# Shedding Light on *Cryptosporidium* in Calves:

## Epidemiology in Three Dairy Herds


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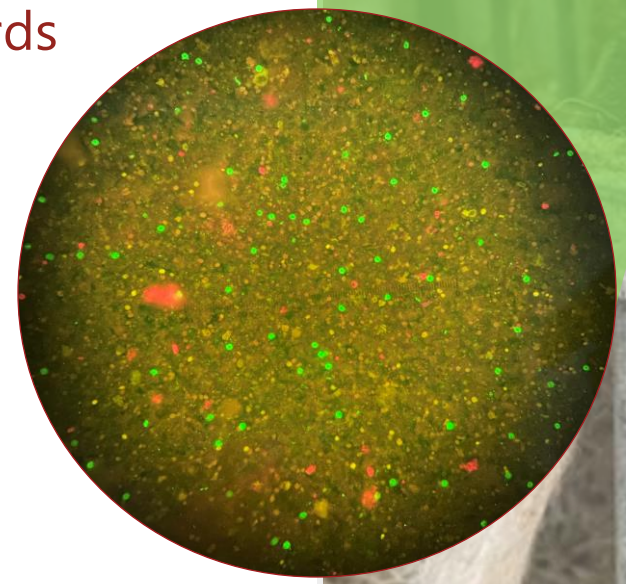
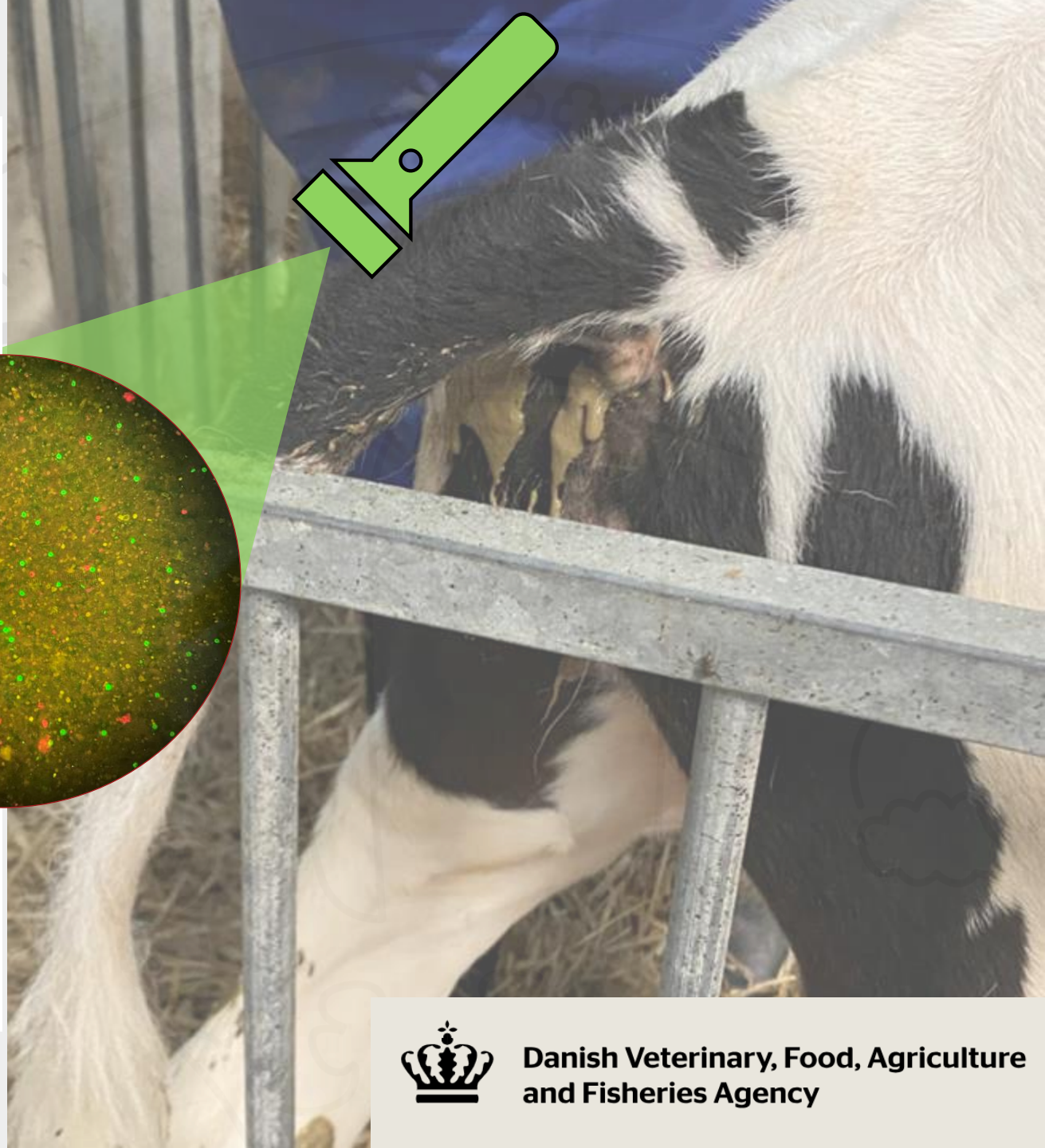





