Veterinærinstituttet
Norwegian Veterinary Institute

DTU

University of Liverpool

Universiteit Utrecht

Dianova
Food Safety & Animal Insight

Central Veterinary Institute
Wageningen UR

Universidade do Minho

Newcastle University

CReSA
Centre de Recerca en Sanitat Animal

PIWet

Annual Meeting 2015

Copenhagen 13 April

Agenda

Monday 13 April

- 14.00 - 16.00 **WP Committee Meetings**
  - (WP3 and WP6: 5 minutes each, the rest: approx. 25 minutes each)
- 16.00 - 17.00 Break (not for Executive Board)
- 16.00 - 17.00 Meeting of the **Executive Board**
- 17.00 - 18.00 **General Assembly**
- 19.00 Dinner

Tuesday 14 April

- **Stakeholder Seminar**

Participants

Partner	Name
1 - NVI	Merete Hofshagen
2 - DTU	Hanne Rosenquist, Birgitte Borck Høg, Birthe Hald, Helle Mølgaard Sommer, Maarten Nauta, Mathilde Hasseldam Josefsen, Jeffrey Hoorfar
3 - ULIV	Nicola Williams, Yvette Merga
4 - UU	Jaap Wagenaar
5 - Dianova	Mogens Madsen, Heidi Dahl
6 – CVI/LEI	Coen van Wagenberg, Peter Willemsen
8 - UMinho	Joana Azeredo, Carla Carvallo
9 – UNEW	Apopogies
10 - CReSA	Marta Cerdà-Cuéllar, Roser Dolz
12 - NVRI	Jacek Osek, Kinga Wieczorek, Edyta Denis, Beata Lachtara
Advisory Board/ Commission	Apologies

Participants

WP1 Committee Meeting

- Nicola Williams, ULIV
- Other participants
  - All except DIA, CVI-LEI, UMinho

Task 1.1
Risk factors for Camp. colonization in broilers

- Task leader: Birgitte Borck Høg, DTU
- Participants: NVI, ULIV, UU, CSA, NVRI

No	Deliverable	Status	Due
1.1.1	Questionnaire and protocol for data collection agreed with all participants	√	
1.1.2	Report on broiler production across Europe (based on questionnaire)	√	
1.1.3	Research publication of risk factors for flock colonization including climatic conditions	√ ▶ *	April 2015

√ = delivered, ▶ = started, ▬ = not started

* 1. Publication submitted April 15, 2. publication in draft, excpected April 15

Task 1.1
Risk factors for Camp. colonization in broilers

- Activities
  - Questionnaire data collected
  - Retrospective Campylobacter status data collected from DK and NO
  - Data from Denmark and Norway analysed - risk factors identified
  - Campylobacter data collected from 20 farms study in ES, NL, PL, UK
  - Climate data collected (temperature, sunshine hours, precipitation)
  - Datasets validated an merged (questionnaire, campylobacter status and climate data) and made ready for analyses
  - Results published : Paper 1. submitted, Paper 2 in draft

Risk factors for Camp. colonization in broilers

Results – DK and NO

Variable	Effect on prevalence
Age of house	Newest house ➡ lowest prevalence
Biosecurity (ante-room/barrier)	High biosecurity ➡ lowest prevalence
Country	Norwegian flocks ➡ lower prev.
Density	High density ➡ lower prevalence (only in Denmark)
Downtime	Low downtime ➡ lower prevalence
Drinkers	Nipples without cups ➡ lower prevalence
No. of broiler houses	Lower no. of broiler houses ➡ lower prevalence (only in Norway)
Bootdips	Bootdips at entrance ➡ higher prevalence (only in Denmark)

Risk factors for Camp. colonization in broilers

- Results – All countries

Variable	Effect on prevalence
Country	*Campylobacter* positive flocks – descending order: PL, ES, UK, NL, DK and NO
Temperature	Increasing temperature ➡ increasing number of positive flocks
Age of house	Newest house ➡ lower prevalence
Biosecurity (ante-room/barrier)	Ante-room/barrier ➡ lower prevalence
Biosecurity (designated tools)	Designated tools ➡ lower prevalence
Downtime	Low downtime ➡ lower prevalence
Drinkers (Bells, nipples with cups, nipples without cups)	Nipples without cups ➡ lower prevalence

Task 1.1
Risk factors for Camp. colonization in broilers

- Points for discussion
  - Familiar risk factors
  - A few new aspects
  - What have we learned from this?
    - Questionnaires
    - Data issues
  - How can we use these findings?

Task 1.2
A longit. study of broiler flocks in UK and Spain

- Task leader: Nicola Williams, ULIV
- Participants: UNEW, CS

No	Deliverable	Status	Due
1.2.1	Study protocol finalised	√	
1.2.2	Data analysis of first-year intensive flock sampling in Spain and the UK	▶	Jun12 (exp. May 15)
1.2.3	Paper on two-year study in UK and Spain*	▶	Feb14 (exp. May 15)
1.2.4	Identification of management intervention to minimize risk of colonization of broiler flocks	▶	Feb14 (exp. May15)

√ = delivered, ▶ = started, ▬ = not started

* Full dataset from Spain yet to be analysed.

Task 1.2
A longitudinal study of broiler flocks in UK and Spain

- *Recap-*
- UK flock prevalence of 54% of flocks (n=109) (13-15 crops per farm) were positive for *Campylobacter* before slaughter, compared to 60% (n=63) flocks in Spain.
- The average age at which flocks become positive was 23 days, with the earliest detection of *Campylobacter* to date being at 9 days of age and 7 days of age for Spanish farms.
- No farm remained consistently negative throughout the study.
- Paths to the study house and anteroom rarely positive.

Task 1.2
A longitudinal study of broiler flocks in UK and Spain

- Activities/Results last year
  - UK: The data from the UK has been sent and analysed by Newcastle.
  - Manuscript in preparation.
  - SP: The data from Spain has been received at Newcastle, with analysis ongoing but delayed.
  - SP: manuscript in preparation.

- Problems
  - UK: Issues with data provided by the broiler companies, they do not record data in the same way, companies confounded by location and stocking density.
  - Spain: Data received March 2015- may not be time to analyse it before the final report submission.
- Points for discussion- data analysis

Task 1.3
Importance of flies in transmission of *Campylobacter* to broiler flocks

- Task leader: Birthe Hald, DTU
- Participants: UNEW, ULIV, CSA

No	Deliverable	Status	Due
1.3.1	First-year report on flies	√	
1.3.2	Paper on the role of insects in colonization of broilers with Campylobacter in UK and Spain	▶	Apr14 (exp. April15)

√= delivered, ▶= started, —= not started

Task 1.3
Importance of flies in transmission of *Campylobacter* to broiler flocks

- Activities/Results last year 1.3.1. & 1.3.2
  - UK- Conclusions:
    - An estimate of 0.3% of the UK flies carried *Campylobacter* species
    - Flies shown to carry cattle and broiler associated STs, responsible for human disease.
    - Positive batches of flies contained a diversity of filth/dung and other Diptera
      - *Anthomyiidae, Fanniidae, Calliphora, Phormia, Stomoxys, Anthomyiidae, Dolichopodidae, Fanniidae, Muscidae, Phaonia sp., Polietes lardarius, Psychodidae, Scatophagidae*
    - High diversity of flies found on UK broiler farms (*Musca domestica* ~2.6% of flies caught).
    - Flies may spread *Campylobacter* from cattle to broiler farms.
    - Large numbers of flies were caught around broiler house ventilation inlets.
  - Manuscript submitted to Applied and Environmental Microbiology*:*
    - Alexandra Royden, Amy Wedley, Yvette Merga, Stephen Rushton, Birthe Hald, Tom Humphrey, Nicola J. Williams. A Role for Flies (*Diptera*) in the Transmission of *Campylobacter* to Broilers?

Task 1.3
Importance of flies in transmission of *Campylobacter* to broiler flocks

- Activities/Results last year
  - Spain- Conclusions 1.3.1.
  - *Musca domestica* (house fly) was the most frequent (89.8%) fly species captured and the only species from which *Campylobacter* was isolated.
  - 1.7% *M. domestica* (house fly) positive by culture.
  - 10.5% of flies positive by PCR, including mainly *M. domestica*, but also *Ophyra* sp. (dump flies), *Calliphora* sp. (blowflies) and *Fannia canicularis*) (lesser house fly).
  - Several broiler flocks became *Campylobacter* positive around the same time or just after detecting *Campylobacter* in the sampled flies.
  - Similar PFGE profiles among *Campylobacter* isolates from flies and broilers during the same rearing cycle.

  - Manuscript *in prep:* Saulo Urdaneta, Sandra Talavera, Marta Verdún, Nonito Pagès, Roser Dolz, Birthe Hald, Marta Cerdà-Cuéllar. Housefly (*Musca domestica*) as a vector for *Campylobacter jejuni* and *Campylobacter coli* in Spanish broiler farms.

