Research outputs:

Toxoplasma gondii seroprevalence in extensively farmed wild boars (Sus scrofa) in Denmark
Toxoplasma gondii is a zoonotic parasite of worldwide importance. In this study, we estimated T. gondii seroprevalence in extensively farmed wild boars in Denmark, where little is known about T. gondii in animal hosts. Our study focused on wild boars because they are considered good indicator species for the presence of T. gondii, and wild boar meat is used for human consumption. Serum samples from 101 wild boars collected in 2016-2018 from five different locations from the continental part of Denmark, Jutland, were screened for anti-T. gondii antibodies. The samples were analysed using a commercial indirect enzyme-linked immunosorbent assay (ELISA). Samples from 28 (27.7%) of the 101 wild boars tested positive with the ELISA. The odds for a wild boar to test seropositive were higher if it was sampled during the hunting season 2017-2018 than during 2016-2017 and if it was reported to be at least 1 year old than if it was younger (logistic regression model with the two variables: odds ratios 17.5 and 3.9, respectively). A substantial proportion of the investigated extensively farmed wild boars had been exposed to T. gondii. Moreover, the parasite appeared widespread, at least in the continental part of Denmark, Jutland, as seropositive wild boars were found from all five sampled locations. Assuming seropositivity indicates hosting viable parasites, consumption of undercooked wild boar meat from Denmark is a potential source of T. gondii infections to other hosts, including humans.

General information
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Organisations: Bacteriology & Parasitology, National Veterinary Institute, University of Copenhagen, University of Latvia, Statens Serum Institut, University of Helsinki, Estonian University of Life Sciences
Contributors: Laforet, C. K., Deksne, G., Petersen, H. H., Jokelainen, P., Johansen, M. V., Lassen, B.
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Web of Science (2017): Impact factor 1.497
Web of Science (2017): Indexed yes
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Scopus rating (2016): CiteScore 1.01 SJR 0.641 SNIP 0.826
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Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 0.98 SJR 0.644 SNIP 1.641
Web of Science (2015): Impact factor 1.23
BFI (2014): BFI-level 1
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BFI (2012): BFI-level 1
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Web of Science (2012): Impact factor 1.345
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BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 1.42 SJR 0.664 SNIP 0.997
Web of Science (2011): Impact factor 1.367
ISI indexed (2011): ISI indexed no
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.551 SNIP 1.005
Web of Science (2010): Impact factor 1.196
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.409 SNIP 0.716
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.338 SNIP 0.588
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Scopus rating (2006): SJR 0.272 SNIP 0.342
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.208 SNIP 0.292
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.322 SNIP 0.543
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 0.277 SNIP 0.501
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 0.328 SNIP 0.454
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.49 SNIP 0.757
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 0.463 SNIP 0.912
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 0.393 SNIP 0.903

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Electronic versions:
Echinococcus multilocularis in Denmark 2012–2015: high local prevalence in red foxes

In Western Europe, the Echinococcus multilocularis lifecycle is predominantly sylvatic, typically involving red foxes (Vulpes vulpes) as the main definitive hosts with Microtus spp. and Arvicola spp. as intermediate hosts. During a 4-year surveillance study (2012–2015), Danish red foxes and raccoon dogs (n = 1345) were examined for E. multilocularis. Moreover, 134 insectivores and rodents collected in South Jutland during spring and summer 2016 were examined for the presence of metacestodes. The sedimentation and counting technique and molecular typing were used to identify E. multilocularis infections in the carnivores, while the rodent livers were examined macro- and microscopically for parasite lesions. Following morphological identification of E. multilocularis adult worms, the identity was verified by sequence analysis of the 12S rRNA gene in most cases (n = 13). Echinococcus multilocularis infection was demonstrated in 19 red foxes (Vulpes vulpes) originating from only two specific areas of South Jutland, namely Højer and Grindsted, and in two raccoon dogs (Nyctereutes procyonoides), originating from Højer. In Højer, 28.5% (CI 95% 11.7–45.3) of the examined red foxes were E. multilocularis positive per year. Moreover, positive red foxes were identified each year from 2012 to 2015, while E. multilocularis positive red foxes were only identified in Grindsted in 2013 (4.0%) and 2014 (6.4%). In contrast, all collected rodents were negative for E. multilocularis. We conclude that E. multilocularis is locally endemic in South Jutland with a high local prevalence in Højer.
A new report of the carnivore-transmitted Taenia ovis cysts infesting the heart muscles of sheep in Denmark

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BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 2.3 SJR 1.002 SNIP 1.055
Web of Science (2011): Impact factor 2.149
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.87 SNIP 0.917
Web of Science (2010): Impact factor 1.812
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.754 SNIP 0.925
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.701 SNIP 0.881
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Scopus rating (2004): SJR 0.596 SNIP 0.724
Scopus rating (2003): SJR 0.498 SNIP 0.776
Scopus rating (2002): SJR 0.688 SNIP 0.676
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Original language: English
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Source: Scopus
Source-ID: 85047900686
Research output: Research - peer-review › Journal article – Annual report year: 2018

A new report of the carnivore-transmitted Taenia ovis cysts infesting the heart muscles of sheep in Denmark
Effect of the nematophagous fungus Pochonia chlamydosporia on soil content of ascarid eggs and infection levels in exposed hens

