18th EURL-AR Workshop 2024
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TECHNICAL SPECIFICATIONS FOR A BASELINE SURVEY ON MRSA IN FATTENING PIGS

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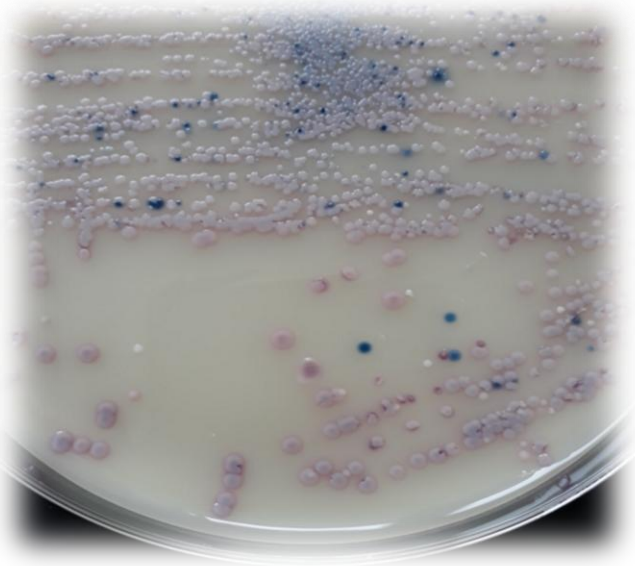
on behalf of the EFSA WG

EUROPEAN FOOD SAFETY AUTHORITY

Objectives

1. To assess **MRSA prevalence** in fattening pigs in the EU and in the EU MSs
2. To inform on **genetic diversity**, **AMR** and **virulence factors** of MRSA in pigs

- EU-wide cross-sectional survey at the slaughterhouse
- Should target slaughtered fattening pigs
- Should provide comprehensive, comparable and reliable information
- Should provide detailed characterisation of MRSA strains and lineages, virulence and host-adaptation factors



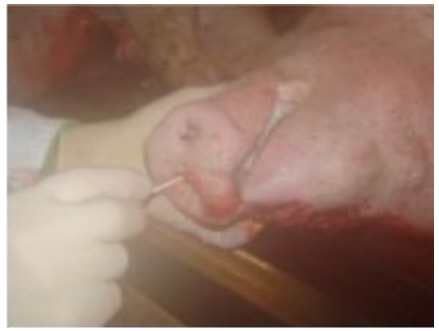
Sampling framework

- Sampling design: **at the slaughterhouse**
- Sampling approach **already in place** for routine AMR monitoring at the slaughterhouse
- Assessing MRSA prevalence **in batches of slaughter pigs**
- Sampling point: post-stunning
- Sample type: **nostril swabs**

Sampling concept	Sampling of nostril samples at slaughter
Target populations	Domestically produced fattening pigs (slaughtered in the SH representing 60% of fattening pigs slaughtered in the MS)
Strata (1st stage)	Slaughterhouses (60% of domestic production of FP)
Proportional allocation	Sample size proportionate to the slaughterhouse throughput
2nd stage	Batches of fattening pig carcases originating from the same herd of pigs
Epidemiological Unit	Slaughter batches of fattening pigs
Sample	4 pooled samples of 20 nostril swabs per epidemiological unit

Sample collection: Nostril swabbing of slaughter pigs

- The slaughter batch should be a of a sufficient size to allow the sampling of at least 20 carcases, given the speed of the slaughter line (to be pragmatic!: for small batches: 4 pooled samples of less than 5 swabs)
- To avoid any misidentification and mixing of batches, samples should be taken from the carcases situated around the middle of the given slaughter batch sampled
- For the operator/sampler's comfort and for proper sample handling, there is no need to sample successive carcases of the same slaughter batch
- To account for the speed of the slaughter line, to **sample only one nostril per carcase**
- To rotate 5 times the swab within the nostril sampled
- Sampling of nostril swabs shall be performed **after stunning** of the pigs but **before scalding** of the carcasses (to be pragmatic!):
  - Optimally **before** the **bleeding** post/ If not possible, after the bleeding post
  - To be recorded: a data element added.
- Unique numbering system of the 4 composite samples (identification of the batch, SH, sample)



Sample size

- **Number of batches**
  - **50%** (between) **batch prevalence** or if unknown prevalence:

  ⇒ N_b=194 batches to be sampled (*vs.* 300 batches for ESBL)
    - Example: 77% (between) batch prevalence

    ⇒ #batches = 97/pr -> *e.g.* 97/0.77=126 batches
  - Maximum number of batches: N_b=194 batches
  - Accounting for lost adjustment (+7%): **208 batches**
    - + 5% to consider missing data
    - + 2% to consider possible loss of strains during storage
  - **Finite population correction**
    - Nb > 5% of the total population size of the batches of the MS
    - Downward adjustment
    - Required number of slaughter batches tabulated in MRSA Tech. Spec. (Table 2)
- **Proportional allocation of sample size per strata and per quarter**

  > Proportional allocation of Nb per strata (slaughterhouse: ft: fraction of throughput): N_b*f_t

  > Number of batches to be collected per quarter: $N_b*f_t/4$

. In the case of unknown prevalence of MRSA *a priori*, **a sequential quarterly procedure has been proposed.**

. A higher prevalence requests a lower sample size to be tested.

. The approach requires a thorough follow up all along the survey so that the adaptation is implemented every quarter of the survey!

. The adjustment needs to be performed after each quarter and can go in both directions

To be documented by quarterly exchange with EFSA

Cf. Table 3 of Tech. Spec.

Sample size

- **At the batch level**
  - > **20 nostril swabs** (individual samples) per batch
  - > **4 pooled samples** (of 5 nostril swabs) per batch
  - > Batches with less than 20 pigs: 4 pooled samples

The sample size allows a sensitivity of 80% for detecting as positive a batch characterised with a within batch prevalence of 10%.

- **Robust randomised sampling procedure currently in place for routine monitoring of AMR**
  - > **Even distribution over the quarter (-> over the year)**

EXPECTED OUTPUTS

- **Data analyses**
  - MRSA Prevalence assessment at MS-level and EU-level
  - Assessment of the diversity of MRSA
  - Accounting for the hierarchical structure of the data

DATA REPORTING (1)

- Existing EFSA Data Models to be used with limited adaptations
  - **Isolate-based Data Model**
    - Isolate-level quantitative AMR data
    - WGS data: **pre-defined list of genes in catalogues to facilitate the reporting**
    - Reported according to the AMR data model of EFSA used in routine
  - **Sample-based Data Model**
    - detailed analytical results of all samples taken (positive and negative) reported using the EFSA standard for reporting laboratory results (Standard Sample Description version 2 (SSD2))
    - Limited number of epidemiological data to be reported
      - durations of transport
      - duration of lairage
      - stunning method
      - Sampling performed before or after bleeding

Reporting is Recommended !

DATA REPORTING (2)

- **Data Model**
  - To collect epidemiological information on Slaughterhouses and Farms
  - Number of animals in the farms involved
  - Annual throughput of the slaughterhouses involved

- **… through XML files**
  - Like the reporting of AMR data from routine monitoring
  - Reporting tools will be made available: from Excel file to XML file

INFO-SESSIONS

- **Info Session 1**
  - April 2024
  - To address points for harmonisation
  - Documentation available on Teams

- **Info Session 2**
  - Dedicated to data reporting
  - … Last Questions

A EFSA info-session dedicated to data reporting is planned on 23 October 2024

Thank you
for your attention!

Acknowledgements

- The EFSA Network
- The EC
- The EURL-AR
- The EFSA Working Group