Spain

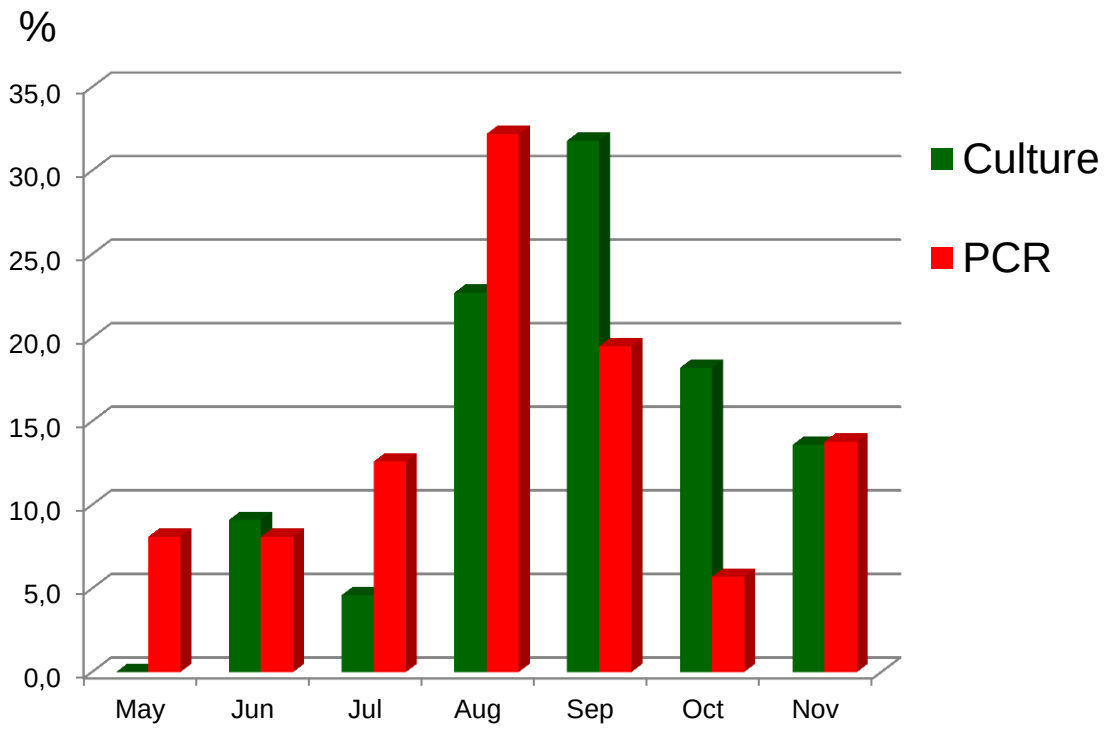
Peak of *Campylobacter* positive flies in August-September:

Culture (2011-2012):

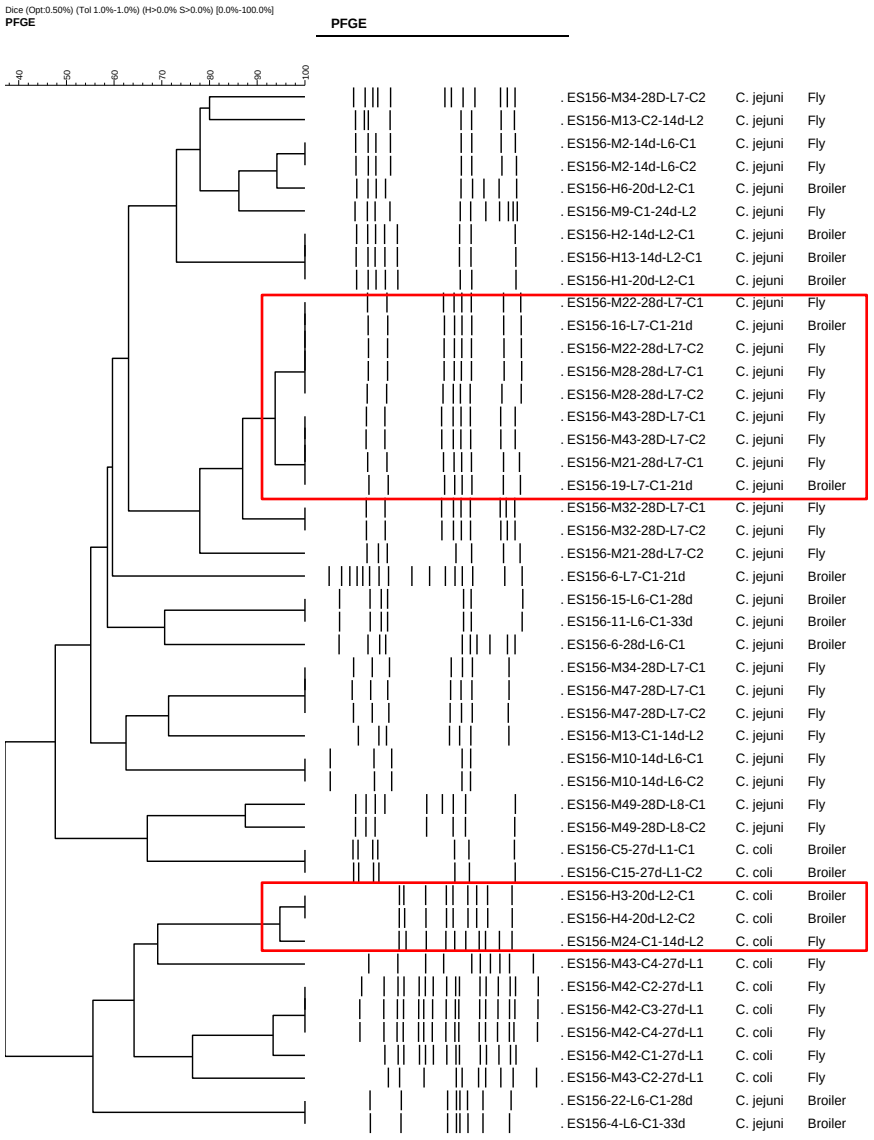
1.7% (22/1304)

PCR (2012):

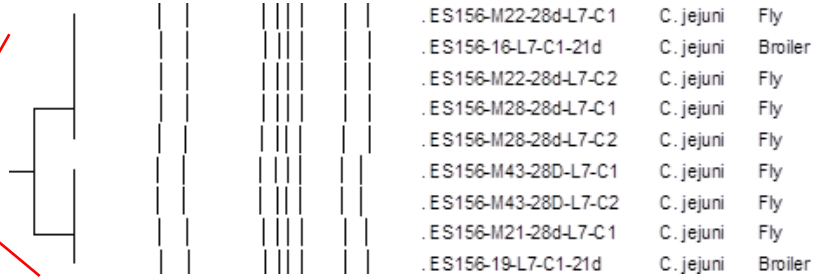
10.5% (87/876)



Spain



Same strains in flies and broilers (from same flock)



Most of the broiler flocks pos. at same time or just after flies pos.

Task 1.3
Importance of flies in transmission of *Campylobacter* to broiler flocks

- Activities/Results last year
  - Spain. Conclusions 1.3.2. Insect community.
  - Overall 7003 insects captured in broiler house air inlet, 74.5% Diptera.
  - The fly families known to carry *Campylobacter* comprised 0.14% of the Diptera's.

Task 1.3
Importance of flies in transmission of *Campylobacter* to broiler flocks

- Activities/Results last year
  - DK
    - A paper published:
    - Anders Kjærsgaard, Wolf U. Blanckenhorn, Cino Pertoldi, Volker Loeschcke, Christian Kaufmann, Birthe Hald, Nonito Pagès, Simon Bahrndorff. 2014. Plasticity in behavioural responses and resistance to temperature stress in *Musca domestica*. Animal Behaviour 99: 123-130.

- Problems
  - None
- Points for discussion
  - None

Task 1.4
Distribution of *Campylobacter* subtypes in EU broiler production

- Task leader: Frieda Jorgensen, Nicola Williams, ULIV
- Participants: NVI, DTU, UU, CSA, NVRI

No	Deliverable	Status	Due
1.4.1	Paper on Campylobacter sub-types in EU broiler production	▶	Dec13 (exp. May15)
√= delivered, ▶= started, ▬= not started			

Task 1.4
Distribution of *Campylobacter* subtypes in EU broiler production

- Activities/Results last year
  - Final batches of sequencing completed.
  - Sequence analysis completed by YM.
  - Draft of paper started.