The nematophagous fungus Pochonia chlamydosporia can degrade ascarid (e.g. Ascaridia galli) eggs in agar and soil in vitro. However, it has not been investigated how this translates to reduced infection levels in naturally exposed chickens. We thus tested the infectivity of soil artificially contaminated with A. galli (and a few Heterakis gallinarum) eggs and treated with P. chlamydosporia. Sterilised and non-sterilised soils were used to examine any influence of natural soil biota. Unembryonated eggs were mixed with sterilised (S)/non-sterilised (N) soil, either treated with the fungus (F) or left as untreated controls (C) and incubated (22 °C, 35 days) to allow eggs to embryonate and fungus to grow. Egg number in soil was estimated on days 0 and 35 post-incubation. Hens were exposed to the soil (SC/SF/NC/NF) four times over 12 days by mixing soil into the feed. On day 42 post-first-exposure (p.f.e.), the hens were euthanized and parasites were recovered. Serum A. galli IgY level and ascarid eggs per gram of faeces (EPG) were examined on days -1 and 36 (IgY) or 40 p.f.e. (EPG). Egg recovery in SF soil was substantially lower than in SC soil, but recovery was not significantly different between NF and NC soils. SF hens had a mean worm count of 76 whereas the other groups had means of 355-453. Early mature/mature A. galli were recovered from SF hens whereas hens in the other groups harboured mainly immature A. galli. Heterakis gallinarum counts were low overall, especially in SF. The SF post-exposure IgY response was significantly lower while EPG was significantly higher compared to the other groups. Pochonia chlamydosporia was very effective in reducing ascarid egg numbers in sterilised soil and thus worm burdens in the exposed hens. However, reduced exposure of hens shifted A. galli populations toward a higher proportion of mature worms and resulted in a higher faecal egg excretion within the study period. This highlights a fundamental problem in ascarid control: if not all eggs in the farm environment are inactivated, the resulting low level infections may result in higher contamination levels with associated negative long-term consequences.

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Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
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Scopus rating (2016): CiteScore 3.23 SJR 1.534 SNIP 1.313
Web of Science (2016): Impact factor 3.035
Web of Science (2016): Indexed yes
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Scopus rating (2015): CiteScore 3.61 SJR 1.72 SNIP 1.396
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 3.31 SJR 1.568 SNIP 1.595
Web of Science (2014): Impact factor 3.43
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 3.52 SJR 1.56 SNIP 1.474
Web of Science (2013): Impact factor 3.251
We report Taenia ovis infection in Danish sheep for the first time. In spring 2016, the metocestode stage of T. ovis was at slaughter observed in heart muscles, diaphragm and skeletal muscles from approx. a third of all sheep from one specific farm localised in South Jutland. The diagnosis was confirmed by molecular typing of the mitochondrial cytochrome c oxidase I (cox1) gene. Three newly imported dogs were suspected but the definitive host was unidentifiable. The finding is not regulated in the meat control procedures. However, infected meat is usually condemned due to aesthetic reasons causing economic losses. Thus, finding of T. ovis is of concern to sheep meat producers in the area, as the infection could have spread further on to other farms.

First report of Taenia ovis infection in Danish sheep (Ovis aries)

We report Taenia ovis infection in Danish sheep for the first time. In spring 2016, the metocestode stage of T. ovis was at slaughter observed in heart muscles, diaphragm and skeletal muscles from approx. a third of all sheep from one specific farm localised in South Jutland. The diagnosis was confirmed by molecular typing of the mitochondrial cytochrome c oxidase I (cox1) gene. Three newly imported dogs were suspected but the definitive host was unidentifiable. The finding is not regulated in the meat control procedures. However, infected meat is usually condemned due to aesthetic reasons causing economic losses. Thus, finding of T. ovis is of concern to sheep meat producers in the area, as the infection could have spread further on to other farms.

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State: Published
Organisations: National Veterinary Institute, Bacteriology & Parasitology, Pathology, Diagnostic & Development, Al-Zaytoonah University of Jordan
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ISSN (Print): 0304-4017
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Web of Science (2019): Indexed yes
A survey was conducted on 30 Danish mink farms from April to October 2016 to determine the prevalence and species of Eimeria in Danish farmed mink. In total, 2.6% of mink faecal samples (108/4140) were positive for Eimeria vison-like oocysts by microscopy, with 24.8% (78/315) of mink being positive at least once during the study period. Morphological analysis of sporulated oocysts (n = 20) identified Eimeria vison-like oocysts measuring 21.0 × 13.8 μm with a length/width (L/W) ratio of 1.5. Phylogenetic analysis of 18S rRNA sequences (1221 bp) from three positive mink indicated that Eimeria vison-like shared the highest genetic similarity to Eimeria sp. ex Apodemus agrarius from a Striped field mouse (A. agrarius) from the Czech Republic (99.6%). Analysis of a shorter region of 18S (531 bp) revealed that the E. vison-like genotype sequences grouped in the same clade and shared 97.7% similarity with E. furonis. At the cytochrome c oxidase subunit I (COI) locus, mink-derived sequences were not available from GenBank and phylogenetic analysis placed the novel E. vison-like in a clade with E. cf. ictidea (99.4% similarity) from a black footed ferret (Mustela nigripes) from Canada.
Patterns of Fasciola hepatica infection in Danish dairy cattle: Implications for on-farm control of the parasite based on different diagnostic methods

Background: Bovine fasciolosis is an economically important livestock disease in Europe, and represents a particular challenge for organic farms, where cattle are grazed extensively and the use of anthelmintic is limited. A two-year longitudinal study was conducted on two conventional and two organic Danish dairy farms to examine the current temporal trend of F. hepatica infection on-farm, and to gather data of practical relevance for parasite control. Data were collected both at the herd and individual level using currently available diagnostic methods: a commercial serum antibody ELISA, a commercial copro-antigen ELISA, faecal egg counts, and monthly bulk tank milk (BTM) ELISA. The temporal patterns (animal age, farm-level temporal trends and seasonality) in the animal-level test results were analysed by generalised additive mixed models (GAMM). Results: Patterns of infection differed substantially between the farms, due to different grazing management and anthelmintic use. However, animals were first infected at the age of 1.5-2 years (heifers), and most at-risk animals sero-converted in autumn, suggesting that summer infections in snails prevail in Denmark. Our results also suggest that the lifespan of the parasite could be over 2 years, as several cows showed signs of low grade infection even after several years of continuous indoor housing without access to freshly-cut grass. The serum antibody ELISA was able to detect infection first, whereas both copro-antigen ELISA and faecal egg counts tended to increase in the same animals at a later point. Decreasing BTM antibody levels were seen on the two farms that started anthelmintic treatment during the study. Conclusions: While important differences between farms and over time were seen due to
varying grazing management, anthelmintic treatment and climatic conditions, the young stock was consistently seen as the main high-risk group and at least one farm also had suspected transmission (re-infection) within the lactating herd. Careful interpretation of test results is necessary for older cows as they can show persistent infections several years after exposure has stopped. Rigorous treatment regimens can reduce BTM ELISA values, but further research is needed to develop a non-medicinal approach for sustainable management of bovine fasciolosis.

