

# VIVALDI: VALIDATION OF VETPOD FOR DETECTION OF *CAMPYLOBACTER* SPP.

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# VIVALDI: VETERINARY VALIDATION OF POINT OF CARE DETECTION INSTRUMENT (VETPOD)

- EU project within Horizon 2020: Innovation action
- January 2018 – December 2020
- 7 partners from 5 member states (DK, SE, DE, FR, IT)
- Led from DTU in Copenhagen
- VETPOD lab-on-a-chip,  
based on LAMP technology
- Adapation and validation of VETPOD for detection of
  - Avian influenza
  - Salmonella
  - Campylobacter

[www.vivaldi-ia.eu](http://www.vivaldi-ia.eu)

# VIVALDI: THE VETPOD SYSTEM

- LAMP: loop-mediated isothermal amplification
- Amplification of DNA in a constant temperature (60–65 °C)
- Cheaper and more rapid than PCR
- Lab-on-a-chip: reagents loaded on pre-fabricated chips
- Turbidity measured in real time with optical technique

## **Pre-storage of gelified reagents in a lab-on-a-foil system for rapid nucleic acid analysis**

Cite this: *Lab Chip*, 2013, 13, 1509

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(Previous paper on lab-on-a-chip from DTU, not part of the present project.)

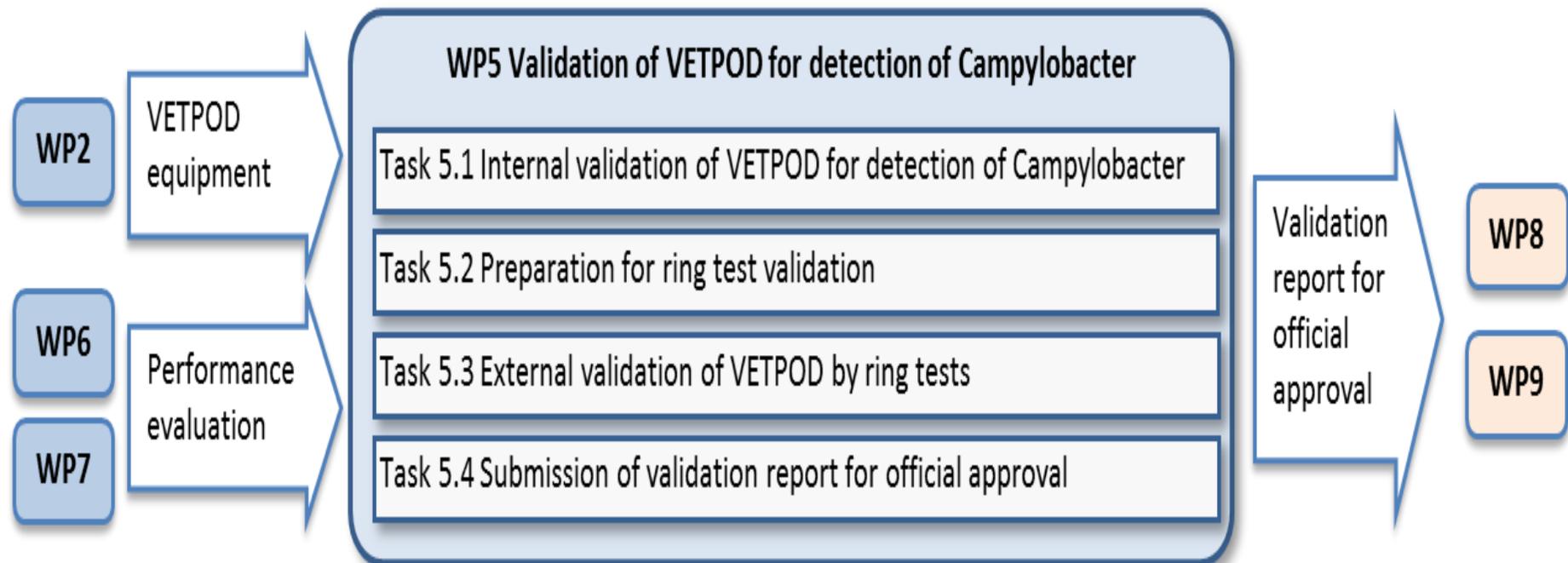


# VIVALDI WORK PACKAGES

- **WP1** Project Management (DTU)
- **WP2** Providing VETPOD equipment for validation (DTU)
- **WP3** Validation of VETPOD for detection of AIV (ANSES)
- **WP4** Validation of VETPOD for detection of Salmonella (DTU)
- **WP5** Validation of VETPOD for detection of Campylobacter (SVA)
- **WP6** Implementation of VETPOD for monitoring of animal health (ACEL)
- **WP7** Implementation of VETPOD for monitoring of food safety (QLAB)
- **WP8** Business plan and market uptake (DIA)
- **WP9** Dissemination and communication (DTU)
- **WP10** Ethical issues

## WP5 Objectives

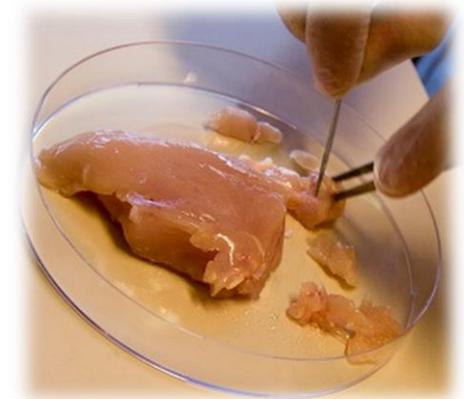
- To perform internal and to organise an external validation ring test for validation the performance of the VETPOD.
- The internal validation and the ring test validation of the VETPOD system will be validated against the international standard provided by ISO (ISO 10272) for *Campylobacter*.



