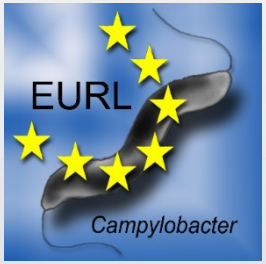

Campylobacter control strategies in poultry farms, biosecurity and innovative rapid diagnostic tests

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Campylobacter, some basic facts

- Public health problem
- Significant costs for society
- Common intestinal pathogen in wild and domestic animals, especially avian species
- Poultry/poultry meat most important source
- No disease in broilers
- Horizontal transmission to broilers

Transmission to broiler flocks

- From ”outside” environment with

  other animals nearby, livestock, manure and wild birds
- Contaminated water, insects, rodents
- People, tools, equipment
- Every contact with the ’outside’ is a risk for introducing *Campylobacter* to the broiler flock

Control at farm level

Aims:

- To reduce the number of positive flocks and counts of *Campylobacter* in birds

→ reduced contamination at slaughter

→ reduced risk for contaminated meat

→ reduced risk for humans ☺

Control strategies at farm level

- Biosecurity measures
- Monitoring the situation with follow-ups
- Information and Education
- Competitive exclusion/probiotics
- Vaccines
- Bacteriophages
- Bacteriocins

Biosecurity measures

- Prevent introduction of *Campylobacter* into broiler house, also prevent spread from already colonized flocks to environment and other broiler houses

Biosecurity measures

- Physical barriers
- Management, following hygiene rules, change boots and clothes, all in all out practices, no thinning
- Prevent insects, rodents, wild birds, pets
- No entry of contaminated equipment, transport crates, un-authorized persons
- Water quality
- etc

Information and Education

- To assist the producers, information and education are key issues.
- The EU project CamCon Educational Material on their website:

Monitoring and follow-up why and how?

To know the status at the farm and decide on follow up actions

To consider:

Sampling and type of laboratory analyses

’Faecal samples’, fresh droppings, sock samples, caecum samples (at abbatoir)

Number, pooling and transport of samples

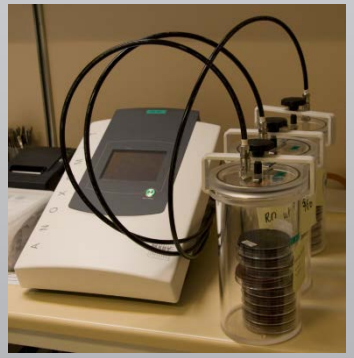
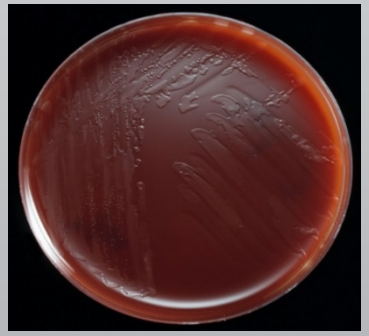
Analysis at laboratory, choice of method, type of matrix, what is asked for?

Campylobacter a difficult bug

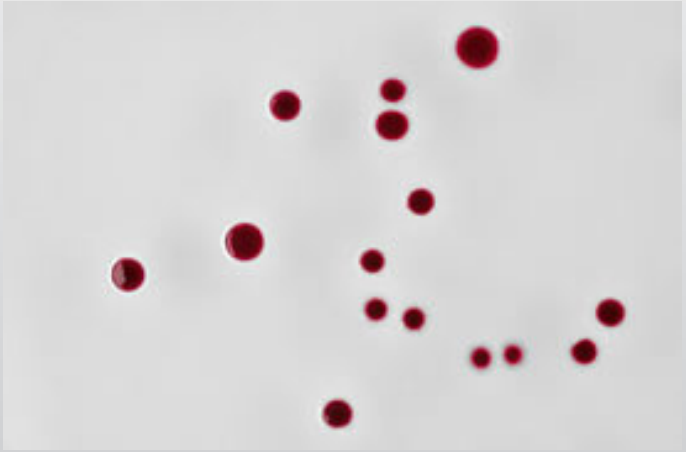
- *Campylobacter* spp are NOT like *Salmonella* or *E. coli*
- Specific growth requirements
- Consequences for everything you want to do with them, from culture to identification and typing

Traditional cultural method(s)

- (Thermotolerant) *Campylobacter* spp: microaerobic, slow growing, biochemically inert bacteria – i.e. difficult to detect, identify, and characterize (subtype)
- Pre enrichment in selective broth followed by culture on selective agar plates


Culture on chromogenic agar



Easy to detect and identify the ”right” bacteria

Expensive
May be less sensitive (too selective)

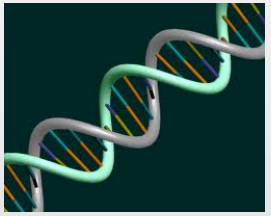
Immunochemical assays

- Immunomagnetic beads for specific capture and concentration of *Campylobacter*
- ELISA, Enzyme-linked

immunosorbent assay for detection of *Campylobacter* in food – commercial assays available

- Combination with other types of assays, e.g. PCR-ELISA – for increased sensitivity

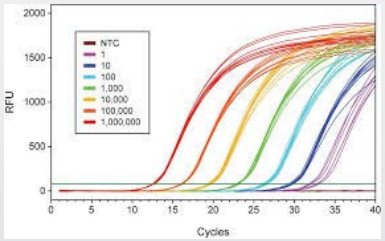
DNA-based assays



PCR

- Polymerase chain reaction, PCR based assays
- Three main steps: DNA extraction, PCR reaction (amplification of target sequence), detection/visualization of amplicon
- Traditional, gel-based PCRs methods
- Real-time PCR assays, quantitative real-time PCRs – commercial and validated tests available

The VBNC issue



- Viable but not culturable cells – debate whether *Campylobacter* (*jejuni* and *coli*) can enter this state or not
- Implications?
- Theoretically – PCR amplification of dead cells could give a ”false” positive result
- Many strategies applied for differentiation between dead and viable cells

Sequencing, metagenomic approach

- Culture independent detection and identification in one step
- Sequencing of the total DNA content of the sample
- Still at research level
- Genome sequencing becoming more available/cheaper
- Rapid technique for future screening of large numbers of samples

Methods for identification and characterization/subtyping

- DNA- based methods superior to phenotypic tests. PCR to WGS
- A wide variety of techniques for subtyping, mainly based on DNA-sequences
- For confirmation and species identification of *Campylobacter*: MALDI-TOF MS has proved very useful

(MALDI-TOF MS = *Matrix-Assisted Laser Desorption Ionization – Time of Flight Mass Spectrometry)*

To keep in mind when it comes to ”rapid methods”

- Different approaches/methods could be applied for different purposes:
- Only detection?
- Species identification?
- Strain characterization, antimicrobial resistance testing, subtyping?
- Enumeration?

To keep in mind when it comes to ”rapid methods”

- For detection small numbers, e.g. in environmental samples (e.g.water) and food – enrichment step usually needed
- Useful for screening large numbers of mainly negative samples
- Automatization, robots will do the job (?)
- Costs vs time

Thank you for your attention!