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BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 3.29 SJR 1.702 SNIP 1.295
Web of Science (2017): Impact factor 3.163
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 3.23 SJR 1.534 SNIP 1.313
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Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 3.61 SJR 1.72 SNIP 1.396
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BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 3.52 SJR 1.56 SNIP 1.474
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ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 3.43 SJR 1.224 SNIP 1.354
Web of Science (2012): Impact factor 3.246
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 3.06 SJR 1.071 SNIP 1.302
Web of Science (2011): Impact factor 2.937
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.98 SNIP 1.015
Prevalence of Capillaria plica in Danish wild carnivores

Capillaria plica is a parasitic nematode belonging to the family Capillariidae. The adult parasites reside in the urinary tract of wild and domestic canines. The infection is most often asymptomatic, but can cause a wide range of symptoms including urinary bladder inflammation, pollacisuria, dysuria and hematuria. Canines acquire the infection by ingesting the intermediate host, the earthworm (Lumbricidae). Epidemiological studies on C. plica infection in wildlife are few and only one previous Danish study examined the prevalence in red foxes, while studies on prevalence in other animals are limited.

We examined the urine sediment or urinary bladder from 375 Raccoon dogs (Nyctereutes procyonoides), 247 red foxes (Vulpes vulpes), 20 beech martens (Martes foina), 16 wild mink (Neovison vison), 14 otters (Lutra lutra), nine European polecats (Mustela putorius), three European badgers (Meles meles) and one golden jackal (Canis aureus) received as a part of Danish wildlife surveillance. Capillaria plica was detected in 73.7% of red foxes, 20.0% of beech martens, 0.5% of raccoon dogs, and in the Golden Jackal. Red foxes originating from all 5 regions of Denmark were infected, although with a significantly higher prevalence in the three regions in Jutland compared to Region Zealand.
Prevalence of Onchocerca in Danish wild deer

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Organisations: National Veterinary Institute, Bacteriology & Parasitology, Epidemiology, Diagnostic & Development
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Reservoirværters mulige rolle for persistens af rådegyser

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Contributors: Petersen, H. H., Chriél, M.
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Serological evidence of exposure to Toxoplasma gondii in extensively farmed wild boars (Sus scrofa) in Denmark

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Organisations: National Veterinary Institute, Bacteriology & Parasitology, University of Copenhagen, University of Latvia, Statens Serum Institut
Contributors: Laforet, C. K., Deksne, G., Petersen, H. H., Jokelainen, P., Johansen, M. V., Lassen, B.
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Toxoplasma gondii antibodies in extensively farmed wild boars (Sus scrofa) in Denmark

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Organisations: National Veterinary Institute, Bacteriology & Parasitology, Statens Serum Institut, University of Copenhagen, University of Latvia
Contributors: Petersen, H. H., Jokelainen, P., Laforet, C. K., Deksne, G., Johansen, M. V., Lassen, B.
Coccidia infections in Danish farmed mink

Although Danish farmed mink are frequently infected with Coccidia, knowledge of factors affecting the infection is scarce. Thus, we studied age, geographical and season-related factors affecting coccidia prevalence. Unsporulated oocysts excretion was quantified microscopically (n=4142) every 7-14th day (April-October 2016) from bitches and cups on 30 farms (n=335 mink) from South- or North Jutland, or Zealand. Minimum once, 60.9% (n=204) mink excreted *Eimeria*, 56.7% (n=190) *Isospora* and 20.9% (n=70) excreted both coccidia. Positive mink were identified on all farms. *Eimeria* prevalence was higher on the Zealand farms (25.4±2.2%, P<0.0001) compared to South- and North Jutland farms (5.4±2.9%; 7.5±4.1%). *Isospora* prevalence was similar regardless of farm locality (12.2±2.9%, 11.8±3.5%, 9.2±7.1%). More cups (19.5%) than bitches (4.6%) were *Isospora* positive, while *Eimeria* prevalence was similar for cups (15.7%) and bitches (10.5%). For cups, *Eimeria* prevalence peaked when cups were 7-11 weeks old and again when 18-24 weeks old. *Isospora* prevalence peaked in cups 13-15 weeks old. Three *Eimeria* types were characterized by size and wall thickness (unverified by PCR): A, B and C. Types B and C (40.9%, 39.8%) were more prevalent than A (19.3%). Bitches were primarily infected with type B (50.4%), while type C (48.0%) predominated in cups. Type B infections dominated in mink from Zealand (56.5±13.7%), while mink from Jutland were primarily infected with type C (55.6±28.6%; 81.9±19.4%). Farmed mink showed high coccidia prevalence with seasonal- and age-related *Isospora* prevalence, and seasonal- and geographical-related *Eimeria* prevalence.

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Contributors: Petersen, H. H., Chriél, M., Hansen, M. S.
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Event: Abstract from 26th International Conference of World Association for the Advancement of Veterinary Parasitology (WAAVP), Kuala Lumpur, Malaysia.
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Research output: Research - peer-review › Conference abstract for conference – Annual report year: 2017

Coccidia infections in Danish farmed mink

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Coccidie-infektion hos danske farmmink – et oversætt problem?