Danish Veterinary, Food, Agriculture and Fisheries Agency

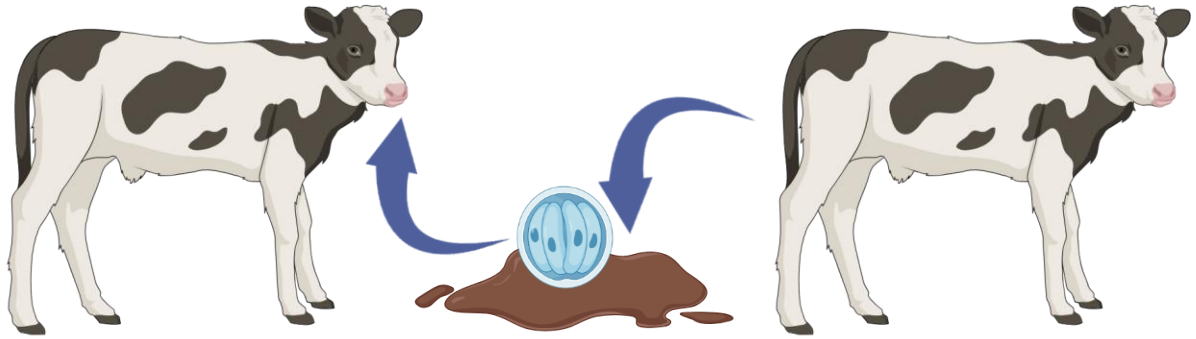
# *Cryptosporidium* spp. in Calves

Single celled parasite, Direct lifecycle + Auto-infection

Cattle species: *C. parvum*, *C. bovis*, *C. ryanae* & *C. andersoni*

Symptoms: Gastrointestinal disease - severe diarrhoea!

Zoonotic -> Faecal contamination
Young and immunocompromised individuals



# Prevalent Worldwide and in Denmark – New study

**Species Diversity and Zoonotic Subtypes of *Cryptosporidium* in Calves in Denmark: A Multi-Method Molecular Investigation**

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## 140 calves from 15 herds

| ***Cryptosporidium* real-time PCR** | ***C. parvum*** | ***C. bovis* or *C. ryanae*** |
|---|---|---|
| 101 (72.1%) | 63 (45.0%) | 17 (12.2%) |

The Project #PARADISE

| | |
|---|---|
| Start: | 1 January 2020 |
| Duration: | 2.5 Years |
| Domain: | Emerging Threats |
| Keywords: | Parasites, genomics, metagenomics, high resolution genotyping, enrichment strategies |
| Contact: | Simone M. Cacciò (ISS) |

# Prevention and treatment is difficult!

**Management** and **early drug administration** after symptom onset

**Risk factors:**
Colostrum bucket feeding
Contact with other calves
Larger herds
Organic herds
Warm/wet weather

**Protective factors:**
Treatment+cresol disinfection
Lime disinfection
Colostrum/time with dam
Hard flooring

Modifiability

Duranti et al. 2008, Delafosse et al. 2015, Keidel & Daugschies 2013, Björkman et al. 2018, Brainard et al. 2020 & Constancis et al. 2021

# Project aim

Fill knowledge gaps on management and epidemiology of *Cryptosporidium* spp. in Danish dairy herds

- How to reduce drug use / When do we need to treat?

# Objectives (Cohort Study - Master's Project)

1. Investigate oocyst excretion over time in Danish Holstein calves in three different herds
2. Compare infectious load with clinical calf management, symptoms, and occurrence of other pathogens