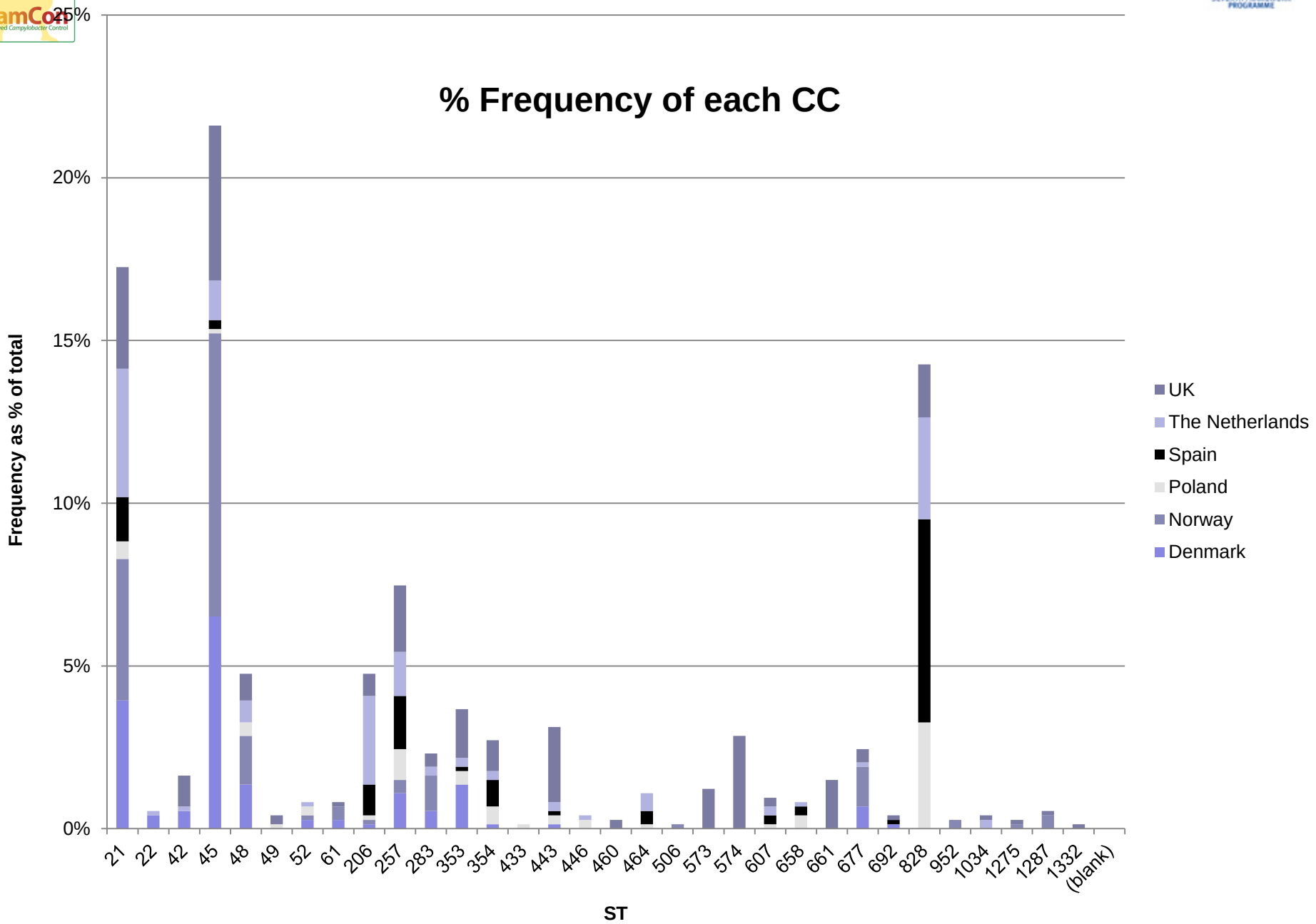
- Problems
  - YM employed full time on another project, completing this work in spare time and longitudinal sampling late starting.

- Points for discussion
  - YM performed Principal Component Analysis on MLST data, following NL study (Smid *et al*. 2013).
  - Help/suggestions for further analysis welcome – e.g. comparison of strain data such as housing type, management of birds?

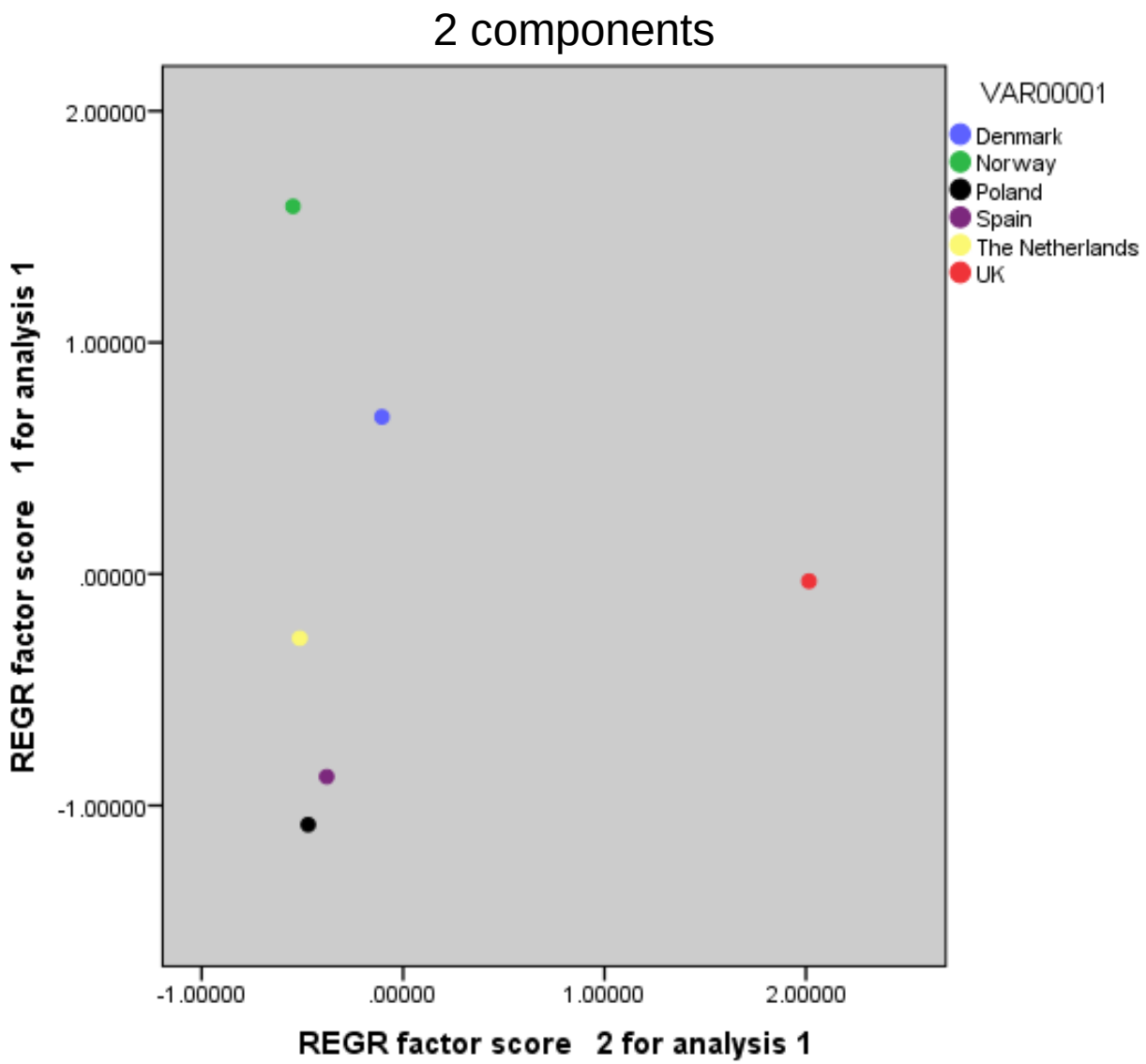
Isolates

- A total of 1011 *Campylobacter* isolates were included in the analysis
- UK: 211 (2003-06)
- NL: 158 (2010-11)
- ES:132 (2011-12)
- PO: 157 (2011)
- NO: 168 (2004-08)
- DK: 185 (2007-08)
- 43 additional isolates were excluded from analysis due to being incomplete or having mixed *C. jejuni/C. coli* alleles

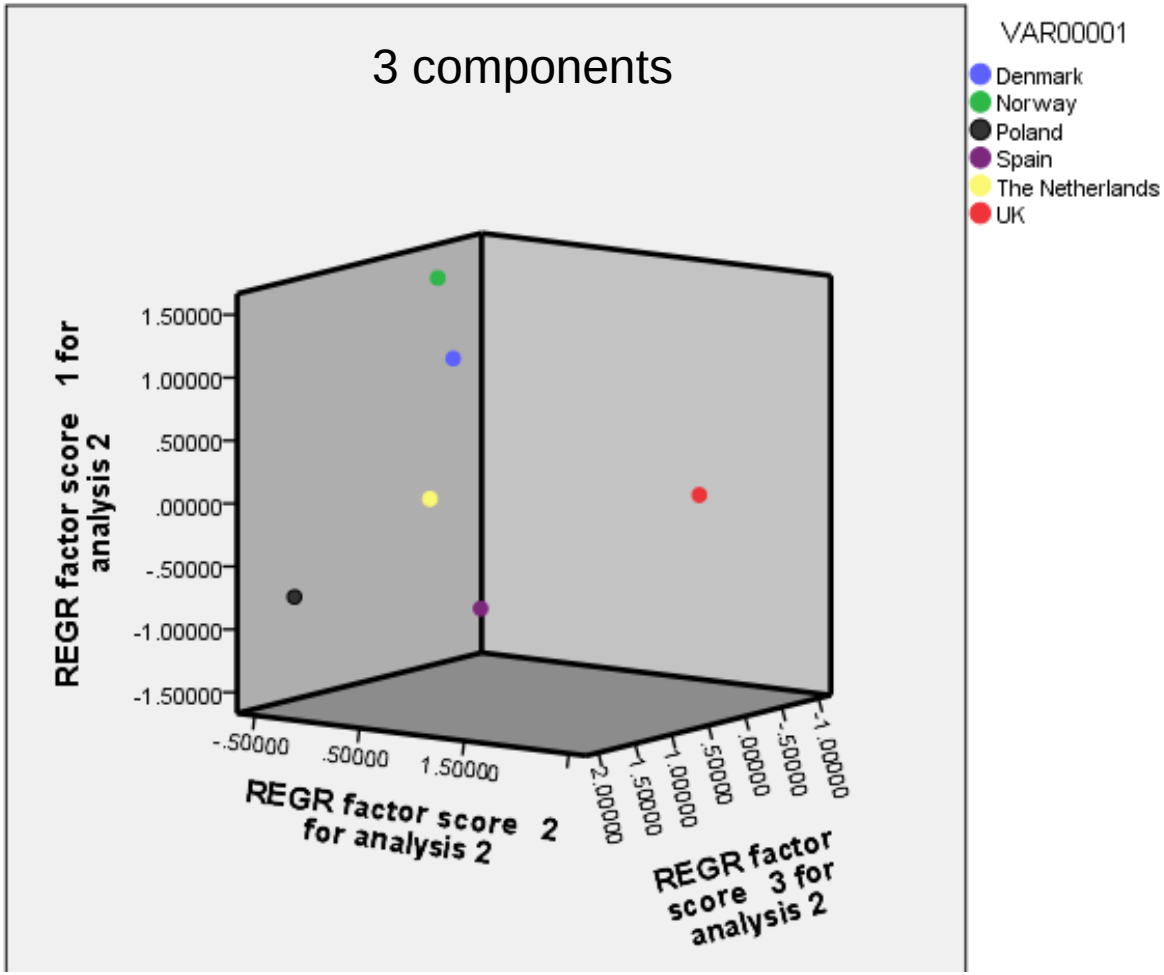
- 446 ST, 35 CC


% Frequency of each CC
Frequency as % of total
25%
20%
15%
10%
5%
0%
21
22
42
45
48
49
52
61
206
257
283
353
354
433
443
446
460
464
506
573
574
607
658
661
677
692
828
952
1034
1275
1287
1332
(blank)
ST
UK
The Netherlands
Spain
Poland
Norway
Denmark