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Organisations: National Veterinary Institute, Bacteriology & Parasitology, Pathology, Diagnostic & Development, Bayer A/S
Contributors: Petersen, H. H., Hansen, M. S., Chriél, M., Holm, T.
Dødelig Haemonchus infektion hos giraffer: Nyt fra Veterinærinstituttet

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Contributors: Petersen, H. H., Larsen, G., Knold, S.
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BFI (2015): BFI-level 1
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BFI (2013): BFI-level 1
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ISI indexed (2012): ISI indexed no
BFI (2011): BFI-level 1
ISI indexed (2011): ISI indexed no
BFI (2010): BFI-level 1
BFI (2009): BFI-level 1
BFI (2008): BFI-level 1
Original language: Danish
Electronic versions:
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Source: PublicationPreSubmission
Source-ID: 139841419
Research output: Communication › Journal article – Annual report year: 2017
Farm specific transmission patterns of *Fasciola hepatica* in Danish dairy cattle based on different diagnostic methods and monitoring of grazing management

A recent survey based on meat inspection data showed that approximately 30% of Danish cattle farms were infected with liver flukes, leading to significant economic losses. Despite the widespread problem, up-to-date knowledge on transmission patterns, diagnostic methods and practical measures for control is still lacking. We therefore initiated a longitudinal, observational study in a few infected dairy farms to elucidate farm specific transmission patterns based on different diagnostic methods and grazing management. Two organic and two conventional dairy farms with high *F. hepatica* antibody levels in bulk tank milk were selected. From each farm a cohort of 40 animals from different age groups (calves, heifers, primiparous and multiparous cows) were sampled 7 times between April 2015 and January 2017. Diagnostic methods included faecal egg count by sedimentation, serum ELISA and coproantigen ELISA. Additionally, monthly bulk tank milk samples were analyzed by ELISA. The analyses are ongoing, but preliminary results indicate that *F. hepatica* is mainly transmitted via summer infection of snails as most animals seroconvert in late autumn without shedding of eggs. However, infection early in the grazing season due to overwintered snails has also been observed. One farm where cows are stabled have had some older cows continuing to shed *F. hepatica* eggs, suggesting long life span of *F. hepatica*, although other routes of infection cannot be ruled out. The final results will provide novel and practical information about different diagnostic tests and transmission patterns related to grazing management on farm-level.

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Contributors: Takeuchi-Storm, N., Denwood, M., Petersen, H. H., Larsen Enemark, H., Thamsborg, S. M.
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Fransk hjerteorm - en lumsk parasit

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Morfologisk og molekylær karakterisering af en eimeriaart fra danske mink


General information
Spirocerca-parasitten: En tropisk/subtropisk hundeparasit, som medfører kræftlignende svulster, er nu påvist i tre danske ræve fra Thy-området

Survival and infectivity of chicken ascarid eggs in soil after exposure to an egg-degrading microfungus

The microfungus Pochonia chlamydosporia has been shown to kill high numbers of chicken ascarid (Ascaridia galli and Heterakis spp.) eggs in vitro but it is not known if surviving eggs may be infective. Unembryonated ascarid eggs (predominantly A. galli) were therefore isolated from faeces and added to sterilised (S) or non-sterilised (N) soil in Petri dishes that were either treated with P. chlamydosporia (F) or left untreated (C) during incubation at 22°C for 35 days. Egg recovery was estimated before (day 0) and after (day 35) treatment. Thereafter, each of four groups of parasite-free egg-laying hens was exposed to the soil from one of the four treatments in the feed over 12 days. The hens were necropsied day 42 post first exposure. The number of surviving eggs was most substantially reduced in SF soil and SF hens had statistically lower worm burdens (both parasites) compared to SC, NC and NF hens. However, adult A. galli were primarily found in SF hens while the other groups mainly harboured immature A. galli. Accordingly, SF hens also had the highest ascarid faecal egg counts and lowest serum A. galli IgY titre. Overall, A. galli recovery increased with increasing exposure, but contrastingly resulted in a reduced risk of egg-producing adult worms, at least short-term. Eggs not destroyed by P. chlamydosporia were clearly infective to the hens. The fungus did not appear to be sufficiently effective as a biocontrol agent of ascarid eggs in natural (i.e. non-sterilised) soil unless its effect can be further optimised.

The impact of a diet with fructan-rich chicory roots on Oesophagostomum dentatum worm population dynamics and host immune responses in pigs

Oesophagostomum infections in pigs persist for months. We hypothesized that feeding fructans (dried chicory roots) may improve immunity and facilitate worm expulsion. We therefore examined the effects of long-term chicory on O. dentatum population dynamics and host immune responses. Methods: Seventy-two pigs were allocated to four groups in a 2-factorial design. Group O was fed regular feed and trickle inoculated with 15 O. dentatum L3/kg/day 0-12 weeks post-infection (pi.) start. Group OC was also trickle inoculated but switched to a chicory-rich diet (12% inulin in DM) weeks 3-12 pi. Group C was uninfected but switched to chicory diet while Group Ctr remained uninfected on regular feed. Six pigs per group were necropsied 5, 9 and 12 weeks pi. for worm counts and qRT-PCR for gene expression in the gut. Faecal egg counts (FEC) and specific antibody levels were assessed regularly. Results: When group OC switched to chicory diet, FECs dropped within 3-4 days and remained very low. Worm counts were reduced 50-65% by chicory feeding (Group OC versus O; p<0.001) and was accompanied by a 2-fold higher O. dentatum-specific IgG1 response. In group O, a build-up of a typical Th2-type immune response was seen but leveled out later and worm counts remained stable. Group C had a down-regulated Th1-type response and thus an anti-inflammatory effect in colon. Conclusions: We found little evidence that chicory feeding improved host protective immunity against Oesophagostomum. It seems more likely, as previously suggested, that physico-chemical changes in caeco-colon are responsible for the observed anthelmintic effects.
Viability Assessment of Cryptosporidium parvum Oocysts by Vital Dyes: Dry Mounts Overestimate the Number of "Ghost" Oocysts

Viability assessment of Cryptosporidium parvum oocysts is crucial for evaluation of the public health significance of this important zoonotic protozoon. Viability is commonly assessed in wet mounts after acid pretreatment and staining with fluorogenic vital dyes. However, in some studies, oocyst viability is evaluated in dry mounts after staining in suspension. Here, we evaluate the effect of acid pretreatment in nine replicate samples and compare the assessment of oocyst viability after evaluation in wet and dry mounts, respectively. Although acid pretreatment had no significant effect on the viability scores, data obtained by scoring oocysts in dry mounts resulted in an 25% underestimation of the proportion of viable oocyst (82.5% → 0.9% [wet mount + acid], 57.7% → 2.3% [dry mount - Oacid], 76.0% → 1.7% [wet mount - Oacid]), while the proportions of nonviable oocysts (DAPI+/PI+) were comparable for wet and dry mounts (9.7% → 0.4% [wet mount + acid], 12.1 → 1.5% [dry mount, - acid], 15.5 → 1.1% [wet mount, - acid]).