Danish Veterinary, Food, Agriculture and Fisheries Agency

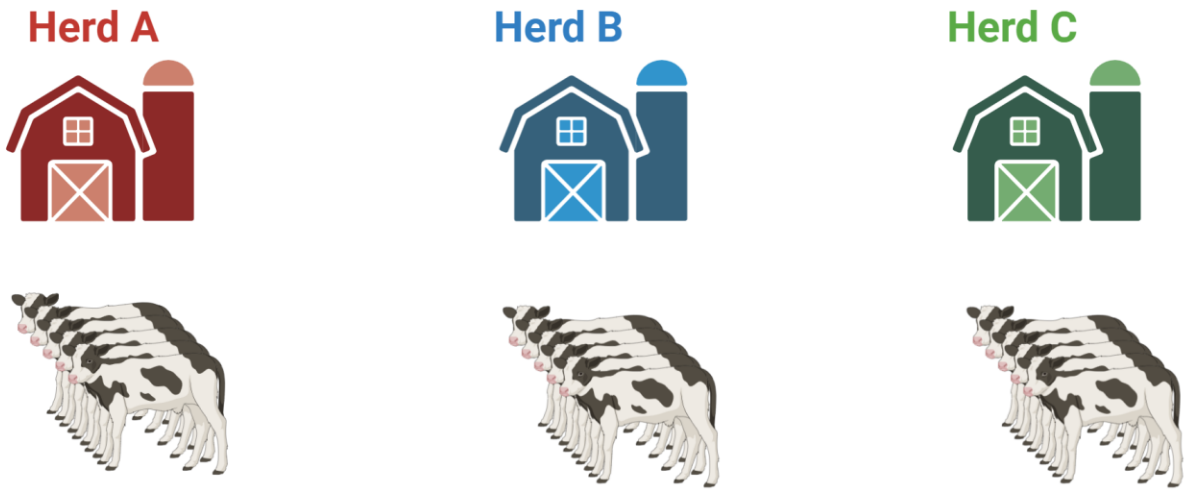
# Master's project August 2025 – January 2026

# Cohort Study Design

## Materials & Methods

Three dairy herds with *Cryptosporidium*
17-20 random calves from each herd

(All *Salmonella* positive – random)

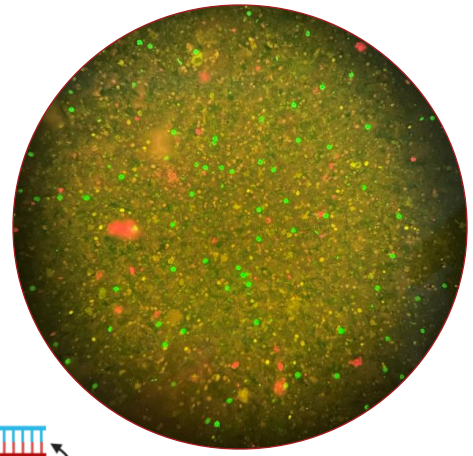


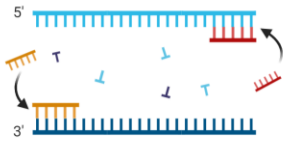

<u>Weekly sampling for 2 months</u>

Clinical examination & Faecal sampling

Crypto/Giardia Immunofluorescence Assay

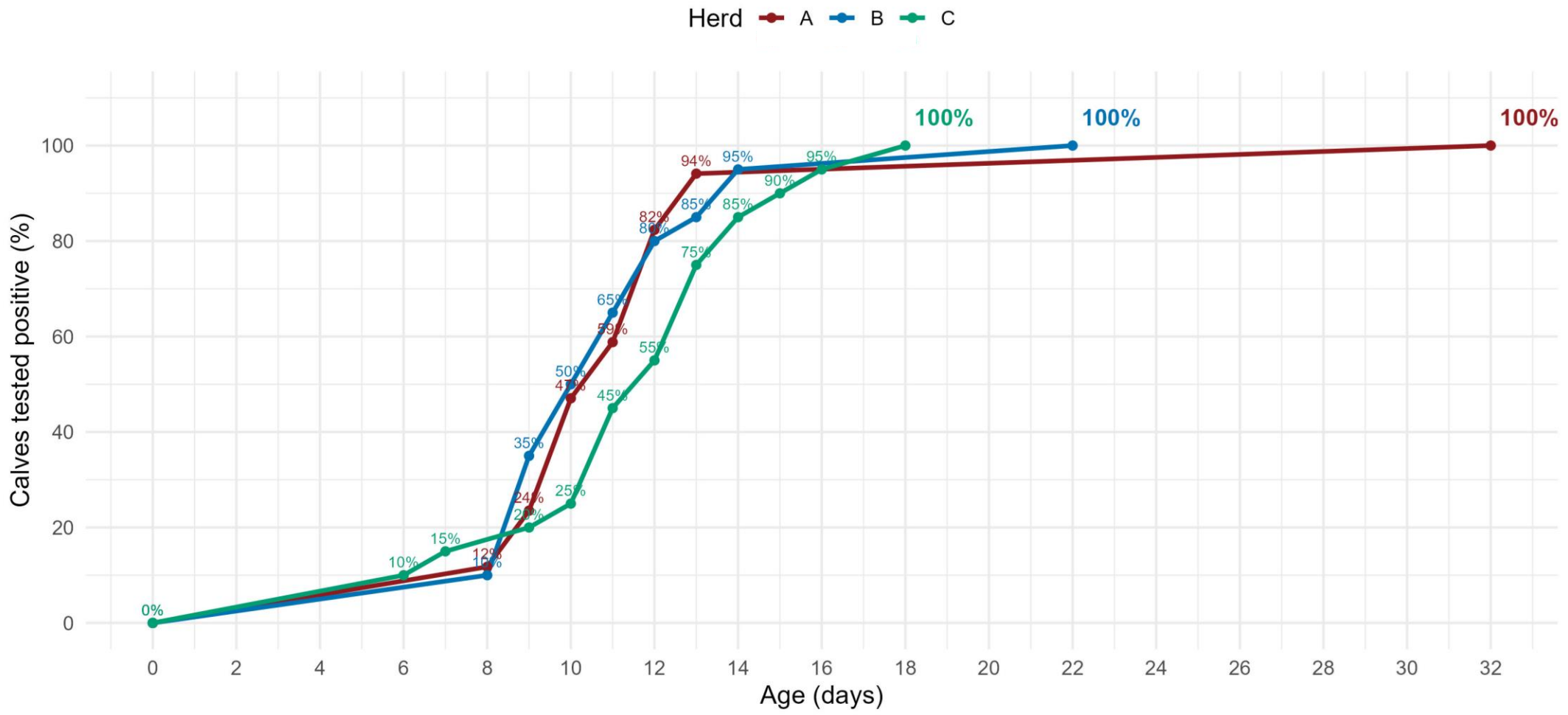
PCR for other pathogens causing diarrhoea





