Bovine tuberculosis in domestic animals

Database: CAB Abstracts <1973 to 2014 Week 16>
Search Strategy:

1  ("bovine tuberculosis" or "Mycobacterium bovis" or tb).mp. [mp=abstract, title, original title, broad terms, heading words]
2  (cats or dogs or pigs or sheep or horses or "non-bovine").mp. [mp=abstract, title, original title, broad terms, heading words]
3  (domestic or domesticated or pet or pets or companion).mp. [mp=abstract, title, original title, broad terms, heading words]
4  1 and 2 and 3

A selection of results

<1>
Accession Number
20143035375
Author
Bailey, S. S.; Crawshaw, T. R.; Smith, N. H.; Palgrave, C. J.
Title
Mycobacterium bovis infection in domestic pigs in Great Britain.
Source
Veterinary Journal; 2013. 198(2):391-397. 41 ref.
Publisher
Elsevier Ltd
Location of Publisher
Oxford
Country of Publication
UK
Abstract
Mycobacterium bovis, the causative agent of bovine tuberculosis (TB), infects a wide range of wild and domestic mammals. Despite a control programme spanning decades, M. bovis infection levels in cattle in Great Britain (GB) have continued to rise over recent years. As the incidence of infection in cattle and wildlife may be linked to that in swine, data relating to infection of pigs identified at slaughter were examined in this study. Between 2007 and 2011, almost all M. bovis-infected pigs originated from farms in the South-West and West-Midland regions of England. The data suggest that pigs raised outdoors or on holdings with poor biosecurity may be more vulnerable to infection with M. bovis. In the majority of cases, the same strains of M. bovis were found in pigs and cattle, despite that fact that direct contact between these species was rarely observed. Genotyping and geographical mapping data indicated that some strains found in pigs may correlate better with those present in badgers, rather than cattle. In consequence, it is proposed that pigs may represent a useful sentinel for M. bovis infection in wildlife in GB. Given the potential implications of this infection for the pig industry, and for the on-going effort to control bovine TB, the importance of understanding the epidemiology and pathogenesis of M. bovis infection, as well as monitoring its prevalence, in pigs should not be underestimated.
Publication Type
Journal article.

<2>

Abstract

Despite the large host range of Mycobacterium bovis, ante-mortem diagnostic tests for the infection mostly lack sensitivity/specificity and/or remain unvalidated in non-bovine species. The epidemiology and importance of M. bovis infection in these species are discussed in the first part of this two-part review. This second part focuses on the diagnostic options available to identify infected species such as sheep, goats, dogs, cats, and camelids, and highlights the significant challenges posed, both in establishing estimates of disease prevalence and in controlling infections in these species, in the absence of fully validated tests.
Pre-multidrug-resistant Mycobacterium tuberculosis Beijing strain associated with disseminated tuberculosis in a pet dog.

Resistance to isoniazid, ethambutol, and streptomycin was detected in a Mycobacterium tuberculosis strain, belonging to the Beijing family lineage, isolated from two nodule exudates of a Yorkshire terrier with generalized tuberculosis. This report alerts medical practitioners to the risk of dissemination of pre-multidrug-resistant tuberculosis (preMDR-TB) through exposure to M. tuberculosis-shedding pets.

Animal health surveillance in Great Britain (GB) is conducted through public and private initiatives, yet there is no consolidated information on these activities and their outcomes. We developed an inventory of livestock health surveillance programmes in GB to identify gaps in resource use and potential synergies that could be exploited. The inventory contained details of 36 livestock surveillance activities active in 2011. Data were collected by questionnaire and interviews. Livestock health surveillance funding was found to be unevenly distributed between species: the vast majority (approximately 94 per cent) was spent on cattle diseases (tuberculosis surveillance accounted for most of this expenditure), with 2 per cent on pigs, 2 per cent on sheep/goats, 1 per cent on poultry, and 1 per cent on antimicrobial resistance surveillance across all species. Consequently, surveillance efforts in GB appears heavily skewed towards regions with high cattle densities, particularly high-prevalence tuberculosis areas such as the southwest. The contribution of private schemes...
to surveillance funding was hard to quantify due to limited access to data, but was estimated to be about 10 per cent. There is scope to better understand the benefits of surveillance, enhance data sharing, clarify costs and identify who pays and who gains. Health surveillance should be considered within the sharing of responsibilities for disease control.
Publication Type
Journal article.

<6>
Accession Number
20133420500
Author
Kukielka, E.; Barasona, J. A.; Cowie, C. E.; Drewe, J. A.; Gortazar, C.; Cotarelo, I.; Vicente, J.
Title
Spatial and temporal interactions between livestock and wildlife in South Central Spain assessed by camera traps.
Source
Preventive Veterinary Medicine; 2013. 112(3/4):213-221. many ref.
Publisher
Elsevier B.V.
Location of Publisher
Amsterdam
Country of Publication
Netherlands
Abstract
The diversification of livestock farms into hunting estates in South Central Spain (SCS) may impede the success of Mycobacterium bovis eradication programmes by facilitating transmission between wildlife and livestock. In this observational study we aimed to provide information of relevance about the nature and frequency of interactions (observed visits to study points) between livestock (cattle and domestic pigs) and wildlife (wild boar and red deer). The study was conducted in an extensive cattle farm in SCS where the land is also used for game hunting. During a period of one year, camera traps (n=16) were placed at a priori risk points for interspecies interaction: water (natural and artificial troughs), food placed on the ground for baiting wildlife, and pasture. To define indirect interspecies interactions, a critical time window for M. bovis to survive in the environment was selected based on the literature. Results suggest that wildlife frequented food and pasture points more often than water points, and that the number of visits increased through the dry season, peaking during the acorn season (October-January) and the deer breeding season (June-July). Direct interactions were rare (n=10), as opposed to indirect interactions (n=8992). Wildlife-followed-by-livestock interactions (n=7714) occurred much more often than livestock-followed-by-wildlife (n=1278) and were frequent at water points (66% water points, 17% food, 17% pasture). Results also suggest that water points are a hotspot for indirect interactions and might therefore be a source of infection at the wildlife-livestock interface in the territory covered, particularly for M. bovis, as it is around water where the bacteria seem to survive the longest. Preventing aggregation and therefore reducing contact rates between domestic and wild animals especially at water points may be valuable for disease control in South Central Spain.
Publication Type
Journal article.