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Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.46 SJR 1.062 SNIP 1.08
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BFI (2015): BFI-level 1
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Web of Science (2015): Impact factor 2.27
BFI (2014): BFI-level 1
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Web of Science (2014): Impact factor 1.905
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BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 2.41 SJR 1.184 SNIP 1.129
Web of Science (2013): Impact factor 2.092
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
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Scopus rating (2012): CiteScore 2.55 SJR 1.185 SNIP 1.144
Web of Science (2012): Impact factor 2.283
Removal of Cryptosporidium parvum oocysts in low quality water using Moringa oleifera seed extract as coagulant

The use of different types of low quality water for irrigation in agriculture is common practice in many countries due to limited freshwater resources. Pathogens may contaminate fruit and vegetables when feces contaminated water is used for irrigation or postharvest processing. A laboratory study was carried out to investigate the effect of a coagulant produced from seeds of the Moringa oleifera tree (MO) in reducing Cryptosporidium parvum oocysts and turbidity in wastewater and stream water. Glass jars (n = 60) containing 500 mL wastewater obtained from the inlet to the primary settling tanks from a Danish sewage treatment plant were spiked with 6.1 x 10^5 ± 6.2 × 10^4 oocysts L^-1, while glass jars (n = 18) containing 500 mL stream water were spiked with approx. 100, 1000 or 10,000 oocysts. To half of the wastewater and stream water 4 mL L^-1 of a 5% w/v MO seed extract was added, while the remaining water was left untreated. The water was stirred slowly for 20 min and subsequently left to sediment for 15, 30, 45, 60 or 90 min (wastewater) or 60 min (stream water), with three (stream water) or six (wastewater) replicate glass jars representing each time point. In wastewater, MO seed extracts reduced the C. parvum oocyst load significantly (p = 0.03) by 38% in the interval 15 to 90 min compared to a 0.02% reduction in the untreated wastewater. Furthermore, the number of oocysts L^-1 was significantly (p > 0.0001-p = 0.041) reduced in the treated wastewater at all five sampling times compared to untreated wastewater. Likewise, the oocyst loads in the supernatant of MO treated stream water were noticeably lower compared with untreated stream water at all three spikes. The turbidity was reduced to 10.9 ± 0.3 Nephelometric turbidity units (NTU) (i.e. 94.7% reduction) and 13.7 ± 1.6 NTU in untreated wastewater and stream water, respectively. M. oleifera seeds are readily available in many tropical countries where the tree is common, and our results clearly demonstrate that MO seed extract may be used by farmers for treatment of different types of surface water prior to irrigation use. Yet, adding MO seed extract to the low quality water did not successfully remove all oocyst. However, treatment of wastewater with MO seed extract significantly improved the water quality with regard to number of oocysts present and turbidity of the water. Further experiments with addition of higher concentrations of MO are needed to establish whether MO seed extract can be used to obtain safe irrigation water free of C. parvum oocysts and other protozoan parasites.

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Removal_of_Cryptosporidium_parvum_oocysts_in_low_quality_water_using_Moringa_oleifera_seed_extract_as_coagulant. pdf
Cryptosporidium and Giardia in Danish organic pig farms: seasonal and age-related variation in prevalence, infection intensity and species/genotypes

Although pigs are commonly infected with Cryptosporidium spp. and Giardia duodenalis, including potentially zoonotic species or genotypes, little is known about age-related infection levels, seasonal differences and genetic variation in naturally infected pigs raised in organic management systems. Therefore, the current study was conducted to assess seasonal and age-related variations in prevalence and infection intensity of Cryptosporidium and Giardia, evaluate zoonotic potential and uncover correlations between species/genotypes, infection intensity and faecal consistency.

Shedding of oocysts and cysts ((oo-) cysts) was monitored at quarterly intervals (September 2011 to June 2012) in piglets (n=152), starter pigs (n=234), fatteners (n=230) and sows (n=240) from three organic farms in Denmark. (Oo-) cysts were quantified by immunofluorescence microscopy; and 56/75 subsamples from Cryptosporidium infected pigs were successfully analysed by PCR amplification and partial sequencing of the small subunit (SSU) 18S rRNA and hsp70 genes, while 13/67 Giardia subsamples were successfully analysed by amplification and partial sequencing of the 18S rRNA and the gdh genes. Altogether, Cryptosporidium or Giardia infections were observed in 40.9% (350/856) and 14.0% (120/856) of the pigs, respectively, including 8.2% (70/856) of pigs infected with both parasites. Prevalence, intensity of infections and presence of Cryptosporidium species varied significantly between age-groups; 53.3% piglets, 72.2% starter pigs, 40.4% fatteners and 2.9% sows were infected with Cryptosporidium, whereas 2.0% piglets, 27.4% starter pigs, 17.8% fatteners and 5.0% sows were infected with Giardia. The overall prevalence was stable throughout the year, except for dual-infections that were more prevalent in September and December (p<0.05). The infection intensity was age-related for both parasites, and dual-infected pigs tended to excrete lower levels of oocysts compared to pigs harbouring only Cryptosporidium. Likewise, pigs infected with C. scrofarum excreted fewer oocysts (mean CPG: 54,848±194,508CI: 9085–118,781) compared to pigs infected with C. suis (mean OPG: 351,035±351,035CI: 67,953–634,117). No correlation between faecal consistency and (oo-) cyst excretion levels was observed. Of the successfully genotyped isolates, 38/56 (67.9%) were C. scrofarum and 18/56 (32.1%) were C. suis, while the livestock specific G. duodenalis Assemblage E was detected in 11/13 (84.6%) isolates and the potentially zoonotic Assemblage A was identified in 2/13 (15.4%) isolates.