Results


2 components
VAR00001
Denmark
Norway
Poland
Spain
The Netherlands
UK
2.00000
1.00000
.00000
-1.00000
REGR factor score 1 for analysis 1
-1.00000
.00000
1.00000
2.00000
REGR factor score 2 for analysis 1

Results


3 components
VAR00001
Denmark
Norway
Poland
Spain
The Netherlands
UK
REGR factor score 1 for analysis 2
1.50000
1.00000
.50000
.00000
-.50000
-1.00000
-1.50000
-.50000
.50000
1.50000
REGR factor score 2 for analysis 2
2.00000
1.50000
1.00000
.50000
.00000
-.50000
-1.00000
REGR factor score 3 for analysis 2

Task 1.5
Modelling in-house colonization of birds in relation to environment and bird welfare

- Task leader: Steven Rushton, UNEW
- Participants: ULIV

No	Deliverable	Status	Due
1.5.1	Quantitative assessment of the relative significance of risk factors in the study countries	▶	Aug13 (exp. May 15)
1.5.2	A pathway model which defines the interactions between risk factors leading to colonization	▶	Oct13 (exp. May 15)

√= delivered, ▶= started, —= not started

Task 1.5
Modelling in-house coloniation of birds in relation to environment and bird welfare- UK data

- Generalized Linear Models generated to identify potential factors associated with increased risk of *Campylobacter*
- For many variables there was extreme variability, or none at all.
- Variability also depended on the production company and geographical region.
- In effect, production system was highly heterogeneous between production company and region while often homogenous within.
- These phenomenon produced strong confounding effects that often made formal analyses impossible.

Task 1.5
Modelling in-house colonization of birds in relation to environment and bird welfare

Parameter	Estimate	Standard Error	Z-value	Pr(>|z|)
(Intercept)	-1.616	0.430	-3.762	0.000
Adjacent Building Status (Positive)	1.685	0.365	4.621	0.000
Internal Air Temperature	0.273	0.162	1.688	0.091
External Air temperature	0.443	0.174	2.553	0.011
Stocking Density	1.153	0.405	2.845	0.004
Average Down-time	-0.555	0.198	-2.801	0.005
Drinking Water Providers (cups)	0.748	0.366	2.043	0.041

- $R^2 = 0.481$

Task 1.5
Modelling in-house colonization of birds in relation to environment and bird welfare- UK

- Estimates describe change in baseline probability of a flock-cycle becoming colonized with *Campyobacter.*
- Total value of all estimates is obtained and baseline probability of colonization is calculated.
- Cumulative probability that a given flock-cycle is colonization by Campylobacter varies according to:
  - Welfare system used to produced birds (low or high stocking density)
  - Whether adjacent farm production buildings are also colonized by *Campylobacter* (farm-level biosecurity breach).

Task 1.5
Modelling in-house colonization of birds in relation to environment and bird welfare- UK

- Baseline probability of colonization generated from estimates from the model makes the following assumptions:
  I. Flock-cycle produced at high density and adjacent production facilities on study farm have also been colonized by *Campylobacter* (*Pr* = 0.978).
  II. Flock-cycle produced at low density and adjacent production facilities on study farm have also been colonized by *Campylobacter* (*Pr* = 0.842).
  III. Flock-cycle produced at high density and adjacent production facilities on study farm have NOT been colonized by *Campylobacter* (*Pr* = 0.626).
  IV. Flock-cycle produced at low density and adjacent production facilities on study farm have NOT been colonized by *Campylobacter* (*Pr* = 0.241).

Task 1.5
Modelling in-house colonization of birds in relation to environment and bird welfare-UK

- Differences in probability of colonization reflect the importance of welfare system, where birds at higher stocking density are more susceptible to infection.
- In addition, maintaining biosecurity within the farm production environment is also important and may mitigate the risk of colonization by *Campylobacter.*

Task 1.5
Modelling in-house colonization of birds in relation to environment and bird welfare-UK

- Problems
  - Data presented late
  - Questionnaire results of variable quality, despite huge efforts by collaborators to generate information.
  - Major differences in recording and reporting of bird health data between companies defeated attempts to analyse data.

WP2 Committee Meeting

- Jaap Wagenaar, UU
- Other participants: all except NVI, DIA, UNEW, NVRI

Task 2.1
Fly screens add-on to biosecurity

- Task leader: Birthe Hald, DTU
- Participants: ULIV, CSA

No	Deliverable	Status	Due
2.1.1	List of study farms and control farms to be visited	√	
2.1.2	List of farms consenting to participate	√	
2.1.3	Report for each study farm to approve biosecurity level and plan for mounting of fly screens	√	
2.1.4	Fly screens delivered on farms	√	
2.1.5	Logbooks filled in and collected – 18 farm study	▶	Dec14 (exp Apr15) **Nov15**
2.1.6	Database with Campylobacter results of farms in T2.1	▶	
2.1.7	Paper on the effect of fly control in UK and Spain	▬	Feb15 (exp. Apr16)

√ = delivered, ▶ = started, ▬ = not started

Task 2.1
Fly screens add-on to biosecurity

- Activities/Results last year
- UK
  - ‘DTU’ has forwarded all data from the fly screen study in Northern Ireland to the project leader of the Defra project to be integrated with the data from the Defra study.

  - No results yet

Task 2.1
Fly screens add-on to biosecurity

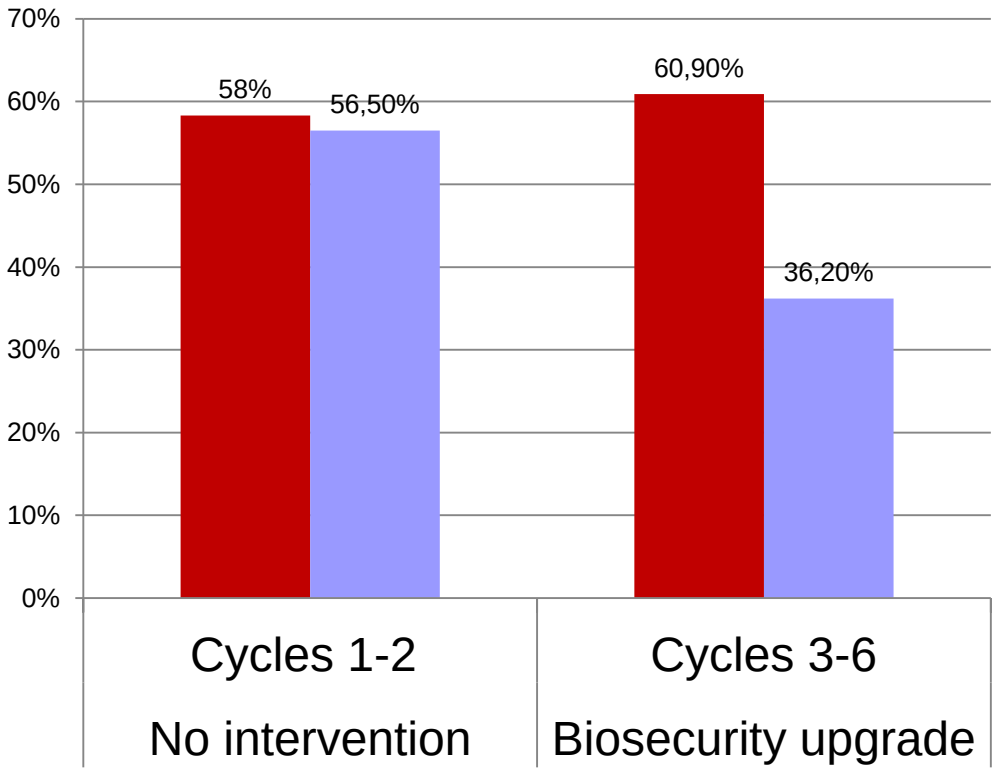
- Activities/Results last year
- Spain – The 18-farm study
  - Midway evaluation of the effect of upgraded biosecurity procedures of the 18-farm study. Effect approved by April 14.

  - Fly screens established during summer/autumn (July – October 2014) on 5 houses (i.e. by Oct2014 total 7 houses running on 5 farms) comprising the ‘BIO + Flyscreen’ group.