<7>
Accession Number
20133374505
Author
Gaspari, M. M. F.
Title
Epidemiologic study of pathogens circulating in populations of jaguar and domestic animals in preserved areas of three Brazilian biomes: Cerrado, Pantanal and Amazon. [Portuguese]
Habitat fragmentation and the increasing proximity between humans, domestic and wild animals can be responsible for emerging and re-emerging diseases, dissemination of pathogens and alterations in host-pathogen relationships. Declines in wild felids due to disease have recently been reported; however, little is known about their potential role in wild jaguar populations. This study aimed to investigate the presence of pathogens in jaguar populations and domestic animals in the regions of Emas National Park (ENP), Cantao State Park (CSP) and the Pantanal of Mato Grosso do Sul, and to identify possible associations in the obtained diagnoses. Between February 2000 and January 2010, biological samples were collected from 31 jaguars, 1246 cattle, 179 dogs and 36 cats. Serological surveys for smooth Brucella (RBT), Leptospira spp. (MAT), Toxoplasma gondii (MAT; IFAT), rabies virus (RFFIT), distemper virus (SN), FIV and FeLV (Snap<sup>TM</sup>), and molecular tests for Babesia spp., Hepatozoon spp., Mycoplasma haemofelis, 'Candidatus Mycoplasma haemominutum' and 'Candidatus Mycoplasma turicensis' were performed. Jaguar scats were analyzed for Giardia intestinalis, Cryptosporidium spp., protozoas of the Sarcocystidae Family and Mycobacterium spp. Monitoring of jaguars through radio-transmitter provided pathogen occurrence maps. Cattle populations from all sites were highly exposed to B. abortus, but only one jaguar from ENP was exposed to smooth Brucella. The most detectable serotypes of Leptospira spp. identified in jaguars from ENP and the Pantanal were distinct from those found in the domestic animals. Jaguars, dogs and cats in the three areas were highly exposed to T. gondii. Jaguars from ENP and the Pantanal were exposed to rabies, and jaguars from the Pantanal and dogs from the three areas were exposed to distemper virus. Two cats from the surroundings of CSP were seropositive for FeLV, but no jaguars were exposed to this agent or to FIV. Dogs from the surroundings of ENP and CSP were positive for Babesia spp., while all jaguars were negative for the hemoparasite. All jaguars from the Pantanal and ENP and three of four jaguars from the CSP were positive for Hepatozoon spp. and Cytauxzoon felis. Dogs and cats were also exposed to Hepatozoon spp., but not to Cytauxzoon spp. The jaguars from the three areas were highly exposed to 'Candidatus Mycoplasma haemominutum', and some individuals from the Pantanal and CSP were positive for Mycoplasma haemofelis and 'Candidatus Mycoplasma turicensis'. Few domestic cats were positive for feline hemoplasms. There were no evidences of exposure to Mycobacterium bovis, but Cryptosporidium spp. and Giardia intestinalis were detected in jaguars from ENP. According to the results, distemper and rabies should be considered potential threats to jaguar populations; brucellosis and leptospirosis could have been transmitted by domestic animals; and jaguars probably play an important role in the maintenance of T. gondii, Cytauxzoon felis, Hepatozoon spp. and 'Candidatus Mycoplasma haemominutum' in nature. These data should be taken into account when elaborating conservation strategies for jaguars in the wild.
Tuberculosis (TB) is endemic in Eurasian wild boar (Sus scrofa) and red deer (Cervus elaphus) in south central Spain, where evidence suggests transmission to domestic cattle. Known risk factors for TB at the interface between livestock and wild ungulate species include density and spatial overlap, particularly around waterholes during summer. We evaluated the effectiveness of selective exclusion measures for reducing direct and indirect interaction between extensive beef cattle and wild ungulates at waterholes as an alternative for the integrated control of TB. We first monitored 6 water points (WP) with infrared-triggered cameras at a TB positive cattle farm to quantify interactions. We then assigned 3 WP to be “cattle-only” and 3 to be “wildlife-only”. Cattle-only WP were surrounded with a wildlife-proof fence (2.5 m high) and an original design of cattle-specific gate. Wildlife-only WP were surrounded by a fence that wild ungulates could breach but cattle could not (1.2 m high). Red deer, roe deer (Capreolus capreolus) and wild boar easily jumped or undercrossed this fence. Wildlife-only fences were 100% effective in preventing cattle access to WP and did not impede wildlife use. Many cows learned to operate the cattle-specific gate quickly and others followed and learned from them. Within 2 weeks, around 70% of cows actively entered and exited through the cattle-specific gate. We demonstrate how simple, low-cost fencing strategies can serve as biosecurity measures to substantially reduce direct and indirect contact between cattle and wild ungulates, serving to reduce the potential for TB transmission. Our designs can be used in the context of integral plans to mitigate disease transmission between cattle and wildlife, and have potential for protecting or segregating the use of a variety of resources in different contexts.
regarding bovine tuberculosis establishment in wildlife hosts, as well as conclusions regarding management practices to assist in bovine tuberculosis control and eradication in wildlife, are offered.