# Results – *Cryptosporidium*

## Cumulative fraction of *Cryptosporidium* positive calves over time

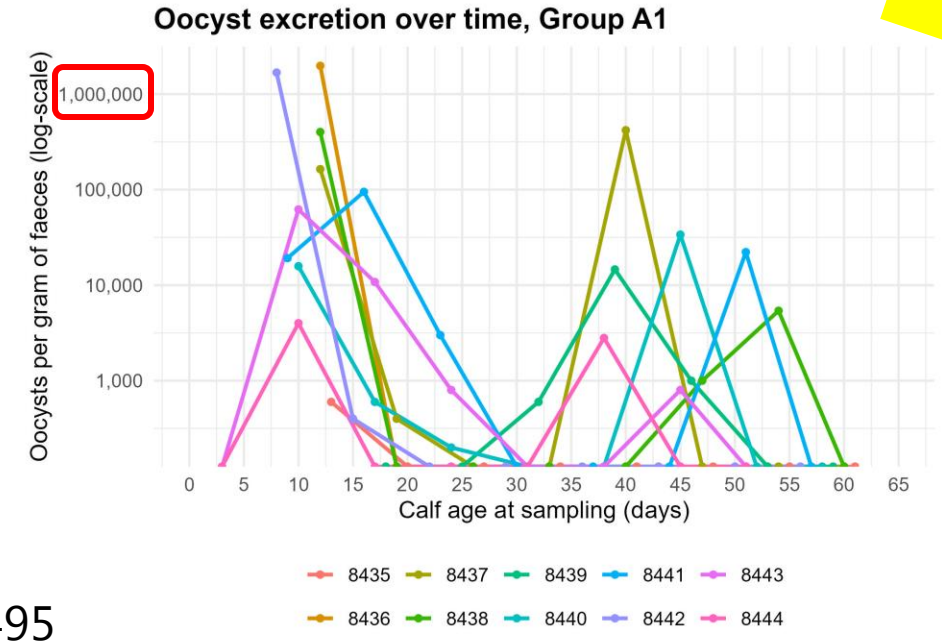


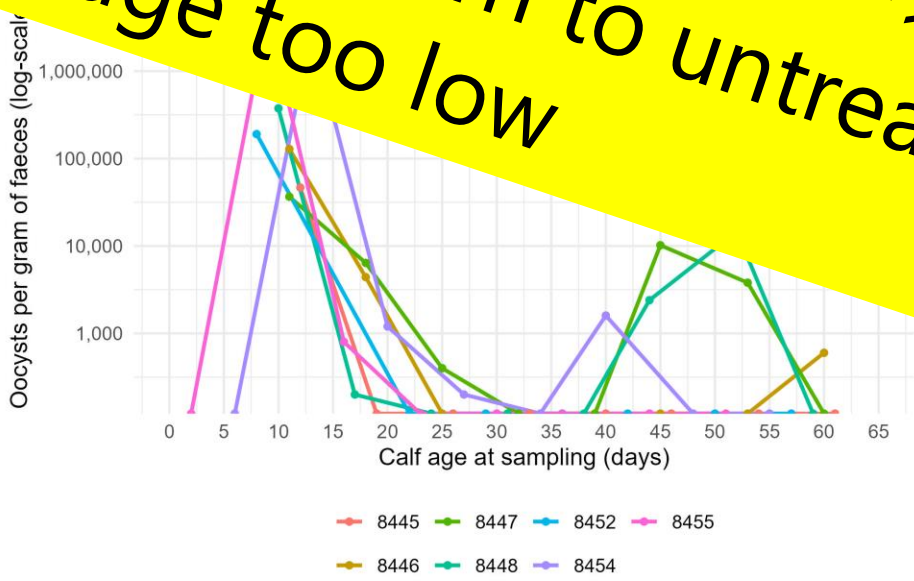
# Results – Management & Oocyst excretion, Herd A