Task 2.1
Fly screens add-on to biosecurity

Preliminary results per April 2014

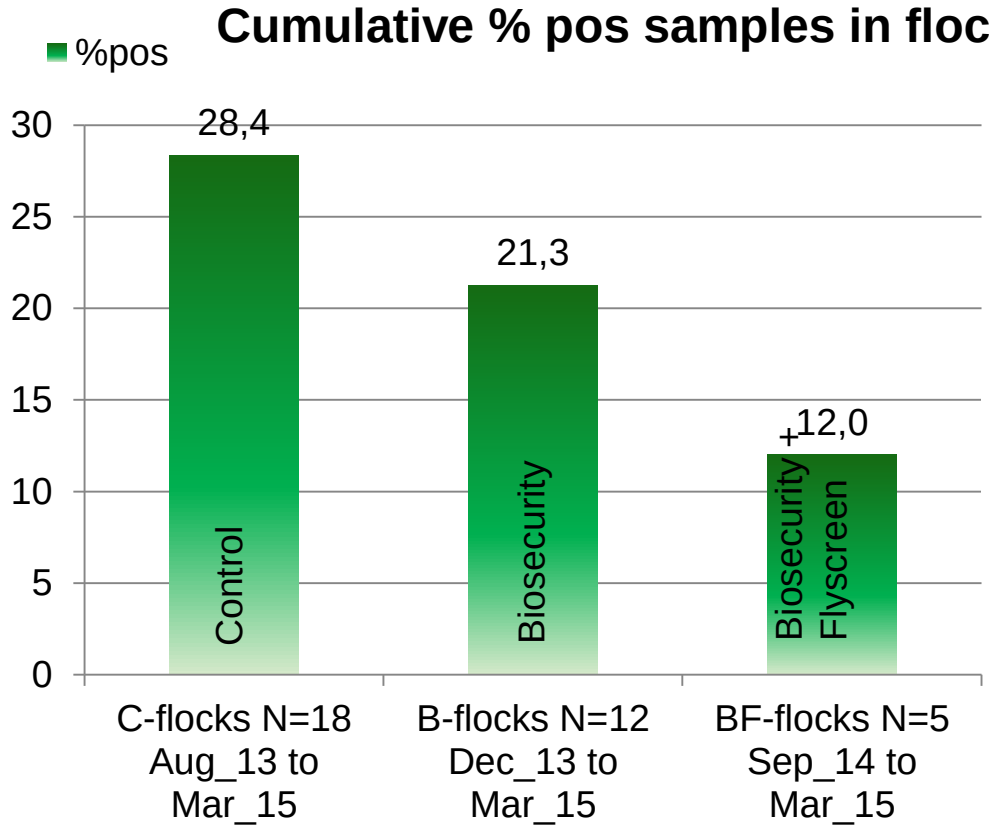
18-farm study Biosecurity upgrade, flock prevalence at day 34



It took at least two cycles for a training period, so the upgrade period does probably not show the full effect of biosecurity

Task 2.1
Fly screens add-on to biosecurity

Preliminary results by April 2015

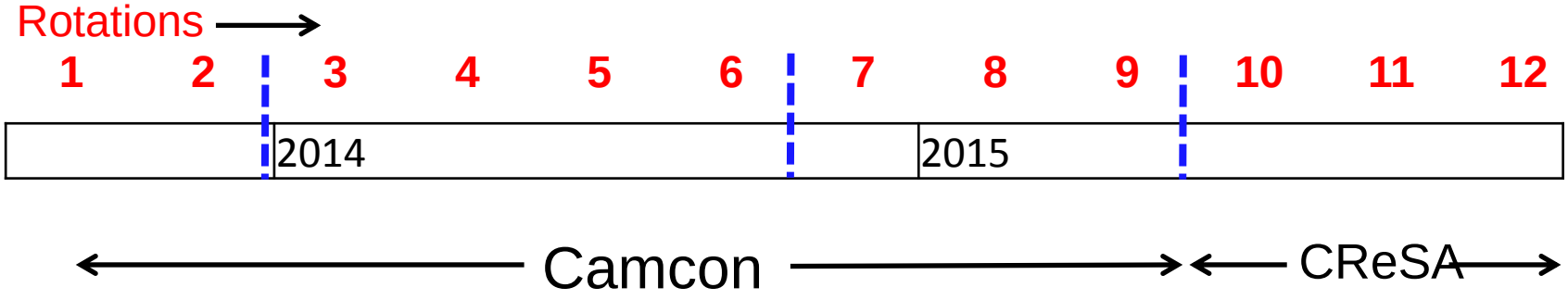


C-flocks = no interventions
B-flocks = biosecurity
BF-flocks = biosecurity and flyscreen

5 samples per flock, at days 7, 14, 21, 28 and 34-35

Task 2.1
Fly screens add-on to biosecurity

- Activities/Results last year
- Spain – The 18-farm study
  -
  - The additional effect of flyscreen can not be expected to show until the summer/autumn season 2015, i. e. after the CamCon project period.



Task 2.1
Fly screens add-on to biosecurity

- Problems
  - There are deliverables that will be incomplete by end date of the project.

    D. 2.1.5 Logbooks filled in and collected – 18 farm study
    D. 2.1.6 Database with Campylobacter results of farms in T2.1

  - Should those Deliverables be uploaded at end of CamCon, or after the project period by Dec 2015?

- Points for discussion
  - The data that are achieved by CReSA from May15 to Dec15, how will they relate to the CamCon project ?

Task 2.2
Phage therapy

- Task leader: Peter Willemsen, CVI-LEI
- Participants: UMinho, DTU

No	Deliverable	Status	Due
2.2.1	Collection of phages to be used for therapy to control Campylobacter	√	Apr12
2.2.2	Paper on the efficacy and effectiveness of the use of phages to combat Campylobacter in field trials	▶	Apr14 (exp. ???)
2.2.3	Paper on the effectiveness of phage therapy	▶	Apr14 (exp. 2015)
√ = delivered, ▶ = started, ▬ = not started			

Task 2.2
Phage therapy

- Activities/Results last year
  - Focus on phage inactivation/ phage resistance

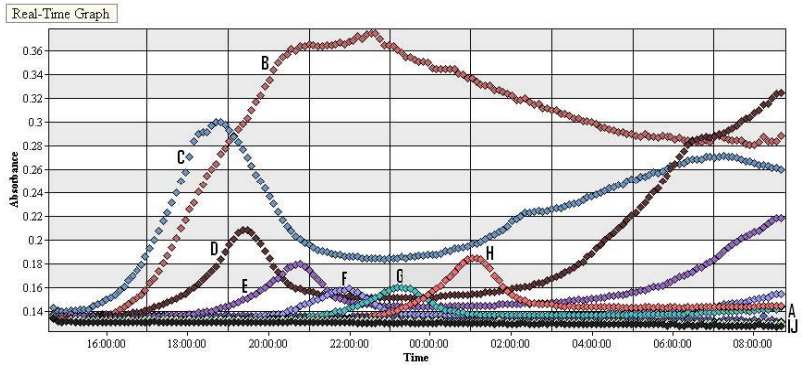
- Problems
  - Trials show no reduction of Campylobacter. Large variation in data. Difficult to publish.

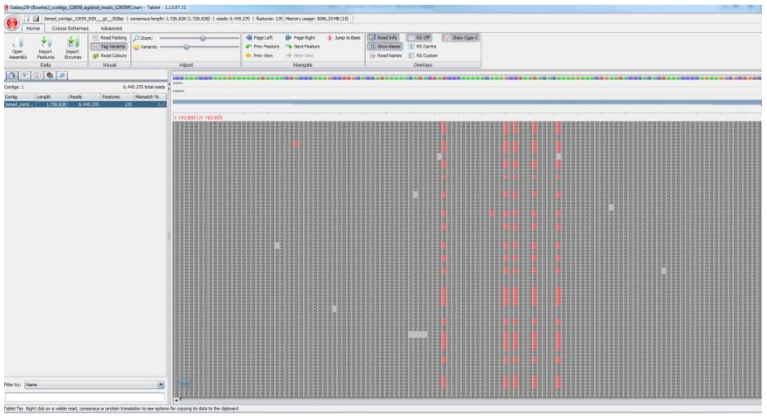
- Points for discussion
  - Decided to change deliverables (publication):
    - in stead of general review on phage therapy:
      a review on Campylobacter phage therapy (2015)
    - results CamCon trials, dependent on final experiments. Still not fit for publication.

Task 2.2
Phage therapy

- Activities/Results last year

  - Focus on phage inactivation/ phage resistance
    - Comparison Parent (susceptible) with Daughter (resistant) strain after *in vitro* induction of phage resistance





Task 2.2
Phage therapy

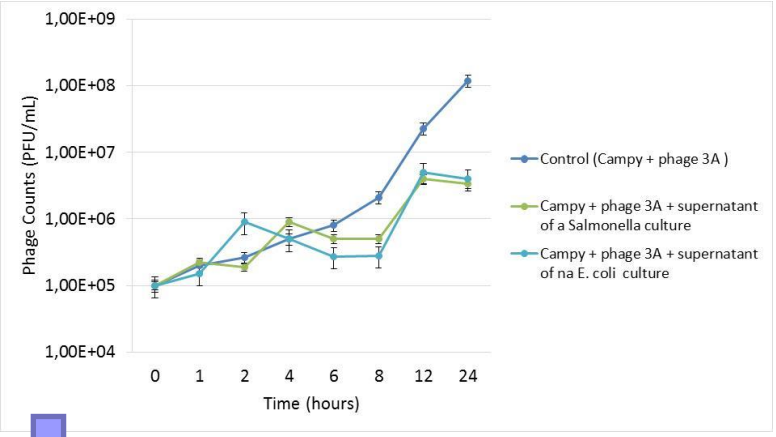
- Activities/Results last year
  - Focus on phage inactivation/ phage resistance
    - No inactivation of cocktail phages:
      - 4 < pH > 8
      - 0.1% DOC