Publication Type
Journal article.

<10>
Accession Number
20133186117
Author
Sintayehu Mulugeta Arega; Conraths, F. J.; Gobena Ameni
Title
Prevalence of tuberculosis in pigs slaughtered at two abattoirs in Ethiopia and molecular characterization of Mycobacterium tuberculosis isolated from tuberculous-like lesions in pigs.
Source
BMC Veterinary Research; 2013. 9(97):(6 May 2013). 47 ref.
Publisher
BioMed Central Ltd
Location of Publisher
London
Country of Publication
UK
Abstract
Background: Tuberculosis (TB) is an infectious, granulomatous disease caused by acid-fast bacilli of the genus Mycobacterium. The disease affects practically all species of vertebrates. Although mammalian tuberculosis has been nearly controlled in many developed countries, it is still a serious problem in humans and domestic animals including pigs in developing countries. In Ethiopia, the prevalence of TB in pigs is not known. Therefore, this study was designed to estimate the prevalence of TB in pigs in central Ethiopia and to characterize the causative agents using molecular techniques. Results: The estimated prevalence of TB was 5.8% (49/841). Age and origin of pigs were significantly associated (P<0.001) with the prevalence. In contrast, an association of sex, floor type and water source with the prevalence could not be shown. Culture positivity was confirmed in 30.6% (15/49) of the tuberculous-like lesions. Of the 15 isolates, 12 were acid fast positive while five of the latter were confirmed by multiplex PCR as members of the M. tuberculosis complex. Speciation of the five isolates further confirmed that they were M. tuberculosis, belonging to SIT1088 (two isolates) and SIT1195 (one isolate). The remaining two isolates belong to an identical spoligotype, the pattern of which was not found in the spoligotype database (SpolDB4). Conclusions: The isolation of M. tuberculosis from pigs suggests a possible risk of transmission between humans and pigs. Hence, establishing feasible control methods is required.

Publication Type
Journal article.

<11>
Accession Number
20123321220
Author
Fernandez C., C.; Falcon P., N.; Grandez R., R.; Moore, D. A. J.
Title
No evidence of Mycobacterium tuberculosis in dogs living with pulmonary tuberculosis patients. [Spanish]
Source
Revista de Investigaciones Veterinarias del Peru (RIVEP); 2012. 23(2):228-234. 1616 ref.
Publisher
Universidad Nacional Mayor de San Marcos
Location of Publisher
Lima
Abstract
Tuberculosis (TB) is an infectious disease primarily of humans which produces high morbidity and mortality. Dogs are also susceptible to Mycobacterium tuberculosis infections; therefore, the present study searched for evidence of the presence of this pathogen in 58 dogs that live with human pulmonary TB patients in Lima, Peru. Chest X-ray was performed and pharyngeal swab, saliva, bronchial fluid, urine and feces samples were taken from dogs. Fluorescence microscopy was performed with auramine O staining and TB culture by the Lowenstein Jensen and the Microscopic Observation Drug Susceptibility (MODS) methods. Epidemiological data was collected to define the patient pet relationship. The custom of spitting on the floor of the house, the dog licking patient's sputum and the affective contact with the pet were practices identified during the study that might facilitate the transmission of M. tuberculosis from human to pets. However, none of the dogs presented clinical or microbiological evidence of TB. Transmission of MTB in dogs that live with pulmonary TB patients could not be determined.

Publication Type
Journal article.

<12>
Accession Number
20123306192
Author
Title
A Bayesian approach to study the risk variables for tuberculosis occurrence in domestic and wild ungulates in South Central Spain.
Source
Publisher
BioMed Central Ltd
Location of Publisher
London
Country of Publication
UK
Abstract
Background: Bovine tuberculosis (bTB) is a chronic infectious disease mainly caused by Mycobacterium bovis. Although eradication is a priority for the European authorities, bTB remains active or even increasing in many countries, causing significant economic losses. The integral consideration of epidemiological factors is crucial to more cost-effectively allocate control measures. The aim of this study was to identify the nature and extent of the association between TB distribution and a list of potential risk factors regarding cattle, wild ungulates and environmental aspects in Ciudad Real, a Spanish province with one of the highest TB herd prevalences. Results: We used a Bayesian mixed effects multivariable logistic regression model to predict TB occurrence in either domestic or wild mammals per municipality in 2007 by using information from the previous year. The municipal TB distribution and endemicity was clustered in the western part of the region and clearly overlapped with the explanatory variables identified in the final model: (1) incident cattle farms, (2) number of years of veterinary inspection of big game hunting events, (3) prevalence in wild boar, (4) number of sampled cattle, (5) persistent bTB-infected cattle farms, (6) prevalence in red deer, (7) proportion of beef farms, and (8) farms devoted to bullfighting cattle. Conclusions: The combination of these eight variables in the final model highlights the importance of the persistence of the infection in the hosts, surveillance efforts and some cattle management choices in the circulation of M. bovis in the region. The spatial distribution of these variables, together with particular Mediterranean features that favour the wildlife-livestock interface may explain the M. bovis persistence in this region. Sanitary authorities should allocate efforts towards specific areas and epidemiological situations where the wildlife-livestock interface seems to critically hamper the definitive bTB eradication success.
Tuberculosis (TB) is a chronic disease caused by Mycobacterium bovis and related members of the Mycobacterium tuberculosis complex. Infection affects not only cattle but also other livestock species, companion animals and wild mammals. Humans are also susceptible; hence, zoonotic infection is a driver for disease control in animal hosts. As bovine TB prevalence has been reduced in livestock, the relative epidemiological and socio-economic importance of wildlife reservoirs has increased, and there is a need for disease management strategies. We review the current status of TB in European wild mammals, identifying epidemiological trends and areas for future research and management. TB has a complex epidemiology, which may involve multiple hosts, and is influenced by climate and habitat. Consequently, the role of wild and domestic hosts in the epidemiology of TB varies among regions. In Europe, there are three regional examples of M. bovis maintenance hosts: the Eurasian badger Meles meles in Great Britain and Ireland, the Eurasian wild boar Sus scrofa in the Iberian Peninsula and deer belonging to the subfamily Cervinae in several European regions. In other parts of Europe, these species are currently regarded as spillover hosts, although in time their status may change depending on local or regional risk factors. Nevertheless, in most situations, the relative contribution of wild mammals to M. bovis infection in cattle is still a matter of debate. Also, the outcome of management interventions to control disease in wildlife populations may be complex and counter-intuitive. As our knowledge of disease dynamics in wild mammals improves, options for disease control in wildlife reservoirs, such as vaccination, improved biosecurity and population management, are likely to broaden. In order to evaluate our existing control options, we must monitor the effects of interventions on TB occurrence in the affected regions of Europe and share our collective experiences.
Equids are considered highly resistant to mycobacterial infections and clinical cases have been described in domestic horses only. Mycobacterium bovis is the most common species reported, although a single report exists of disease due to definitively diagnosed infection with Mycobacterium avium subsp. hominisuis in two domestic horses. This is the first report of a mycobacterial infection in a kiang (Equus kiang), or indeed any wild equid. The animal had chronic loss of condition and serum biochemical changes suggestive of liver disease and chronic infection. Further investigation showed a chronic granulomatous enteritis, lymphadenitis and hepatitis with focal granulomatous pneumonia due to systemic infection with M. avium subsp. hominisuis. The distribution and severity of the lesions suggested that the route of infection was alimentary.

