



Statistical analysis on the EPILOBEE dataset and Lessons learnt

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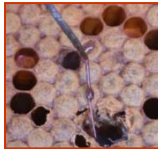
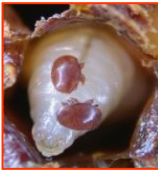
BACKGROUND

- **2012 - EPILOBEE project:** EU wide monitoring program on honeybee colony mortalities in Europe
 - Following the EFSA report on existing **bee surveillance systems** in the EU
 - Coordinated by **EU Reference Laboratory (EURL)** for Honeybee Health
 - First **active EU epidemiological surveillance** program based on the EU reference laboratory guidelines
 - in 17 Member States (England and Wales left the program in 2nd year)
 - over 2 consecutive years (autumn 2012 - summer 2014)
- **2015 - Statistical analysis** on EPILOBEE dataset to support EFSA's work
 - **MUST-B project:** EU efforts to develop a holistic approach to the risk assessment of multiple stressors in honeybee colonies

EPILOBEE SURVEY

■ Objective:

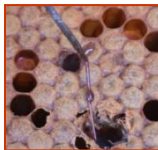
Collect data on **mortality** and **disease prevalence** in a standardised way on a representative number of apiaries and colonies in each MS through onsite investigations



EPILOBEE ANALYSIS

■ Objective:

- Investigate **statistical associations** between colony mortality and some risk factors (disease prevalence & beekeeping knowledge and training)
 - EPILOBEE study was not originally designed to evaluate causes of mortality
 - EPILOBEE was an extensive survey but did not sample an intensive number of factors that may be relevant to mortality (e.g. pesticides, nutrition, etc.)





RESULTS

■ DATA

- 5798 apiaries visited 3 times: 3053 in year 1 and 2745 in year 2
- Total of 138 variables recorded via questionnaires
- 36 explanatory variables for the statistical analysis

■ ANALYSIS

- Statistical link between winter and seasonal mortality
- Winter and seasonal mortalities associated with beekeeper age, apiary/operation size, and beekeeping knowledge/training
- Statistical associations between mortality and other variables included in the study such as in-hive treatments was not possible within the timeframe of this procurement



RESULTS

- Highest winter mortality rate for hobbyist beekeepers aged > 65, with small apiary, with a production including queens and with small experience in beekeeping; Apiaries suffered from AFB at the autumn visit
- Lowest winter mortality rate for professional beekeepers aged 30-45, with large migrating apiaries. Apiaries did not suffer from any disease at autumn visit
- Highest seasonal mortality in apiaries associated with AFB and with beekeepers having no beekeeping knowledge & training
- Lowest seasonal mortality in apiaries with no previous winter mortality, with health events at autumn visit but with no disease at spring visit



LESSONS LEARNT FROM THE EPILOBEE SURVEY AND ANALYSIS

- **Project management, coordination and communication**
- **Training**
- **Protocol design**
- **Data reporting and analysis**





KEY POINTS FOR IMPLEMENTATION

- **Project management, coordination and communication**
 - Strong and dedicated project management team adapted to the size of the sampling effort
 - Regular communication with the coordination teams in MS to monitor progress of field operations
 - Continuous monitoring of field operators/operations by both coordination and project management teams
- **Training**
 - Allocate time for communication on protocols and training on data collection before the start of the survey
 - Dedicated (on-site) teams of field inspectors for continuous data collection (> 2 years)



LESSONS LEARNT AND KEY POINTS FOR IMPLEMENTATION

■ Protocol design

- Use of expert knowledge in data management, statistics, epidemiology, bee biology and landscape ecology for the design of the survey
- Define and select indicators of honeybee colony health that are linked to specific protection goals
- Develop calibrated tools for standardised field measurements
- Use GIS mapping techniques for a detailed survey of the apiaries' environment

■ Data reporting and analysis

- Develop robust data model to report and analyse data in the most efficient way (e.g. minimize data cleaning operations, missing values, data incompleteness, etc.)



NEXT STEPS AT EFSA

- **Develop a holistic field survey and data collection**
 - Sampling in a holistic way (multiple stressors, factors affecting bee health) in a **smaller number of representative** sites in EU
 - Use of **calibrated and validated methods** to assess honeybee health, in field conditions, with a selected set of indicators
 - Use of **high quality data** to validate an **integrated model** to assess risks to honeybee colonies from exposure to pesticides under different scenarios of combined stressors and factors
 - Develop an holistic approach to the **risk assessment of multiple stressors** in honeybee colonies at the landscape level



Thank you for your attention