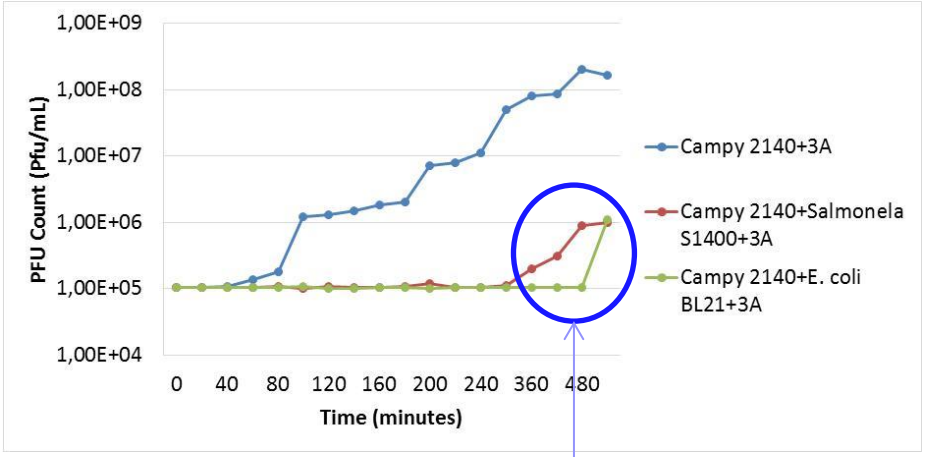
Task 2.2
Phage therapy

- Activities/Results last year

  - Focus on phage inactivation/ phage resistance
    - Quorum sensing/other gut microbiota

Hypothesis: Microbiota present in the chickens GI tract can interfere with phage infectivity





Supernatants of *E. coli* and *Salmonella* growth suspensions interfere with phage replication

No phage replication in the presence of *Salmonella* or *E. coli*

E. Coli and *Salmonella* metabolites inhibits phage replication – Quorum sensing?

- Activities/Results last year
  - Focus on phage inactivation/ phage resistance
    - Conclusion:

      Both phage inactivation and (acquired) phage resistance occur, but no mechanism or gene involved has been identified yet.

Task 2.3
Vaccination

- Task leader: Jaap Wagenaar, UU
- Participants: CVI-LEI

No	Deliverable	Status	Due
2.3.1	Identification of immune response against *C. jejuni* subunit vaccines	√	
2.3.2	Identification of immune response against *C. jejuni* whole cell vaccines	√	
2.3.3	Protection against *C. jejuni* challenge after vaccination with *C. jejuni* subunit vaccines		Under internal review
2.3.4	Protection against *C. jejuni* challenge after vaccination with *C. jejuni* killed whole cell vaccines		Under internal review

√ = delivered, ► = started, ▬ = not started

Task 2.3
Vaccination

- Activities/Results during the project
  - Over the years we performed several *in ovo* vaccination/challenge experiments with recombinant proteins with combined antigen-adjuvant properties (manipulated flagellin). Recombinants activated the TLR5 pathway (in contrast to wildtype *Campylobacter*).
  - TLR5 activation was possible *in ovo* (upregulation of cytokines after vaccination

- Problems
  - Antibody responses were observed; the hypothesis that glycosylation of the antigen would be essential for an effective immune response became stronger.

Task 2.3
Vaccination

- Points for discussion
  - The production of glycosylated antigens appeared to be the limiting factor (must be IN Campylobacter as this is the only species that produces glycosylated proteins).

Conclusions from the experiments

- *In ovo* vaccination with protein-based vaccines induces antibody responses
- Antibody response is dose-dependent
- No protection upon *C. jejuni* challenge
- *Possible reasons:*
  - Glycosylated flagellin needed?
  - Antibody titer not sufficient?
  - Dose still too low?

Task 2.3
Vaccination

- Activities/Results last year

  Attempts to increase the production of glycosylated antigens in *Campylobacter* (on the chromosome instead of plasmid).

- Problems

  Stability of the glycosylated strain and products

- Points for discussion
  - The current focus is on improved production and use of glycosylated recombinant vaccine antigen with cloning of *C. jejuni* flagellar chaperones-genes in the production strain

WP3 Committee Meeting

- Mathilde Josefsen, DTU
- Other participants: NVRI

Task 3.1
Development of methods of quantification of *Campylobacter* in air

- Task leader: Mathilde Josefsen, DTU
- Participants: DTU

No	Deliverable	Status	Due
3.1.1	Establishment of methods of quantification of airborne Campylobacter	√	
3.1.2	Definition of level of sensitivity	√	
3.1.3	Publication on quantities of airborne Campylobacter	√	
3.1.4	Identification of a suitable semi-automated technology allowing semi-continuous monitoring of airborne Campylobacter	√	

√ = delivered, ►= started, ▬= not started

Task 3.2
Feasibility of real-time monitoring of *Campylobacter* in broiler flocks

- Task leader: Mathilde Josefsen, DTU
- Participants: NVRI

No	Deliverable	Status	Due
3.2.1	Knowledge of the airborne particle size distribution under various farming conditions	√	
3.2.2	Knowledge of the ratio of airborne particles and Campylobacter under various farming conditions	√	

√ = delivered, ► = started, ▬ = not started

Task 3.3
Report on future research needs

- Task leader: Mathilde Josefsen, DTU
- Participants: DTU

No	Deliverable	Status	Due
3.3.1	Report on future research needs regarding diagnostic tools to detect Campylobacter in primary poultry production	√	

√ = delivered, ► = started, ▬ = not started

WP4 Committee Meeting

- Maarten Nauta, DTU
- Other participants: all except DIA, UMinho, UNEW

Task 4.1
Risk assessment

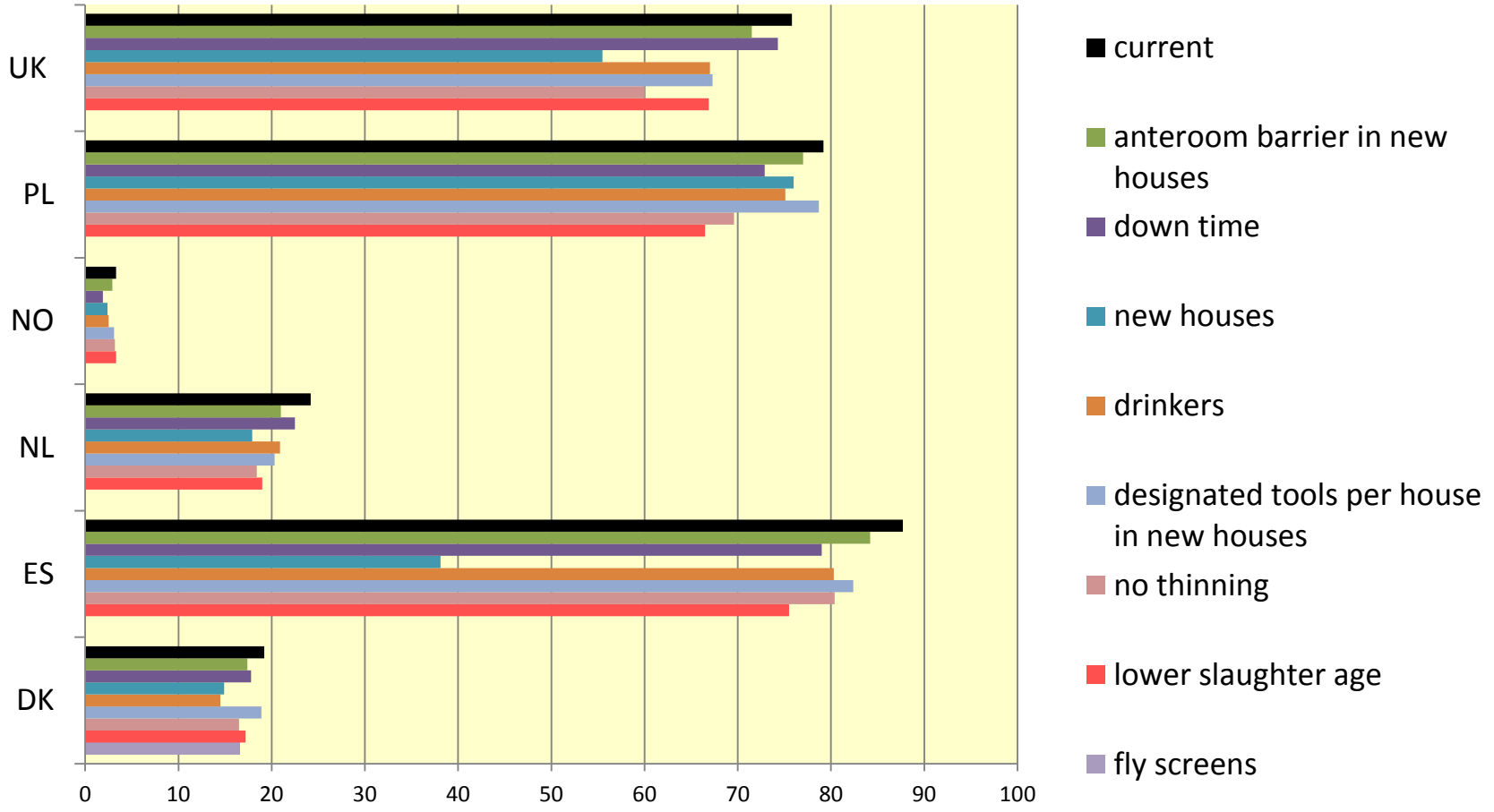
- Task leader: Maarten Nauta, DTU
- Participants: DTU

No	Deliverable	Status	Due
4.1.1	Research paper on the QRA model	▶	Feb15 (exp. Apr15)
√ = delivered, ▶ = started, ▬ = not started			

We will deliver TWO Research papers!!