Publication Type
Journal article.

Accession Number
20123179358

Author
Nugent, G.; Whitford, J.; Yockney, I. J.; Cross, M. L.

Title
Reduced spillover transmission of Mycobacterium bovis to feral pigs (Sus scrofa) following population control of brushtail possums (Trichosurus vulpecula).

Source

Publisher
Cambridge University Press

Abstract
In New Zealand, bovine tuberculosis (bTB) is present in domestic cattle and deer herds primarily as the result of on-going disease transmission from the primary wildlife host, the brushtail possum (Trichosurus vulpecula). However, bTB is also present in other introduced free-ranging mammalian species. Between 1996 and 2007, we conducted a series of studies to determine whether poison control of possum populations would have any effect on the prevalence of Mycobacterium bovis infection in sympatric feral pigs (Sus scrofa). We compared trends in the prevalence of bTB infection in feral pigs in six study areas: possum numbers were reduced in three areas, but not in the other three, effectively providing a thrice-replicated before-after-control-intervention design. Before possum control, the overall prevalence of culture-confirmed M. bovis infection in feral pigs was 16.7-94.4%, depending on area. Infection prevalence varied little between genders but did vary with age, increasing during the first 2-3 years of life but then declining in older pigs. In the areas in which possum control was applied, M. bovis prevalence in feral pigs fell to near zero within 2-3 years, provided control was applied successfully at the whole-landscape scale. In contrast, prevalence changed much less or not at all in the areas with no possum control. We conclude that feral pigs in New Zealand acquire M. bovis infection mainly by inter-species transmission from possums, but then rarely pass the disease on to other pigs and are end hosts. This is in contrast to the purported role of pigs as bTB maintenance hosts in other countries, and we suggest the difference in host status may reflect differences in the relative importance of the oral route of infection in different environments. Despite harbouring M. bovis infection for a number of years, pigs in New Zealand do not sustain bTB independently, but are good sentinels for disease prevalence in possum populations.

Publication Type
Journal article.
Title:
Notifiable and zoonotic disease for companion animal practitioners.
Source:
Publisher:
British Small Animal Veterinary Association
Location of Publisher:
Quegeley
Country of Publication:
UK
Publication Type:
Journal article.

Title:
Detection of Mycobacterium tuberculosis infection in dogs in a high-risk setting.
Source:
Research in Veterinary Science; 2012. 92(3):414-419. 28 ref.
Publisher:
Elsevier Ltd
Location of Publisher:
Oxford
Country of Publication:
UK
Abstract:
Dogs infected with Mycobacterium tuberculosis can develop clinical tuberculosis (TB) but there are currently no validated immunological assays for diagnosing this infection in this species. Using a post mortem survey we investigated the prevalence of non-clinical M. tuberculosis infection and clinical TB disease in a high-risk population of dogs and developed and utilised a novel interferon-gamma release assay to determine the risk of transmission of M. tuberculosis from TB patients to contact dogs. The prevalence of clinical TB in dogs from a high-risk setting was 1% (95% CI: 0-5%) while the prevalence of immunological sensitization to M. tuberculosis antigens in dogs living in contact with sputum smear-positive TB patients was 50%. The IGRA proved a useful test of M. tuberculosis infection in dogs and the high levels of transmission of this pathogen from humans to companion dogs should be considered when assessing the zoonotic risks associated with such animals.
Publication Type:
Journal article.