Piglets exclusively hosted C. suis, with one exception, while starter pigs and fatteners predominantly hosted C. scrofarum. As organic pigs are partly reared outdoors, environmental contamination with Cryptosporidium and Giardia is inevitable. Nevertheless, the present data indicate that the potential public health risk associated with both of these parasites in Danish organic pig production seems to be negligible.

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Scopus rating (2016): CiteScore 2.49 SJR 1.228 SNIP 1.218
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Immune and inflammatory responses in pigs infected with Trichuris suis and Oesophagostomum dentatum

The aim of the present study was to investigate parasite induced immune responses in pigs co-infected with Trichuris suis and Oesophagostomum dentatum as compared to mono-species infected pigs. T. suis is known to elicit a strong immune response leading to rapid expulsion, and a strong antagonistic effect on O. dentatum populations has been observed in co-infected pigs. Forty-eight helminth naïve pigs were allocated into 4 groups in a 2-factorial design. Two groups were trickle inoculated with either 10 T. suis eggs/kg/day (Group T) or 20 O. dentatum L3/kg/day (Group O). Group OT was infected with same levels of both T. suis and O. dentatum (Group OT) and Group C remained uninfected. In each group, six pigs were necropsied after 35 days and the remaining pigs after 71 days. Parasite E/S-antigen specific serum antibodies were quantified by an in-direct ELISA. qPCR was used to measure the expression of immune function related genes in the mucosa of proximal colon and the draining lymph node. Highly significant interactions were identified for O. dentatum specific IgG1 (p < 0.0001) and IgG2 (p < 0.0006) antibodies with a remarkable 2-fold higher antibody response in group OT pigs as compared to group O. These findings indicated that T. suis enhanced the antibody response against O. dentatum in Group OT. The gene expression data confirmed a strong Type 2 response to T. suis (e.g. marked increase in IL-13, ARG1 and CCL11) and clearly weaker in amplitude and/or delayed onset response to O. dentatum in the single infected group. Interactions were found between the two nematodes with regard to several cytokines, e.g. the increase in IL-13 observed in Group T was absent in Group OT (p = 0.06, proximal colon mucosa, 35 and 71 p.i.). Some of these immune response-related interactions may support, or even partially explain, the observed interactions between the two worm populations in co-infected pigs.

General information

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Scopus rating (2017): CiteScore 2.55 SJR 1.275 SNIP 1.215
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Scopus rating (2016): CiteScore 2.49 SJR 1.228 SNIP 1.218
Web of Science (2016): Impact factor 2.356
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Scopus rating (2015): CiteScore 2.46 SJR 1.21 SNIP 1.309
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Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 2.63 SJR 1.262 SNIP 1.437
Serum antibody responses in pigs trickle-infected with Ascaris and Trichuris: Heritabilities and associations with parasitological findings

A humoral immune response following helminth infection in pigs is well documented. However, it has been difficult to confirm the existence of antibody mediated resistance against the large roundworm, Ascaris suum, and whipworm, Trichuris suis, in experimental settings by correlating worm burdens or egg excretion with specific antibody levels. We set out to investigate the association between worm load and T. suis and A. suum specific serum antibody levels (IgG1, IgG2 and IgA) against excretory-secretory products of adults and third stage larvae, respectively, measured at 0, 7 and 14 weeks p.i. in a trickle-infected F-1-resource-population of crossbred pigs (n = 195). Furthermore, we wanted to determine the heritability of these antibody isotypes during the course of infection. Most pigs remained infected with A. suum throughout the experiment while they expelled T. suis between 7 and 14 weeks post infection (p.i.). Parasite specific IgG1 and IgA were significantly (P <0.001) elevated after 7 and 14 weeks of infection, whereas parasite specific IgG2 levels only changed slightly at 14 weeks p.i.. However, the observed association between specific antibody isotype levels and faecal egg counts and macroscopic worm load was weak. The relative heritabilities of the different parasite specific isotypes were assessed and resulted in significant heritability estimates for parasite specific IgG1 and IgA. The highest heritabilities were found for A. suum specific IgG1 (h(2) = 0.41 and 0.46 at 7 and 14 weeks p.i., respectively). Thus, the present study demonstrates that host genetic factors influence the IgG1 and IgA antibody isotype responses specific to two of the most common gastrointestinal nematodes of swine whereas specific antibody levels were poorly associated with egg excretion and the presence of macroscopic worms. (C) 2015 Published by Elsevier B.V.
Parasite population dynamics in pigs infected with Trichuris suis and Oesophagostomum dentatum
The aim of the present study was to investigate the population dynamics and potential interactions between Trichuris suis and Oesophagostomum dentatum in experimentally co-infected pigs, by quantification of parasite parameters such as egg excretion, worm recovery and worm location. Forty-eight helminth nave pigs were allocated into four groups. Group O was inoculated with 20 O. dentatum L-3/kg/day and Group T with 10 T. suis eggs/kg/day. Group OT was inoculated with both 20 O. dentatum L-3/kg/day and 10 T. suis eggs/kg/day, while Group C was kept as an uninfected control group. All inoculations were trickle infections administered twice weekly and were continued until slaughter. Faecal samples were collected from the rectum of all pigs at day 0, and twice weekly from 2 to 9 weeks post first infection (wpi). Six pigs from
each group were necropsied 5 wpi and the remaining 6 pigs from each group were necropsied 10 wpi. The faecal egg counts (FEC) and total worm burdens of O. dentatum were dramatically influenced by the presence of T. suis, with significantly lower mean FECs and worm burdens at 5 and 10 wpi compared to single infected pigs. Furthermore, in the presence of T. suis we found that O. dentatum was located more posteriorly in the gut. The changes in the Trichuris population were less prominent, but faecal egg counts, worm counts 5 wpi (57% recovered vs. 39%) and the proportion of infected animals at 10 wpi were higher in Group OT compared to Group T. The location of T. suis was unaffected by the presence of O. dentatum. These results indicate an antagonistic interaction between T. suis and O. dentatum which is dominated by T. suis. (C) 2013 Elsevier B.V. All rights reserved.