| Herd | Calf weeks of life | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| A | Calves per pen | Single | | Pair | | | 10 Calves | | |
| | Milk | 4L milk replacement BID | | | | | 4L milk replacement SID | | |
| | Feed | Calf müesli + water | | | | | | Cow feed + supplement feed | |

Gabbrovet (paromomycin) treatment of 5 calves -> similar pattern to untreated
Dosage too low

Cleaning: Empty period -> High p
Colostrum: From dam, 4L within 3




Mean: 100,495
SEM: 45,476

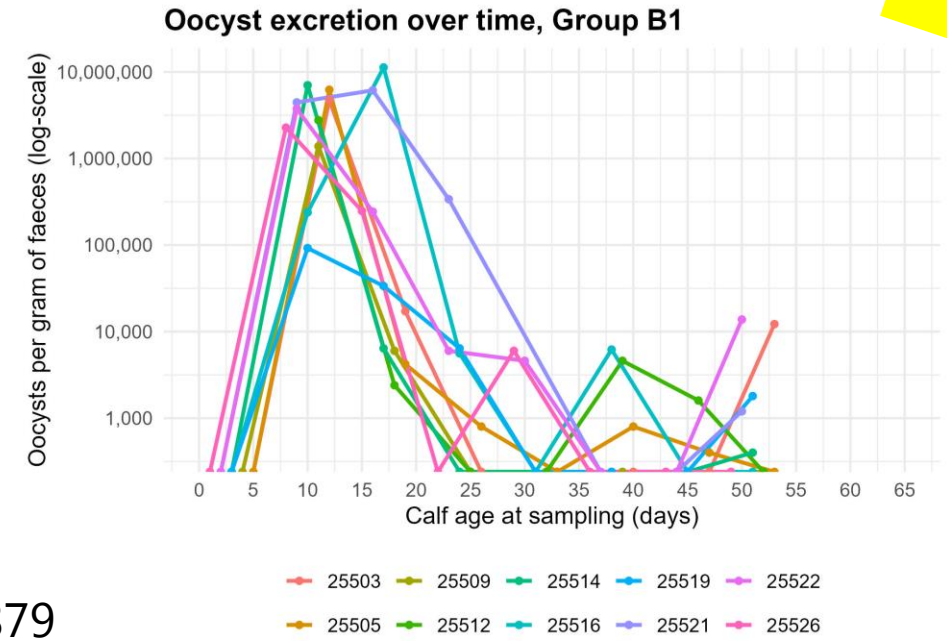
Second peak in 58% of calves

# Results – Management & Oocyst excretion, Herd B

| Herd | Calf weeks of life | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| B | Calves per pen | 8 Calves | | | | | | | |
| | Milk | Transition milk | 5L leftover milk/milk replacement BID | | | | | Weaning | |
| | Feed | Calf müesli + water | | | | | | ment feed | |

Cleaning: Inventory Virkon S + High pressure … empty period)
Colostrum: From bank, 4L within 3 hours of …

Gabbrovet (paromomycin) treatment of 5 calves -> similar pattern to untreated
Dosage too low





