of WGS and bioinformatics – evt. include metagenomics
- The shared and secured platform "Computerroom" is under development in order to establish better opportunity to apply bioinformatic analyses in the secured environment
- Improve the on-time analyses to follow surveillance trends and identify clusters also from a food chain perspective
 - move from retrospective outbreak management to prospective preparedness and prevention
- Increase the amount of data uploaded to EFSA One Health WGS system and the speed of upload/automation after isolation and analyses – improve/develop automatic tools for easy data transfer and data analysis – expand with more agents.
- Agree with stakeholders (public authorities and eventually industry) on how to share data globally within the scope of legislation and political framework

Together we are stronger – wish for collaboration

Cross member state collaboration and development for improved outbreak investigation



Thank you for you attention !

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