**General information**

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- Scopus rating (2013): CiteScore 2.63 SJR 1.262 SNIP 1.437
- Web of Science (2013): Impact factor 2.545
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- Web of Science (2013): Indexed yes
- BFI (2012): BFI-level 1
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- ISI indexed (2012): ISI indexed yes
- Web of Science (2012): Indexed yes
- BFI (2011): BFI-level 1
- Scopus rating (2011): CiteScore 2.61 SJR 1.233 SNIP 1.429
- Web of Science (2011): Impact factor 2.579
- ISI indexed (2011): ISI indexed yes
Transport of Cryptosporidium parvum oocysts in soil columns following applications of raw and separated liquid slurry

The potential for transport of viable Cryptosporidium parvum oocysts through soil to land drains and groundwater was studied using simulated rainfall and intact soil columns which were applied raw slurry or separated liquid slurry. Following irrigation and weekly samplings over a four week period, C. parvum oocysts were detected from all soil columns regardless of slurry type and application method although recovery rates were low (<1%). Soil columns with injected liquid slurry leached 73% and 90% more oocysts compared with columns with injected and surface applied raw slurry, respectively. Among leachate samples containing oocysts, 44/72 samples yielded viable oocysts as determined by a dye permeability assay (DAPI/PI) with the majority (41%) of viable oocysts found in leachate from soil columns with added liquid slurry. The number of viable oocysts was positively correlated ($r=0.63$) with the total number of oocysts found. Destructively sampling of the soil columns showed that type of slurry and irrigation played a role in the vertical distribution of oocysts, with more oocysts recovered from soil columns added liquid slurry irrespectively of irrigation status. Further studies are needed to determine the effectiveness of different slurry separation technologies to remove oocysts and other pathogens, as well as whether application of separated liquid slurry to agricultural land may represent higher risks for ground water contamination as compared to application of raw slurry.
Population dynamics of Ascaris suum in trickle-infected pigs

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Scopus rating (2016): CiteScore 1.23 SJR 0.64 SNIP 0.75
Web of Science (2016): Impact factor 1.326
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 1.31 SJR 0.707 SNIP 0.792
Web of Science (2015): Impact factor 1.394
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 1.3 SJR 0.654 SNIP 0.889
Web of Science (2014): Impact factor 1.227
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 1.43 SJR 0.725 SNIP 0.915
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Population dynamics of Trichuris suis in trickle-infected pigs

The population dynamics of Trichuris suis in pigs as studied during long-term experimental infections. Twenty-three 10-week-old pigs were inoculated with 5 T. suis eggs/kg/day. Seven, 8, and 8 pigs were necropsied at weeks 4, 8, and 14 post-start of infection (p.i.), respectively. The median numbers of worms in the colon were 538 (thin-mats: 277-618), 332 (14-1140) and 0 (0-4) at 4, 8, and 14 weeks p.i. respectively, suggesting an increased aggregation of the worms with time and acquisition of nearly sterile immunity. The serum levels of T. suis specific antibodies (IgG1, IgG2 and IgA) peaked at week 8 p.i. By week 14 p.i. the IgG2 and IgA antibody levels remained significantly elevated above the level of week 0.

The population dynamics of T. suis trickle infections in pigs is discussed with focus on interpretation of diagnostic and epidemiological data of pigs, the use of pigs as a model for human Trichuris trichiura infections and the novel approach of tilling T. suis eggs in the treatment of patients with inflammatory bowel disease.

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The effect of HIV on filarial-specific antibody response before and after treatment with diethylcarbamazine in Wuchereria bancrofti infected individuals

The effect of HIV on filarial-specific antibody response before and after treatment with diethylcarbamazine (DEC) was analysed by comparing two groups of Wuchereria bancrofti-infected adult individuals (Positive for circulating filarial antigen) who were positive (n = 15) or negative (n = 21) for HIV co-infection. Prior to DEC treatment there was no significant difference in filarial-specific IgG1, IgG2, IgG4 and IgE antibody response between the HIV negative and the HIV positive group, while a five times (statistically significant) higher filarial-specific IgG3 response was observed in the HIV positive than in the HIV negative group. At 12 weeks after treatment with DEC, a significant decrease in filarial-specific IgG4 was observed in the HIV positive but not in the HIV negative group, indicating that DEC treatment had a stronger antifilarial effect in individuals co-infected with HIV. DEC treatment had no significant effect on the other classes of filarial specific antibodies, neither in the HIV negative or the HIV positive group. (C) 2009 Elsevier Ireland Ltd. All rights reserved.
Coccidiose i danske lam - to case studier

General information
State: Published
Organisations: National Veterinary Institute
Contributors: Hempel Olsen, C., Petersen, H. H., Milan Thomsborg, S., Maddox-Hyttel, C.
Pages: 26-30
Reservoirværters mulige rolle for persistens af rådyr syge

Petersen, H. H., Project Coordinator, National Veterinary Institute, Bacteriology & Parasitology
01/10/2017 → 01/07/2018
Project: Research

Sundhed i vækstperioden - årsager til sygdom, diagnostik og forbrug af medicin - delprojekt om coccidiose hos mink
Systematisk undersøgelse af forekomsten af coccidiose hos danske farm mink på 30 besætninger.
Petersen, H. H., Project Participant, National Veterinary Institute, Bacteriology & Parasitology
01/03/2016 → 31/12/2016
Project: Research
**Danish-Colombian Strategic Sector Cooperation on Veterinary and Food Safety within the Colombian pig meat sector**

Petersen, H. H., Project Participant, National Veterinary Institute
Lauritsen, K. T., Project Participant, Section for Public sector service and commercial diagnostics, National Veterinary Institute
Andresen, L. O., Project Participant, Section for Public sector service and commercial diagnostics, National Veterinary Institute
Calvo Artavia, F. F., Project Participant, Section for Public sector service and commercial diagnostics, National Veterinary Institute, Section for Epidemiology

01/06/2016 → 01/02/2018

Collaborators: National Institute of Surveillance of Medications and Food, Colombian Agricultural Institute, Fødevarestyrelsens laboratorium, The Colombian Pig Producers Organization, The Danish Embassy to Colombia, Danish Veterinary and Food Administration

