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CPE Detected in Norwegian Livestock – Characterization and Origin

EURL-AR workshop October 9, 2024

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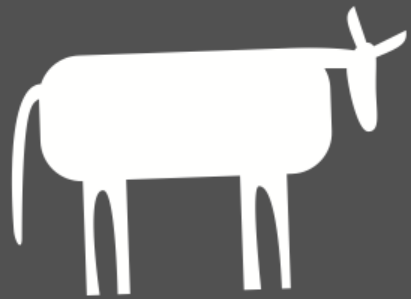

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Landscape

- Relatively small animal production and production units (except salmon)
- Very low import of production animals (except poultry parent stocks)
- Animal population "spread" over a geographically large area with favorable topographic conditions
- Geographical location – surrounded by the sea and «good neighbours»
- Well organized and developed livestock industry and veterinary authorities who cooperate well
- Tradition for the prevention of diseases - infectious diseases systematically controlled for >100 years
- Generally good health status with low disease occurrences

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Healthy animals do not need antibacterials

- Low usage of antibacterials
  - Do not treat preventively
  - Do not use growth promoters
  - Solely prescription use
  - Mainly use of narrow-spectrum agents
  - Mainly individual animals treated

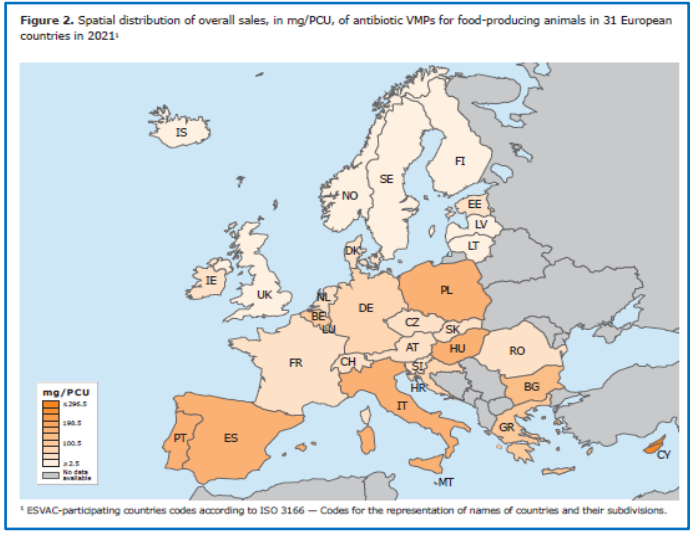

Figure 2. Spatial distribution of overall sales, in mg/PCU, of antibiotic VMPs for food-producing animals in 31 European countries in 2021[1]

[1] ESVAC-participating countries codes according to ISO 3166 — Codes for the representation of names of countries and their subdivisions.

Source: 12th ESVAC report

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AMR surveillance in veterinary sector

MRSA in pigs

Healthy animals

At farm sampling:
- MRSA

2023:
A total of 277 caecal samples from cattle

procedures, re-population with MRSA

September:
Detected CPE from one sample

NORM-VET

Healthy animals

Production animals at slaughter:
- *E. coli*
- ESC resistant *E. coli*
- CRE
- *Enterococcus faecalis/faecium*
- VRE (poultry)
- MRSA
- *Campylobacter*
- (*Salmonella*)

Surveys in dogs, cats, horses:
- *E. coli*
- ESC resistant *E. coli*
- CRE
- *Staphylococcus spp.*
- MRSA
- MRSP

Diseased animals

Samples from veterinary practisioners / clinics
- Animal pathogens
- (*Salmonella*)

Food

Fresh meat at retail:
- ESC resistant *E. coli*
- CRE

Other food categories at retail:
- *E. coli*
- ESC resistant *E. coli*
- CRE

AIM: documenting occurrence of AMR, mapping reservoirs, following trends, detect emerging AMR, identify knowledge gaps, investigate effect of interventions

ESC = Extended spectrum cephalosporin, CRE = Carbapenem resistant *Enterobacterales,* VRE = Vancomycin Resistant *Enterococcus spp.,* MRSA = methicillin resistant *Staphylococcus aureus,* MRSP = methicillin resistant *Staphylococcus pseudintermedius*