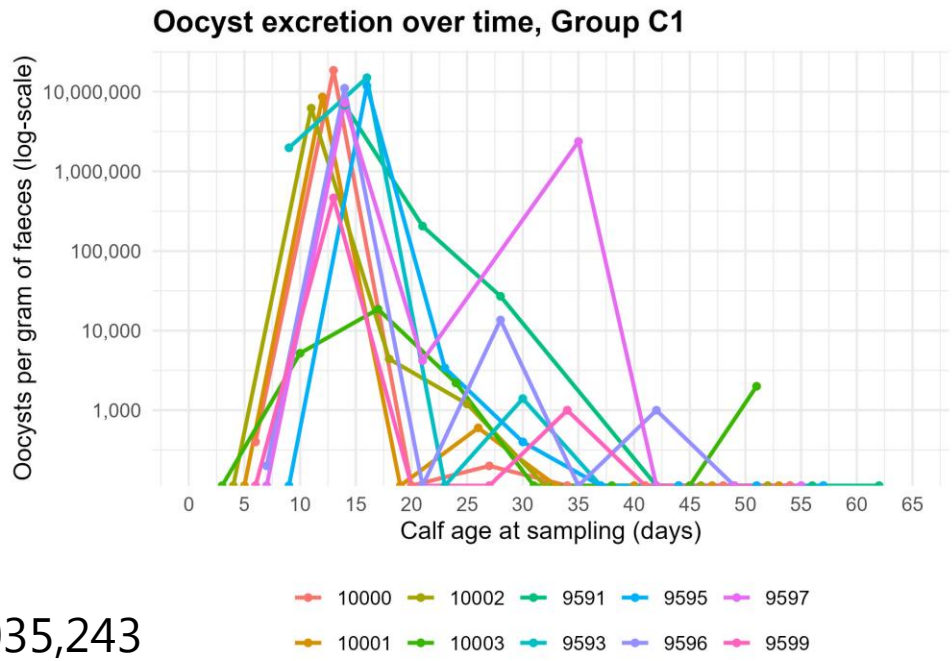
Mean: 782,879
SEM: 202,693

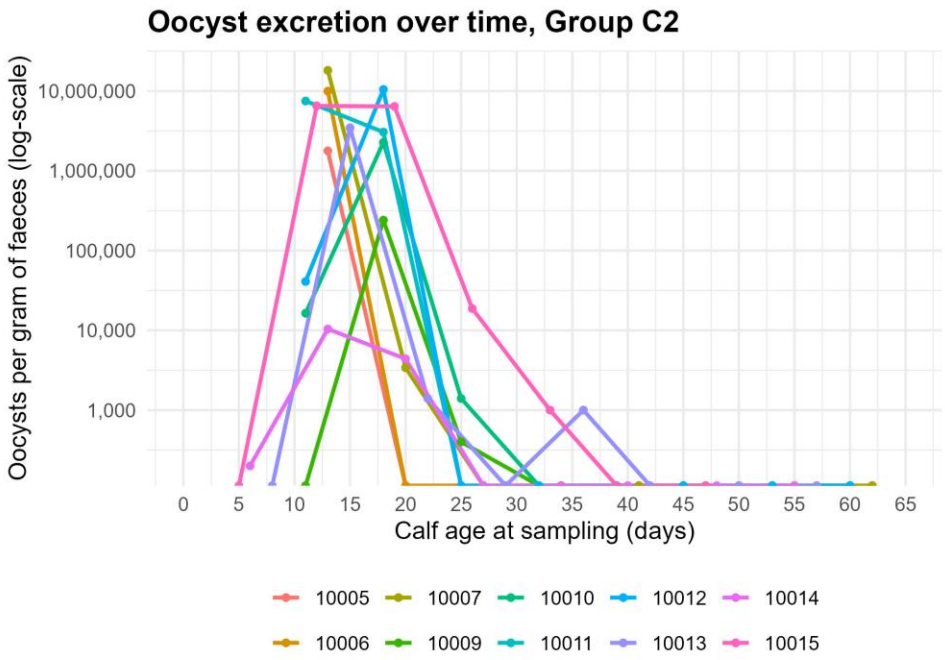
Second peak in 75% of calves

# Results – Management & Oocyst excretion, Herd C

| Herd | Calf weeks of life | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| C | Calves per pen | Single | Pair | | | | 4 Calves | | |
| | Milk | 5L leftover milk BID | | | | | | | |
| | Feed | Calf müesli + hay + water | | | | Calf müesli + ensilage | | | |

Cleaning: Empty period -> High pressure water + Kenosan + Lime
Colostrum: From bank, 4L within 5 hours of life