Title:
The European Union Summary Report on Trends and Sources of Zoonoses, Zoonotic Agents and Food-borne Outbreaks in 2010.
Source:
The European Food Safety Authority and the European Centre for Disease Prevention and Control analysed the information on the occurrence of zoonoses and food-borne outbreaks in 2010 submitted by 27 European Union Member States. In 2010, 99,020 salmonellosis cases in humans were reported and the decreasing trend in case numbers continued. Most Member States met their Salmonella reduction targets for poultry, and Salmonella is declining in these populations. In foodstuffs, Salmonella was most often detected in fresh broiler and turkey meat. Campylobacteriosis was the most commonly reported zoonosis with 212,064 human cases. Campylobacter was most often detected in fresh broiler meat. The number of human listeriosis cases decreased slightly to 1,601. Listeria was seldom detected above the legal safety limit from ready-to-eat foods at retail. A total of 4,000 confirmed verotoxigenic Escherichia coli (VTEC) infections were reported and this number has been increasing since 2008. VTEC was also observed in food and animals. The numbers of human yersiniosis cases have been decreasing in recent years and, 6,776 cases were reported in 2010. Yersinia enterocolitica was isolated also from pig meat and pigs; 133 cases of Mycobacterium bovis and 356 cases of brucellosis in humans were also reported. The prevalence of bovine tuberculosis in cattle increased, and the prevalence of brucellosis decreased in cattle, sheep and goat populations. Trichinellosis and echinococcosis caused 223 and 750 confirmed human cases, respectively. These parasites were mainly detected in wildlife. The number of Q fever cases in humans decreased to 1,414. In animals Q fever was found in domestic ruminants. There were two human cases of rabies in 2010 and the number of rabies cases in animals slightly increased. Most of the 5,262 reported food-borne outbreaks were caused by Salmonella, viruses, Campylobacter and bacterial toxins and the main food sources were eggs, mixed or buffet meals and vegetables.

Epidemiological significance of the domestic black pig (Sus scrofa) in maintenance of bovine tuberculosis in Sicily. Bovine tuberculosis (bTB) is an emerging disease among wild animals in many parts of the world. Wildlife reservoir hosts may thus represent a potential source of infection for livestock and humans. We investigated the role played by the Sicilian black pig, an autochthonous free- or semi-free-ranging domestic pig breed, as a potential source of bTB infection in an area where bTB prevalence in cattle is high. We initially performed a preliminary field study to assess the occurrence of bTB in such animals. We sampled 119 pigs at abattoir and found 6.7% and 3.4% of them to be affected by gross tuberculous-like lesions (TBL) and Mycobacterium bovis culture positive, respectively. We then proceeded to investigate the dissemination and characteristics
of lesions in a second field study performed on 100 animals sampled from infected herds. Here, tissues collected at the abattoir were examined macroscopically, microscopically, and by culture tests. Most pigs with TBL showed generalized lesions in both gross and histological examinations (53% and 65.5%, respectively). Head lymph nodes were the most frequently affected in both localized and generalized TB cases observed macroscopically and microscopically. M. bovis was the most frequently isolated etiologic agent. The molecular characterization of isolates from both field studies by spoligotyping and analysis of 12 mycobacterial interspersed repetitive-unit-variable number tandem repeat (MIRU-VNTR) loci, followed by their comparison to isolates of cattle origin, suggested a potential transmission of mycobacteria from domestic animals to black pigs and vice versa. Our findings, along with ethological, ecological, and management considerations, suggest that the black pig might act as a bTB reservoir in the ecosystem under study. However, additional studies will be necessary to establish the true epidemiological significance of the Sicilian black pig.

Publication Type
Journal article.

Accession Number
20123064723

Author
Bezos Garrido, J.; Casal Comendador, C.; Fernandez de Mera, I. G.; Mateos Garcia, A.

Title
The immune response to tuberculosis in domestic ruminants. [Spanish]

Source

Publisher
Grupo Asis Biomedia, S.L.

Location of Publisher
Zaragoza

Country of Publication
Spain

Abstract
The aetiology, pathogenesis, virulence, transmission, diagnosis, and resistance (immune response) of ruminants to tuberculosis are discussed.
This study describes the comparison of the cell-based interferon-gamma (IFN gamma) test with serological rapid antibody tests (STAT-PAK and DPP VetTB) for the ante mortem testing of tuberculosis in domestic cats. The antibody specificities of rapid antibody test-positive cats were further discerned using multi-antigen print immunoassay. A total of 62 cats with culture-confirmed Mycobacterium bovis, Mycobacterium microti, Mycobacterium avium and Mycobacterium malmoense, as well as negative controls and dangerous-contact cats were tested. Tests were also applied longitudinally to one further cat undergoing TB chemotherapy for suspected M. bovis infection. Our data from this small study show excellent test specificity (100% for all tests) and encouraging levels of test sensitivity for M. bovis and TB Complex infections (IFN gamma 70-100% depending upon test interpretation criteria; rapid tests both 90% for M. bovis infection and up to 46.2% for M. microti infection). The differential diagnosis of very pathogenic TB Complex (M. bovis, Mycobacterium tuberculosis), as opposed to less-pathogenic TB Complex (M. microti) was possible where positive responses to the protein cocktail ESAT6/CFP10 were observed (80% of M. bovis-infected cats in this study showed positive IFN gamma responses to ESAT6/CFP10, while 20% had antibody responses to ESAT6/CFP10 using MAPIA). Finally, preliminary data from a longitudinal study of one M. bovis-exposed cat with a positive IFN gamma test pre-treatment suggest that a decrease in bacterial burden may be reflected in the IFN gamma response, and thus the IFN gamma test may provide a monitor for TB chemotherapy.

Publication Type
Journal article.

<22>

Accession Number
20113348319

Author
Bennett, A. D.; Lalor, S.; Schwarz, T.; Gunn-Moore, D. A.

Title
Radiographic findings in cats with mycobacterial infections.