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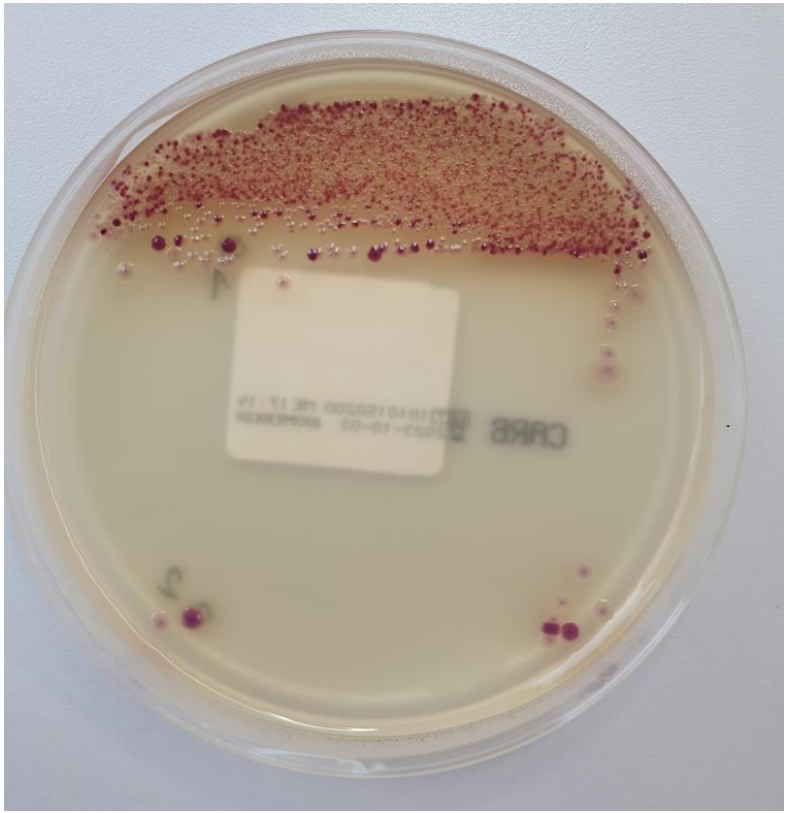
- CHROMID CARBA
- MacConkey cefotaxime
- MacConkey ceftazidime
- EUVSEC3 and EUVSEC2
- CIM test
  - Carbapenemase Inactivation Test
- WGS Illumina MiSeq and ONT MinION



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First finding of CPE from production animals in Norway

Norwegian Food Safety Authorities (NFSA) was informed

Many questions were raised…

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What is the situation within the herd?
Is there a high within-herd occurrence?
Will this evolve into a consistent CPE reservoir?
Is there a risk for further dissemination to other cattle herds?
Or to other production animals?
Is there a risk for transmission to humans?
Where did this CPE come from…?

How are we going to tackle this???

NFSA established an advisory group consisting of participants from
- NFSA
- Norwegian Veterinary Institute
- Norwegian Institute for Public Health
- Reference laboratory for CPE in human medicine

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Cattle herd info

- Dairy herd with 25-30 animals in total
  - 12 dairy cows with calves and animals for slaughter
- Self-recruiting herd
  - No purchase of animals since 2019, no sale of animals
- Traditional stall barn, pens for calves
- Cows on pasture during the day
- No direct contact with other animal herds

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Cattle herd info cont.

- Situated in the Western part of Norway
- Camping site at the farm
- Tourists had been allowed into the barn

https://www.google.com/maps/

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Further actions

- Information and advices given to the farmer by the NFSA
  - No legal restrictions were taken
  - Advice on the importance of biosecurity and hygiene, i.e. focus on hand hygiene, limit visits, pasteurization of milk
- Municipal doctor was informed
- Cattle industry organization with it's support unit was informed
- Communication on NFSA & NVI web-pages
- Follow-up sampling

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Follow-up sampling end of October

- Individual samples from 26 animals
- Four environmental samples

E. coli ST648 bla_{NDM-5} detected from one animal and one empty pen - both from surrounding areas of the previous detection (i.e. where the slaughtered animal had been housed)

Low within-herd occurrence.
Probably very low to negligble risk for dissemination to other cattle herds and other production animals.
With focus on hand hygiene, very low risk of transmission to humans.
Probably originally transmitted to the animals from humans.
Will this still evolve to a continuous reservoir or die out?

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Follow up sampling January

- Individual samples from 31 animals
- Three pooled environmental samples

All samples were negative

In this case it did not evolve into a continuous reservoir.
No more actions were taken.

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Concluding remarks

- We were lucky… this time….
- We must expect more cases from animals in the future
- How are we going to tackle this?

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Thank you for your attention

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Section for Microbiology:

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Thomas Haverkamp

Basma Asal

Section for Molecular biology:

Illumina MiSeq sequencing
Nanopore minION sequencing

Faglig ambisiøs, fremtidsrettet og samspillende - for Én helse!

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www.vetinst.no