Work Plan		Resp. partner	0	12	24	36
<b>WP5</b>	<b>Validation of VETPOD for detection of Campylobacter</b>	<b>SVA</b>		[Blue bar from 12 to 36]		
Task 5.1	Internal validation of VETPOD for detection of Campylobacter	SVA		[Grey bar from 12 to 18]		
Task 5.2	Preparation for ring test validation	SVA			[Grey bar from 21 to 27]	
Task 5.3	External validation of VETPOD by ring tests	SVA			[Grey bar from 24 to 30]	
Task 5.4	Submission of validation report for official approval	DTU				[Grey bar from 33 to 36]

# WP5: VALIDATION OF VETPOD FOR DETECTION OF *CAMPYLOBACTER* SPP.

- Validation against ISO 10272-1:2017
- Detection of *Campylobacter* spp. in
  - poultry meat
  - primary production samples from poultry
- Internal validation 2019
- External validation (ring test) 2020
- Apply for official approval by NordVal



# WP5 – INTERNAL VALIDATION

## ACCORDING TO NORDVAL PROTOCOL & ISO 16140-2

- **Sensitivity study:** comparing the sensitivity of the VETPOD protocol to the reference method (ISO) using naturally (or artificially) contaminated samples
- **Relative Level of Detection (RLOD) study:** determining the RLOD of the VETPOD protocol using artificially contaminated samples
- **Selectivity (inclusivity/exclusivity) study:** confirming the selectivity of the VETPOD system using 50 target strains (*C. jejuni*, *C. coli* and possibly *C. lari*), and 30 non-target strains

# RELEVANT MATRIX CATEGORIES AND TYPES ACCORDING TO NORDVAL (AND ISO 16140-2)

Matrix group	Category	Types (matrix)	Example of items
<b>Meat</b>	<b>Raw poultry and ready-to-cook poultry products</b>	Fresh meat (unprocessed)	Carcasses, meat, cuts Carcasses, swabs, rinsates
		Ready-to-cook products (processed)	Minced meat, meat preparations Seasoned chicken breast
	Ready-to eat, ready to reheat meat poultry products (only in ISO 16140-2, error in NordVal doc?)	Cooked meat products	Cooked turkey filet
		Fermented or dry meat products	Chicken sausage
		Raw cured (smoked) (aw > 0.92)	Smoked turkey filet
	<b>Primary production samples (PPS)</b>	<b>Primary production samples (PPS)</b>	Animal faeces
Environmental samples and non-faeces			Dust samples, hygiene swabs, water from drinkers, litters, hatchery samples

# SENSITIVITY STUDY: MATRICES

- Raw poultry and ready-to-cook poultry products

*Matrix type: Fresh meat (unprocessed)*

- chicken skin
- fresh chicken meat

*Matrix type: Ready-to-cook products (processed)*

- frozen seasoned chicken breasts

- Primary production samples

*Matrix type: Animal faeces*

- broiler caecal samples
- sock samples from broiler houses

*Matrix type: Environmental samples and non-faeces*

- sock samples from surroundings of broiler houses

- 20 samples of each matrix (= totally 120 samples), at least 30 of each category positive

# RELATIVE LEVEL OF DETECTION (RLOD) STUDY

- One type for each category
  - Fresh/frozen chicken meat
  - Broiler caecal samples
- Artificial contamination, three levels of inoculation:
  - Negative (5)
  - Low level (at  $LOD_{50}$ ) (20)
  - High level (at  $LOD_{50} \times 2$ ) (5)
- All replicates are analysed with both methods, i.e. at least 30 samples of each type

# SELECTIVITY STUDY

- Inclusivity study: at least 50 target strains
  - 30 *Campylobacter jejuni*
  - 20 *Campylobacter coli*
  - 10 *Campylobacter lari* (?)
- Exclusivity study: at least 30 non-target strains
  - Other *Campylobacter* species
  - Other species that share some properties with *Campylobacter*
  - Other species common in chicken intestines
- Carried out on the alternative method, i.e. VETPOD
- Doubtful results: test repeated with the reference method (ISO 10292-1:2017) included

# STRAIN COLLECTION

- For inclusivity and exclusivity
- 50 target strains
- 30 non-target strains
  
- At SVA: mainly isolates from primary production
- From the National Food Agency in Sweden: food and water isolates
- Possibly NRL-*Campylobacter* isolates from the baseline survey in the EU 2008 (isolates from food and primary production)?

# WP5 – RING TRIAL VALIDATION (ACCORDING TO ISO 5725-2 AND ISO 16140-2)

## Participants:

- 10 external laboratories from at least 5 (preferably 10) different organisations

## Preparation of test samples:

- Matrix: chicken meat (?)
- 3 levels: negative, low (around  $LOD_{50}$ ) and high, 8 replicates, 2 methods = 48 samples to analyse for each laboratory