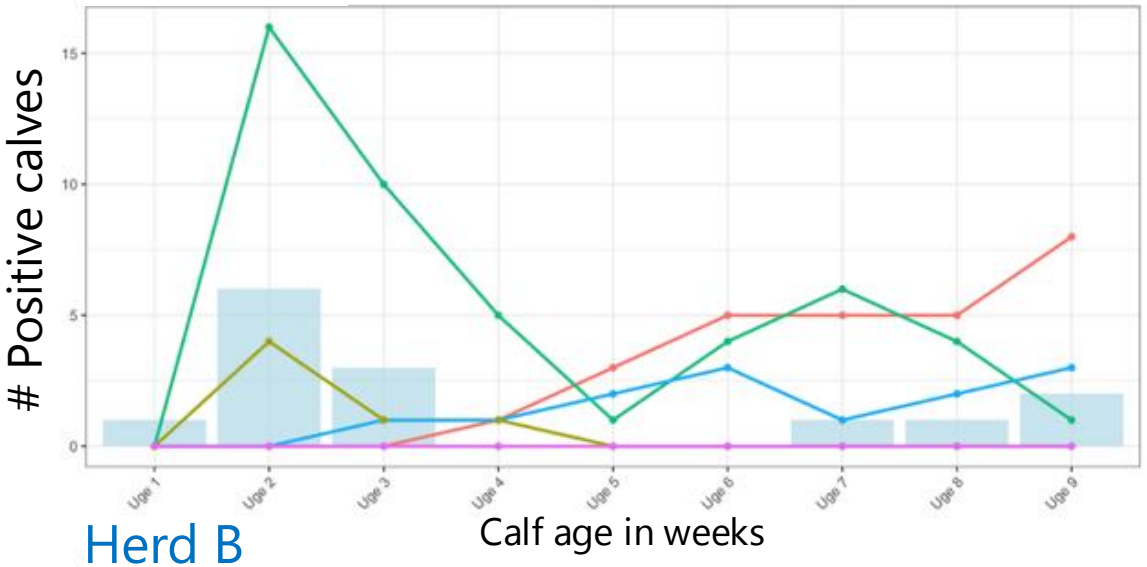




Mean: 1,035,243
SEM: 258,735

Second peak in 35% of calves

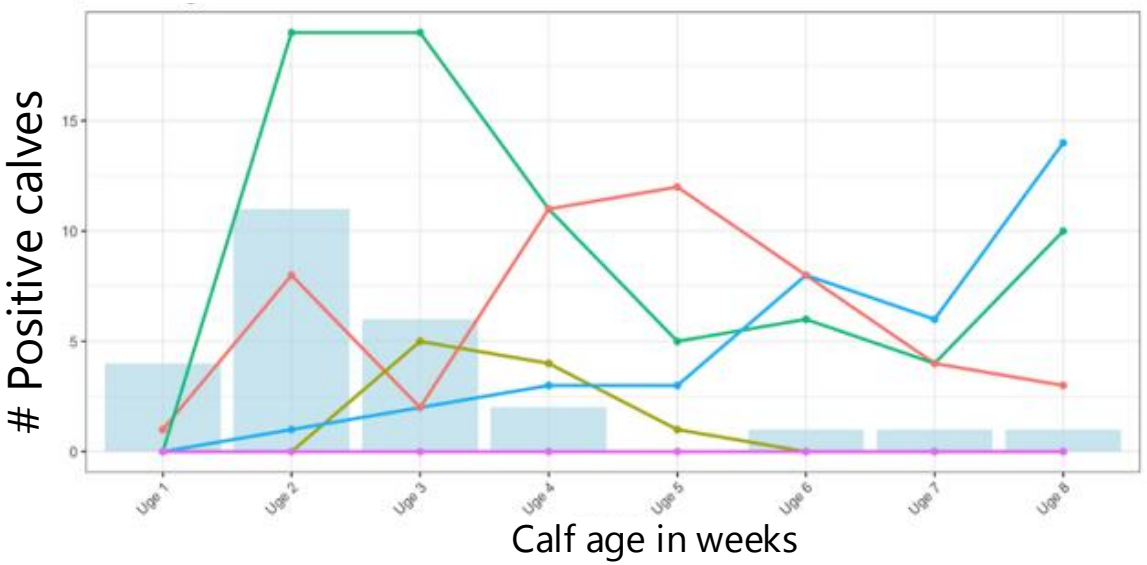
# Results - All Pathogens & Diarrhoea, All Herds