Source

Publisher
Elsevier Ltd

Location of Publisher
Oxford

Country of Publication
UK

Abstract
This study describes radiographic changes associated with mycobacterial infection in 33 domestic cats confirmed by culture or interferon-gamma testing. Infection was seen most frequently in adult (average age 5.7 years; range 1.5-12 years), non-pedigree (87%; 27/31), neutered male cats (69%; 22/32). The most common infections were Mycobacterium microti (60%; 18/30) and Mycobacterium bovis (37%; 11/30); Mycobacterium avium and Mycobacterium malmoense were infrequently cultured (3% of each; 1/30). Radiographs were available for the thorax (24 cats), abdomen (eight), appendicular skeleton (11) and head (three). Radiographic changes affected the thorax most commonly, consisting of bronchial (46%; 11/24), alveolar (38%; 9/24), nodular unstructured interstitial (38%; 9/24) or unstructured interstitial (25%; 6/24) lung patterns, which were often mixed. Perihilar or sternal lymphadenopathy were common (42%; 11/24), alveolar (38%; 9/24), nodular unstructured interstitial (38%; 9/24) or unstructured interstitial (25%; 6/24) lung patterns, which were often mixed. Perihilar or sternal lymphadenopathy were common (42%; 10/24), particularly perihilar lymphadenopathy (25%; 6/24). Skeletal changes were found in the distal antebrachium (three), pes (two), maxilla, scapula, spine, manus, femur, and tarsus (one each). Changes were typically osteolytic (73%; 8/11), often permeative osteolytic (64%; 7/11). Osteoproliferative changes were seen in three cats and soft tissue swelling in five cats, which were adjacent to the bony abnormality in four cats. Other changes included submandibular soft tissue swelling, marked aortic, aortic root and brachiocephalic trunk calcification, and soft tissue swelling with calcification in the distal antebrachium which was not involving bone. Abdominal changes were uncommon (seen in 2/8 cats) and consisted of hepatomegaly and hepatosplenomegaly. In summary, radiographic changes were varied, no lesion was pathognomic for mycobacterial infection, and pathology was seen most commonly in the thorax.
Journal article.

<23>
Accession Number
20103330387
Author
Title
Comparison of three immunodiagnostic assays for antemortem detection of Mycobacterium bovis stimulation in domestic cats.
Source
Publisher
American Association of Veterinary Laboratory Diagnosticians
Location of Publisher
Davis
Country of Publication
USA
Abstract
Mycobacterium bovis causes disease in numerous mammalian species including humans, thus making research, surveillance, and control important in the eradication of tuberculosis. Domestic cats are susceptible to multiple mycobacterial species including Mycobacterium bovis; however, their role in the epidemiology of bovine tuberculosis is not fully documented. The current study was an evaluation of the immune response in specific pathogen-free (SPF) cats stimulated with sensitinogen, a heat-killed M. bovis product, using the rapid test, multiple antigen print immunoassay (MAPIA), and bovine-purified protein derivative (bPPD) single skin test. Six cats were inoculated with sensitinogen subcutaneously on days 0 and 24; 2 noninoculated cats and 49 non-SPF cats were controls. Serial serum samples were collected during 135 days and assayed for M. bovis antibodies by rapid test and MAPIA. On day 123, bPPD skin test was performed and read at 48 and 72 hr. The bPPD test at 72 hr had a mean skin thickness of 0.3 mm for stimulated cats and 0.1 mm for controls. Rapid test identified 4 of 6 stimulated cats after bPPD injection. The MAPIA detected antibody against MPB83, 16/83, 16 kDa, and M. bovis culture filtrate (MBCF) antigens. All assays differentiated between stimulated and control cats; however, 7 of 49 non-SPF control cats had a reaction for either antigen MBCF or 16/83. These preliminary studies show potential for antemortem detection of M. bovis among domestic cats. Additional studies to better characterize virulent M. bovis infection in cats would be of value.
Publication Type
Journal article.

<24>
Accession Number
20103291665
Author
LoBue, P. A.; Enarson, D. A.; Thoen, C. O.
Title
Tuberculosis in humans and animals: an overview.
Source
Publisher
International Union Against Tuberculosis and Lung Disease
Location of Publisher
Paris
Country of Publication
France
Abstract
Tuberculosis (TB) is a significant disease for both humans and animals. Susceptibility to Mycobacterium tuberculosis is relatively high in humans, other primates and guinea pigs. Cattle, rabbits and cats are susceptible to M. bovis and are quite resistant to M. tuberculosis. Wild hoofed stock is generally susceptible to M. bovis, but few reports are available on the isolation of M. tuberculosis. Swine and dogs are susceptible to both M. bovis and M. tuberculosis. M. bovis accounts for only a small percentage of the reported cases of TB in humans; however, it is a pathogen of significant economic importance in wild and domestic animals around the globe, especially in countries where little information is available on the incidence of M. bovis infection in humans. Unlike transmission of M. bovis from cattle to humans, the role of human-to-human airborne transmission in the spread of M. bovis has been somewhat controversial. Investigations are needed to elucidate the relative importance of M. bovis on TB incidence in humans, especially in developing countries. Efforts should be concentrated in countries where human immunodeficiency virus (HIV) infection is widespread, as HIV-infected individuals are more susceptible to mycobacterial disease. Eradication of M. bovis in cattle and pasteurisation of dairy products are the cornerstones of the prevention of human disease.
Richomme, C.; Boschiroli, M. L.; Hars, J.; Casabianca, F.; Ducrot, C.
Title
Bovine tuberculosis in livestock and wild boar on the Mediterranean island, Corsica.
Source
Publisher
Wildlife Disease Association
Location of Publisher
Lawrence
Country of Publication
USA
Abstract
The zoonotic agent of bovine tuberculosis (bTB), Mycobacterium bovis, can be transmitted between domestic and wild animals, threatening wildlife populations and control programs for bTB in cattle. In Corsica, a French Mediterranean island where domestic and wild species have close interactions, bTB cases have been reported in cattle, pigs, and wild boar. Moreover, genotypes of M. bovis found in wild and domestic animals from the same area were identical. These data strongly suggest that wild and domestic animals are associated in an epidemiologic bTB-transmission cycle. More investigations are needed, not only to understand the role played by each species in order to implement appropriate control measures, but also to assess the risk of transmission to humans.