Project: Research

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**Occurrence and fate of Cryptosporidium in Danish, organic pigs and animal waste**

Ph.D. projekt

Petersen, H. H., PhD Student, National Veterinary Institute

01/03/2010 → 01/09/2015

Documents:

Occurrence and fate of Cryptosporidium in Danish, organic pigs and animal waste. Ph.D. afhandling

Project: Research

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**Activities:**

**Thirteenth Workshop of National Reference Laboratories for Parasites**

Period: 24 May 2018 → 25 May 2018

Heidi Huus Petersen (Participant)

National Veterinary Institute

Bacteriology & Parasitology

Degree of recognition: International

**Related event**

**Thirteenth Workshop of National Reference Laboratories for Parasites**

24/05/2018 → 25/05/2018

Rome, Italy

Activity: Attending an event › Participating in or organising a conference

**Joint Spring Symposium 2018: Danish Society for Parasitology and Danish Society**

Period: 6 Apr 2018

Heidi Huus Petersen (Participant)

National Veterinary Institute

Bacteriology & Parasitology

Section for Public sector service and commercial diagnostics

Degree of recognition: National

**Related event**

**Joint Spring Symposium 2018: Danish Society for Parasitology and Danish Society**

06/04/2018 → 06/04/2018

Frederiksberg, Denmark

Activity: Attending an event › Participating in or organising a conference

**World Association for the Advancement of Veterinary Parasitology (External organisation)**

Period: 6 Oct 2017

Heidi Huus Petersen (Member)

National Veterinary Institute
Gæsteforelæser på kurset Parasitic zoonoses
Period: 3 Oct 2017
Heidi Huus Petersen (Guest lecturer)
National Veterinary Institute
Bacteriology & Parasitology

26th International Conference of World Association for the Advancement of Veterinary Parasitology (WAAVP)
Period: 4 Sep 2017 → 8 Sep 2017
Heidi Huus Petersen (Organizer)
National Veterinary Institute
Bacteriology & Parasitology
Degree of recognition: International

Related event
26th International Conference of World Association for the Advancement of Veterinary Parasitology (WAAVP): Combating Zoonoses: Strength in East-West Partnership
04/09/2017 → 08/09/2017
Kuala Lumpur, Malaysia
Activity: Attending an event › Participating in or organising a conference

EUROLAB
Period: 29 May 2017
Heidi Huus Petersen (Organizer)
National Veterinary Institute
Bacteriology & Parasitology
Degree of recognition: Local

Related event
EUROLAB: Netværksmøde
29/05/2017 → 29/05/2017
Kgs. Lyngby, Denmark
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

Animal Parasitology
Period: 22 May 2017
Heidi Huus Petersen (Guest lecturer)
National Veterinary Institute

University of Copenhagen
Twelfth Workshop of National Reference Laboratories for Parasites
Period: 18 May 2017 → 19 May 2017
Heidi Huus Petersen (Speaker)
National Veterinary Institute
Bacteriology & Parasitology
Degree of recognition: International

Related event

Twelfth Workshop of National Reference Laboratories for Parasites
18/05/2017 → 19/05/2017
Rom, Italy
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

Joint Spring Symposium 2017: Danish Society for Parasitology and Danish Society for Tropical Medicine and International Health
Period: 31 Mar 2017
Heidi Huus Petersen (Participant)
National Veterinary Institute
Section for Public sector service and commercial diagnostics
Bacteriology & Parasitology
Degree of recognition: National
Documents:
Coccidia infection in Danish farmed mink
Links:
http://parasitology.dk/web/

Related event

Joint Spring Symposium 2017: Danish Society for Parasitology and Danish Society for Tropical Medicine and International Health
31/03/2017 → 31/03/2017
Frederiksberg, Denmark
Activity: Attending an event › Participating in or organising a conference

Levedygtige økologiske kalve
Period: 15 Mar 2017
Heidi Huus Petersen (Participant)
National Veterinary Institute

Related event

Levedygtige økologiske kalve
15/03/2017 → 15/03/2017
Tjele, Denmark
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

Personlig power for AC'ør og ledere
Period: 28 Feb 2017 → 28 Apr 2017
Heidi Huus Petersen (Participant)
National Veterinary Institute
Office for HR
Colombiansk delegation
Start date: 23 Jan 2017 → 27 Jan 2017
Heidi Huus Petersen (Host)
National Veterinary Institute
Bacteriology & Parasitology
Degree of recognition: International
Activity: Hosting a guest lecturer

Bedre behandling og forebyggelse af orrn i fårebesætninger
Period: 16 Sep 2016
Heidi Huus Petersen (Participant)
National Veterinary Institute

Eleventh Workshop of National Reference Laboratories for Parasites
Period: 23 May 2016 → 24 May 2016
Heidi Huus Petersen (Participant)
National Veterinary Institute

Joint Spring Symposium 2016: Danish Society for Parasitology and Danish Society for Tropical Medicine and International Health
Period: 1 Apr 2016
Heidi Huus Petersen (Participant)
National Veterinary Institute
Bacteriology & Parasitology

Kompetenceudvikling i forskningsbaseret myndighedsbetjening
Period: Mar 2016 → May 2016
Heidi Huus Petersen (Participant)
Related event

Kompetenceudvikling i forskningsbaseret myndighedsbetjening
06/04/2016 → 08/04/2016
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

International Association for Food and Waterborne Parasitology (IAFWP) (External organisation)
Period: 19 Nov 2015
Heidi Huus Petersen (Participant)

National Veterinary Institute

Description
Body type: Forskningsnetværk
Degree of recognition: International

Related external organisation

International Association for Food and Waterborne Parasitology (IAFWP)
Activity: Membership › Membership of research networks or expert groups

Danish Society for Parasitology (External organisation)
Period: 2005 → …
Heidi Huus Petersen (Participant)

National Veterinary Institute

Related external organisation

Danish Society for Parasitology
Denmark
Activity: Membership › Membership of research networks or expert groups