## Herd A

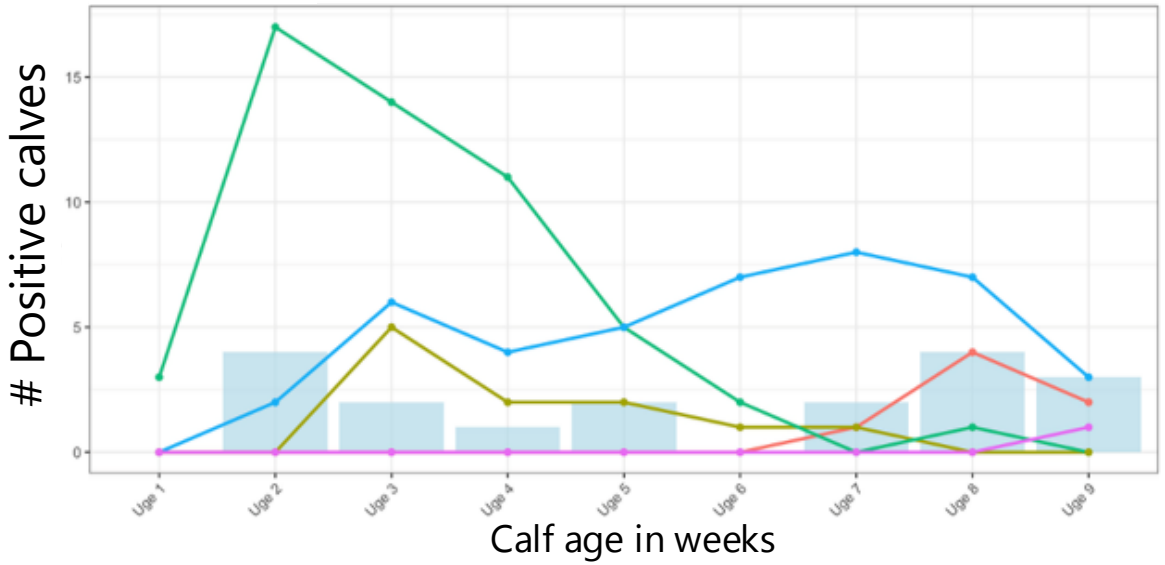




## Herd B



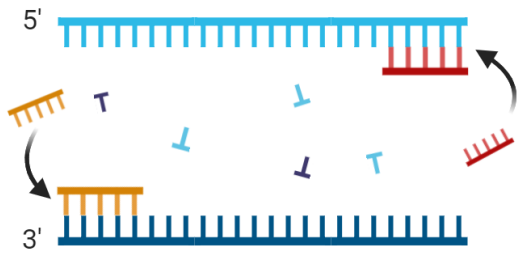

## Herd C



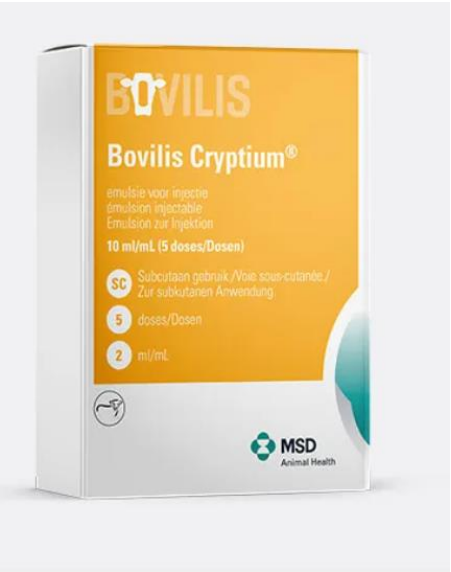
# Conclusions

- None of the three herd systems prevented infection;
  - >95% infected within 16 days of life
- Similar *Cryptosporidium* oocyst excretion patterns despite VERY different management
- Differences in second infection (%), diarrhoea and other pathogens
  - Large farm w. early group stabling, no lime disinfection and no empty period seemed to be most affected

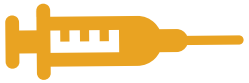
# Next steps



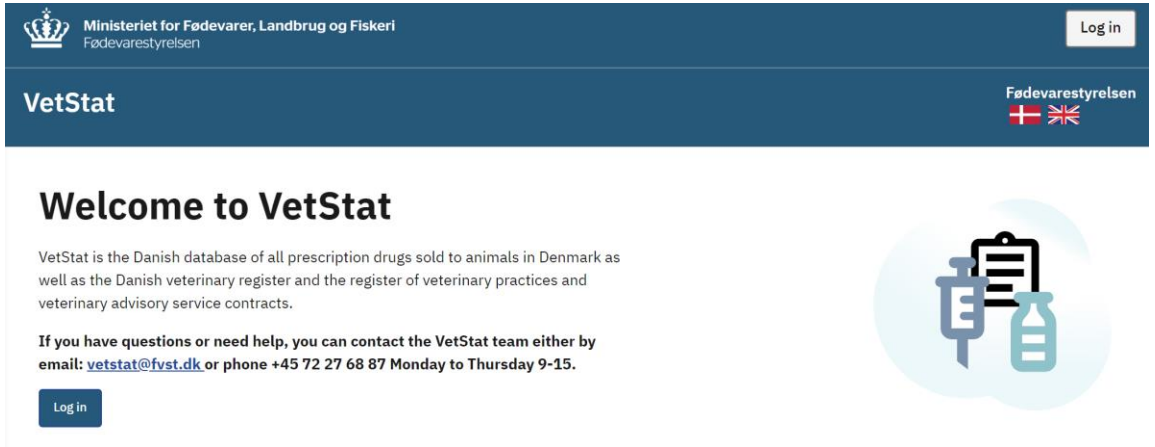

- Real-time PCR analyses
- Species & subtyping
  - epidemiology and zoonotic potential




- Vaccine study in the fall of 2026



- Analysis of national drug use – VETSTAT



# THANK YOU!
# QUESTIONS?

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