Task 4.1
Risk assessment (1)

- Activities/Results last year
  - Effective interventions defined on the basis of significant risk factors (WP1)
  - Three additional interventions included:
    - Ban on thinning
    - Reduction of slaughter age to 35 days
      - Using EFSA analyses
    - Application of fly screens (Denmark)
      - Bahrndorff et al. paper
  - Effects of interventions on flock prevalences assessed


UK
PL
NO
NL
ES
DK
0
10
20
30
40
50
60
70
80
90
100
current
anteroom barrier in new houses
down time
new houses
drinkers
designated tools per house in new houses
no thinning
lower slaughter age
fly screens

Task 4.1
Risk assessment (2)

- Activities/Results last year
  - Assessment of effect of interventions reducing the concentration of Campylobacter in intestinal contents
    - No data from WP2 on vaccines and phages
    - Data on concentrations in caeca from SP, UK, NO, DK, NL
    - EU Baseline data on neck skins
  - Comparison of two approaches
    - Linear regression caeca – skin
    - Risk assessment model (CARMA, NL)

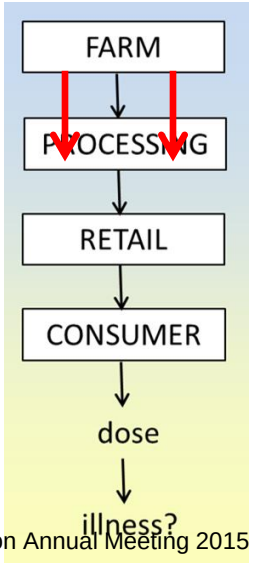


Table 2. Country data, caecal concentrations

	mean, m (log cfu/g)	sd of means (between), s_b (log cfu/g)	mean sd (within), s_w (log cfu/g)
Denmark	7.25	0.80	0.82
Norway	7.28	1.41	1.06
UK	7.18	1.00	0.80
Spain	6.55	0.85	0.8
Netherlands	6.94	1.37	1.18

Only positive flocks

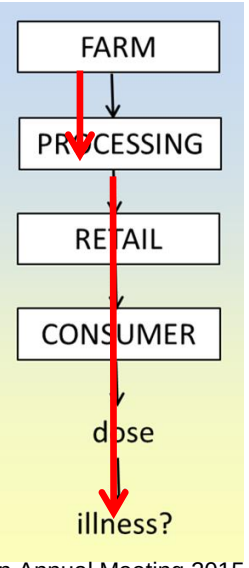
Not necessarily representative for the country!

- Regression model
  - Based on DK data (25 samples of 3x5 flocks), (Boysen et al. 2015)

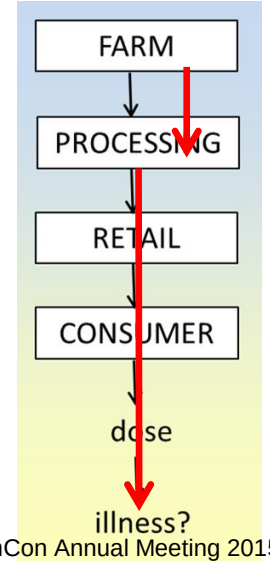
$$\log C_{skin} = 0.70 \log C_{fec} - 2.5 \quad (+- 0.36)$$

  - Caecal count data form Camcon countries
  - Risk assessment model C_{skin} – Risk

  - Other data sets predict no or different regression lines
    - The slope is crucial



- Risk assessment model (Nauta et al 2007)
  - Inputs
    - Caecal count data Camcon countries
    - Nauta et al. 2007 inputs and assumptions
  - Modified last part of the model
    - To allow comparison



What is the effect of reduction in C_{fec} ?

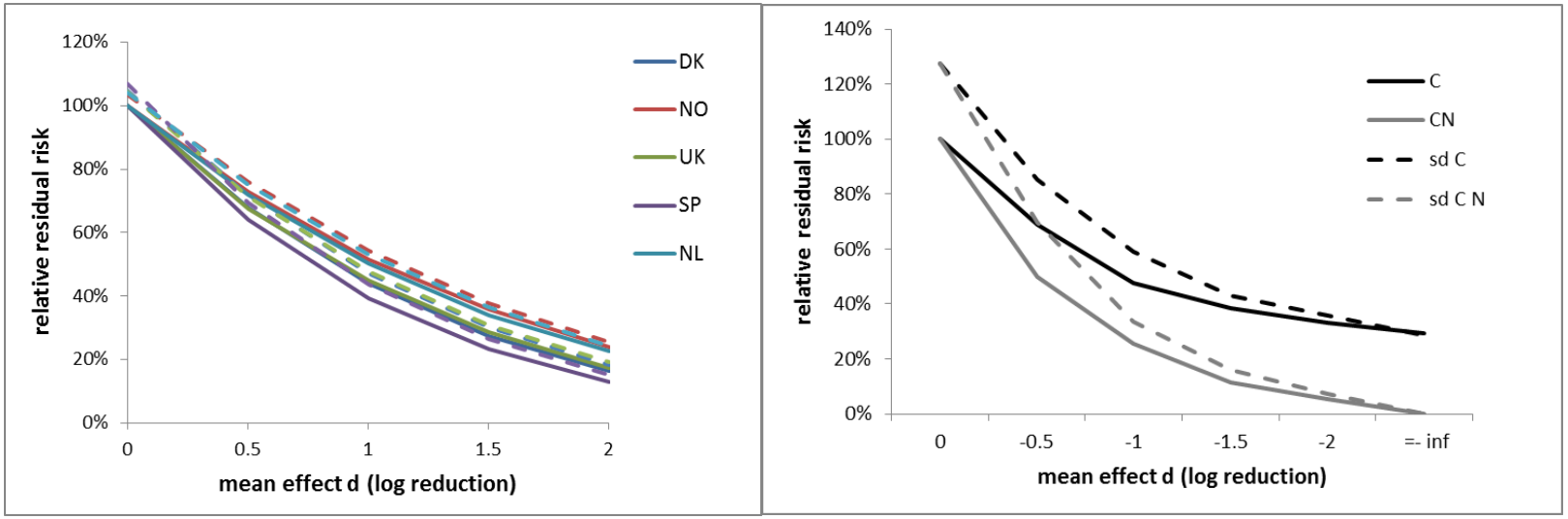


Figure: Relative residual risks after reduction of the mean Campylobacter concentration in intestinal content of broilers by d *log, estimated by analysis of a linear regression model using data from five countries involved in CamCon (left) and a risk assessment model (right).*

Effect of 1 to 2 log reduction is large

Caecal count data are not so important

Not one generic model, no ”rule of thumb”

Task 4.1
Risk assessment: main results

- 20 farm study WP1 results translated in estimates of effects of interventions
  - No single intervention solves the problem
  - Differences between countries

- Reducing caecal concentrations may be effective
  - Difficult to predict HOW effective
  - Linear regression is too simple, Risk assessment is too complex

Task 4.2
Data collection and compilation

- Task leader: Hanne Rosenquist, DTU
- Participants: CVI-LEI, NVI, ULIV, UU, CSA, NVRI

No	Deliverable	Status	Due
4.2.1	Report on data collected for risk assessment and economics	▶	Feb15 (exp. Apr15)

√ = delivered, ▶= started, ▬= not started

Task 4.2
Data collection and compilation

- Activities/Results last year
  - We have collected and compiled information for risk assessment and economics. This information is now available in a report (Deliverable 4.2.1) which includes:
    - Results of a literature survey on *Campylobacter* in the broiler chain (2007-2013).
    - Results of analyzing the correlation between *Campylobacter* in caeca and meat on data provided by partners in Norway, the UK, Spain and Poland.
    - Results of analyzing the impact of interventions (thinning, slaughter age, fly screens) that could not be extracted from the risk factor study in CamCon WP1.
    - Costs of interventions.
- Problems
  - None
- Points for discussion
  - None

Task 4.3
Economics

- Task leader: Peter van Horne, CVI-LEI
- Participants: CVI-LEI

No	Deliverable	Status	Due
4.3.1	Research paper on the cost-effectiveness of interventions in different regions in Europe	▶	Apr15

√ = delivered, ▶ = started, ▬ = not started

Task 4.3
Economics

- Activities/Results last year
  - Collection on general economic data in countries and verification is finished
  - Definitions of intervention measures made
  - Collection of specific economic data
  - Final draft of research paper on intervention costs

- Problems
  - None

- Points for discussion
  - None

- Farm level calculation model
- Economic-engineering approach: combining detailed engineering and costs data in a quantitative model of the production process
- Typical farm in 2009
- Considering differences in:
  - Economic factors (interest, labour costs, electricity and water prices)
  - Technical and economic farm performance

Task 4.3

Economics: main results

- Costs differ substantially between countries
- Cheapest interventions:
  - Anteroom with hygiene barrier
  - Dedicated tools
  - Fly screen
- Most expensive interventions:
  - New houses
  - Slaughter at 35 days
  - Discontinue thinning
  - Drink nipples without cup
- Maximum downtime ten days: very different between countries

Task 4.4
Cost-effectiveness on interventions at farm and comparison with interventions post farm

- Task leader: Maarten Nauta, DTU
- Participants: CVI-LEI

No	Deliverable	Status	Due
4.4.1	Research paper on integration of risk assessment and economy (cost effectiveness)	▶	Feb15 (exp. Apr15)