Duarte, E. L.; Domingos, M.; Albuquerque, T.; Amado, A.; Botelho, A.
Title
Bovine tuberculosis transmission between domestic and feral species in Portugal: first molecular evidences in Mycobacterium bovis isolates from a farm in Alentejo. [Portuguese]
Source
Publisher
Sociedade Portuguesa de Ciencias Veterinarias
Location of Publisher
Lisboa
Country of Publication
Portugal
Abstract
Included in a broader study of Portuguese Mycobacterium bovis (M. bovis) and Mycobacterium caprae (M. caprae) strains molecular typing, two isolates from a bovine and a wild boar (Sus scrofa), that inhabited the same farm in the Alentejo region, were typed. Two techniques were chosen on the basis of their reproducibility and discriminatory power: Spoligotyping and MIRU-VNTR analysis, with characterization of nine different genome loci (VNTR 3232, ETR-A, ETR-B, MIRU-26, QUB 11b, QUB 11a, ETR-C, VNTR 5156 e MIRU- 4) that vary in the number of tandem repeats. Isolates shared the same SB0265 spoligotype pattern, an infrequent pattern for Portuguese isolates but previously described in Spain and France, and presented the same number of repetitions in each of the nine MIRU-VNTR loci characterised. This molecular data, along with the spatial closeness of both animals, allowed us to conclude on the probability of M. bovis transmission between them, providing the first evidences that, in Portugal, domestic and feral species can share the same strains. These results should encourage further studies on the role of feral species in bovine tuberculosis epidemiology in Portugal.
Publication Type
Journal article.
Mycobacterium microti is a member of the Mycobacterium tuberculosis complex of bacteria. This species was originally identified as a pathogen of small rodents and shrews and was associated with limited diversity and a much reduced spoligotype pattern. More recently, specific deletions of chromosomal DNA have been shown to define this group of organisms, which can be identified by the absence of chromosomal region RD1<sup>mic</sup>. We describe here the molecular characteristics of 141 strains of the Mycobacterium tuberculosis complex isolated in Great Britain over a 14-year period. All strains have characteristic loss of some spoligotype spacers and characteristic alleles at the ETR-E and ETR-F variable-number tandem-repeat (VNTR) loci, and a sample of these strains was deleted for regions RD7, RD9, and RD1<sup>mic</sup> but intact for regions RD4 and RD12. We therefore identified these strains as M. microti and show that they have much more diverse spoligotype patterns and VNTR types than previously thought. The most common source of these strains was domestic cats, and we show that the molecular types of M. microti are geographically localized in the same way that molecular types of Mycobacterium bovis are geographically localized in cattle in the United Kingdom. We describe the pathology of M. microti infection in cats and suggest that the feline disease is a spillover from a disease maintained in an unknown wild mammal, probably field voles. The location of the cats with M. microti infection suggests that they do not overlap geographically with the strains of Mycobacterium bovis in Great Britain.
cases, particular species act as a reservoir of infection that can spill over into domestic livestock with economic and zoonotic consequences. Immunological methods for the detection of TB infection in wildlife are important for diagnostic and research purposes, especially where post-mortem examination is neither feasible nor desirable. In this review, the approaches taken to the immunological study of TB in wildlife species are summarized, with particular emphasis on their suitability for different applications and their applicability to different species. Different approaches to improving diagnostic sensitivity are discussed together with factors that can confound the use of tests in certain situations. Caution in the interpretation of test results for TB in wildlife is encouraged, especially where it has not been possible to confirm the accuracy of the test.

Author
Millan, J.; Candela, M. G.; Palomares, F.; Cubero, M. J.; Rodriguez, A.; Barral, M.; Fuente, J. de la; Almeria, S.; Leon-Vizcaino, L.

Title
Disease threats to the endangered Iberian lynx (Lynx pardinus).

Source

Publisher
Elsevier

Abstract
The Iberian lynx, (Lynx pardinus), is the most endangered felid in the world. To determine whether sympatric carnivores are reservoirs of pathogens posing a disease risk for the lynx, evidence of exposure to 17 viral, bacterial and protozoan agents was investigated in 176 carnivores comprising 26 free-living lynx, 53 domestic cats, 28 dogs, 33 red foxes (Vulpes vulpes), 24 Egyptian mongooses (Herpestes ichneumon), 10 common genets (Genetta genetta) and 2 Eurasian badgers (Meles meles) in the areas inhabited by the last two populations of Iberian lynx, both in Andalusia (South-Western Spain). The results indicated that the lynx had low rates of contact with viral pathogens, with one seropositive finding each for feline leukemia virus, parvovirus and canine adenovirus-1, whereas contact with bacteria and protozoa appeared more frequent. Active infections with parvovirus, Ehrlichia spp., Mycobacterium bovis, Leptospira interrogans and Cyttauxzoon spp. were confirmed. In contrast, 53% of the domestic cats were exposed to some infectious agent (prevalence range 4.5-11.4%). Antibodies to canine distemper virus and parvovirus were frequently found in dogs (32% and 42%, respectively) and foxes (30% and 12%). Past or present infections with parvovirus, Ehrlichia spp., Chlamydiophila spp., M. bovis, Salmonella enterica, L. interrogans, Toxoplasma gondii, and Neospora caninum were also detected in these and other species surveyed. Questionnaires to owners revealed that 14% of the dogs but none of the cats had been vaccinated, and no cat had been neutered. Based on the apparent absence of acquired immunity of the lynx against infectious agents, the frequent detection of agents among sympatric carnivores, and the reported lack of immunocompetence of the Iberian lynx, a disease outbreak among the local abundant carnivores may pose a serious disease risk for lynx conservation.