√ = delivered, ▶ = started, ▬ = not started

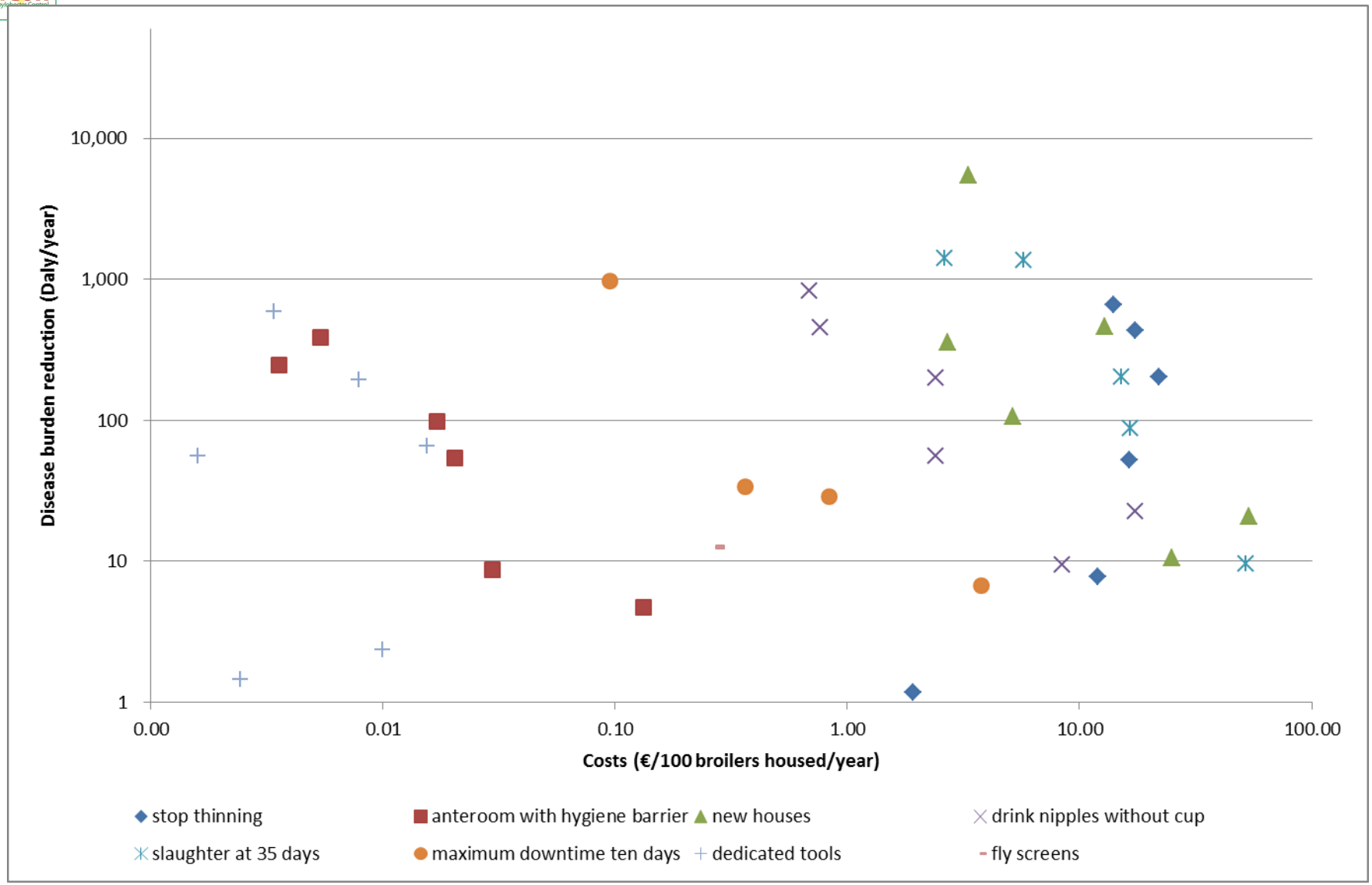
Task 4.4
Cost-effectiveness on interventions at farm and comparison with interventions post farm

- Activities/Results last year
  - Collection of human health data related to campylobacter
  - Collection import/export data of broilers and their meat
  - Final draft of research paper on cost-effectiveness

- Problems
  - None

- Points for discussion
  - None

- Farm level calculation model
- Economic-engineering approach: combining detailed engineering and costs data in a quantitative model of the production process
- Typical farm in 2009
- Considering differences in:
  - Economic factors (interest, labour costs, electricity and water prices)
  - Technical and economic farm performance
  - Effectiveness interventions
  - Import/export
  - Campylobacter disease burden


10,000
1,000
100
10
1
Disease burden reduction (Daly/year)
0.00
0.01
0.10
1.00
10.00
100.00
Costs (€/100 broilers housed/year)
stop thinning
anteroom with hygiene barrier
new houses
drink nipples without cup
slaughter at 35 days
maximum downtime ten days
dedicated tools
fly screens

Task 4.4
Cost-effectiveness: main results

- Interventions with low costs/DALY:
  - Anteroom with hygiene barrier
  - Dedicated tools
- Interventions with high costs/DALY:
  - Discontinue thinning
  - New houses
  - Slaughter at 35 days
  - Drink nipples without cup
- Interventions with medium costs/DALY:
  - Fly screens
  - Maximum downtime ten days

WP5 Committee Meeting

- Mogens Madsen, DIA
- Other participants: all except CVI-LEI, UMinho, UNEW

Task 5.1
Best Practice Manual for production of Camp-free chickens

- Task leader: Mogens Madsen, DIA
- Participants: all other participants in WP5

No	Deliverable	Status	Due
5.1.1	Best Practice Manual	√	
√ = delivered, ►= started, ▬= not started			

Task 5.1
Best Practice Manual for production of Camp-free chickens

- Activities/Results last year
  - Work on a basic Best Practice Manual in Spain (WP2) has been combined with CamCon updated project knowledge
  - The CamCon Best Practice Manual has been completed and distributed to project partners (D5.1.1)
  - The CamCon Best Practice Manual will be distributed to external stakeholders at the CPH Hilton seminar, and in hard copies by mail afterwards

- Problems
  - Time restraints have not allowed for a draft-and-comment phase from all CamCon partners

- Points for discussion
  - - Is this a problem?

Task 5.2
Specific targeted learning programmes for proficiency in implementing the “BPM for production of Camp-free chickens”

- Task leader: Mogens Madsen, DIA
- Participants: DTU, all other participants in WP5

No	Deliverable	Status	Due
5.2.1	Plan for distribution of the final E-learning product	√	
5.2.2	E-learning programme	√	
√ = delivered, ►= started, ▬= not started			

Task 5.2

Specific targeted learning programmes for proficiency in implementing the "BPM for production of Camp-free chickens"

- Activities/Results last year
  - A distribution plan for CamCon educational products has been completed (D5.2.1)
  - An e-learning programme for broiler farm owners and staff on 'Campylobacter and biosecurity' has been completed (D5.2.2)
  - The e-learning programme will be demonstrated at the CPH Hilton seminar, and will be available at www.camcon-eu.net
- Problems
  - Change of subcontractor delayed the production
- Points for discussion
  - None

Task 5.3
Voluntary Certification Programme

- Task leader: Mogens Madsen, DIA
- Participants: all other participants in WP5

No	Deliverable	Status	Due
5.3.1	Voluntary Certification Programme	√	

√ = delivered, ► = started, ▬ = not started

Task 5.3
Voluntary Certification Programme

- Activities/Results last year
  - A CamCon Draft CertificationProgramme has been completed and distributed to project partners (D5.3.1)
  - The CamCon Draft CertificationProgramme will be distributed to external stakeholders at the CPH Hilton seminar, and in hard copies by mail afterwards

- Problems
  - Time restraints have not allowed for a draft-and-comment phase from all CamCon partners

- Points for discussion
  - Is this a problem?

WP6 Committee Meeting

- Merete Hofshagen, NVI
- Other participants: all

Task 6.1 – 6.3
CA, Management team, Web site

- Task leader: Merete Hofshagen, NVI
- Participants: all

No	Deliverable	Status	Due
6.1.1	The Consortium Agreement signed by all participants	√	
6.2.1	Management support team appointed	√	
6.3.1	The Project web site established	√	
√ = delivered, ►= started, ▬= not started			

Task 6.1 – 6.3
CA, Management team, Web site

- Activities/Results last year
  - According to plan
  - Must finalize reports after project ends
- Problems
  - None
- Points for discussion
  - None

Task 6.4
Establish and maintain the Communication and Dissemination Plan

- Task leader: Merete Hofshagen, NVI
- Participants: all

No	Deliverable	Status	Due
6.4.1	Plan for the use and dissemination of foreground presented	√	

√ = delivered, ► = started, ▬ = not started

Task 6.4
Establish and maintain the Communication and Dissemination Plan

- Activities/Results last year
  - According to plan
  - Must finalize reports after project ends

- Problems
  - None

- Points for discussion
  - None

Task 6.5 – 6.6
Meetings and reports

- Task leader: Merete Hofshagen, NVI
- Participants: all

No	Deliverable	Status	Due
6.5.1	Reports of project's meetings	√, √, √, √, √ ▶	Apr15
6.6.1	Regular reports to the European Commission	√, √ ▶	Apr15
6.6.2	Report on awareness and wider societal implications	▶	Apr15

√ = delivered, ▶ = started, ▬ = not started

Task 6.5 – 6.6
Meetings and reports

- Activities/Results last year
  - Annual and Quarterly Meetings
  - Last Periodic Report and Final Report to COM
    - Started, but will be finalized in May/June
      - Depending on WP-leaders, Task leaders and Institutions
    - Need all Deliverables before 30 April!
    - NB – economical reporting from Participants!!
      - Start asking economy department NOW! – Audits!! DTU/ULIV
      - Lars will send email soon
- Problems
  - None
- Points for discussion
  - None

Executive Board Meeting

- Discussions
  - The Executive Board was in general pleased with the project!
  - Reports – deadlines!
- Decisions
  - None

General Assembly

- Meeting tomorrow
  - Discussion Tables – which?
  - Should we send out/publish slides? NO

- Decisions
  - None