Publication Type
Journal article.

Accession Number
20093201801
Author
Shrikrishna, D.; Rua-Domenech, R. de la; Smith, N. H.; Colloff, A.; Coutts, I.
Title
Human and canine pulmonary Mycobacterium bovis infection in the same household: re-emergence of an old zoonotic threat?
Source
Thorax; 2009. 64(1):89-91.
Publisher
BMJ Publishing Group
Location of Publisher
London
Country of Publication
UK
Abstract
Bovine tuberculosis (bTB), caused by Mycobacterium bovis, remains a serious animal health problem in the UK, despite longstanding statutory surveillance and control measures. Endemic infection in the Eurasian badger population is thought to complicate bTB eradication efforts. Sporadic cases of M bovis infection have also been reported in domestic animals other than cattle. Human M bovis infection is extremely rare in the native UK population in the absence of unpasteurised milk consumption or residence abroad. Here, pulmonary TB infection in a UK born female and her pet dog is described, caused by an identical strain of M bovis. Late TB infection was also identified in a household contact. The potential routes of infection and implications of this case are discussed.
Publication Type
Journal article.

<32>
Accession Number
2008307245
Author
Title
Source
Epidemiology and Infection; 2008. 136(12):1617-1623. 26 ref.
Publisher
Cambridge University Press
Location of Publisher
Cambridge
Country of Publication
UK
Abstract
A cross-sectional field study was performed to evaluate infection in dogs and cats living on farms with Mycobacterium bovis-infected cattle. The purpose was to determine pet infection status and assess their risk to farm families and/or tuberculosis-free livestock. Data and specimens were collected from 18 cats and five dogs from nine participating farms. ELISA testing for M. bovis and M. avium was conducted. Fifty-one biological samples were cultured; all were negative for M. bovis, although other Mycobacterium species were recovered. No radiographic, serological or skin test evidence of mycobacterial infection was found. These negative results may be due to the low level of M. bovis infection in the cattle and the limited duration of exposure of pets to infected cattle residing on the same farm. No evidence was found to indicate that pets residing on M. bovis-infected Michigan cattle farms pose a risk to humans or M. bovis-free livestock; however, precautionary advice for farm owners was provided.
Publication Type
Journal article.
There are currently no reliable immunodiagnostic tests for feline tuberculosis. Infection of domestic cats in the UK is thought to occur via their contact with the relevant reservoir of infection, e.g. cattle and badgers for Mycobacterium bovis, and rodents for M. microti. In the African National Parks, where M. bovis infection of Bovidae is an increasing problem, transmission to big cats is occurring via their ingestion of infected carcasses. We have adapted feline ELISA and ELISPOT assays to potentially provide the first cell-based diagnostic test for the detection of tuberculosis in cats. We tested peripheral blood mononuclear cell antigen-specific IFN-gamma responses of 18 cats suspected of mycobacterial infection for which biopsy material was co-submitted to the Veterinary Laboratories Agency for mycobacterial culture and identification. Seventeen cats were tested by ELISA while seven cats were tested by ELISPOT (six cats were tested by both ELISA and ELISPOT). Six healthy control cats provided baseline data for these tests. Responses to bovine and avian tuberculins (PPDB and PPDA) and a protein cocktail of ESAT6 and CFP10 were measured, together with positive mitogen (PMA and calcium ionophore) and negative (medium) controls. Overall, both ELISPOT and ELISA tests were found to be suitable for generating rapid results (2 and 4 days, respectively), which provided good predictive information for M. bovis and M. microti infections, but were unable to reliably discern M. avium infection.

Publication Type: Journal article.
Tuberculosis is an important disease among many zoonoses, because both Mycobacterium tuberculosis and Mycobacterium bovis, which are the major causes of tuberculosis, are highly pathogenic, infect many animal species and thus are likely to be the source of infection in humans. In particular, monkeys are highly susceptible to these bacteria and are important spreaders. Recently, two outbreaks of M. tuberculosis occurred in four different kinds of monkeys and humans were also infected with the disease in Japan. In zoos, tuberculosis was reported not only in monkeys, but also in several different kinds of animals, including elephants. Pets such as dogs and cats are believed to be generally less susceptible to M. tuberculosis, but in this article we introduce a case of infection from man to dog by close contact. Japan is one of the few countries that have been able to control M. bovis infection. In other countries, however, cases of bovine tuberculosis and human M. bovis infection have been reported, and thus further attention is still required in the future.

Publication Type
Journal article.

<35>
Accession Number
20073033493
Author
Barlow, A. M.; Monies, R. J.
Title
Bovine tuberculosis in pigs in cornwall and the west of England.
Source
Pig Journal; 2006. 58:204-211. 8 ref.
Publisher
Pig Veterinary Society
Location of Publisher
Chippenham
Country of Publication
UK
Abstract
The pattern of mycobacterial infection in both wild and domestic pigs over the last 50 years is described. Infection with M. avium usually occurs through environmental contamination by affected birds. M. bovis infection, on the other hand, can result from pigs scavenging dead carcasses, e.g. infected badgers, or from contamination of feed or water by such animals. Direct infection through ingestion of tuberculous milk, or milk products, is also possible. Three cases are described by the authors. No clinical disease was reported, each case being initially picked up at slaughter. Cattle on two of the premises tested clear to disease. On the third farm, cattle were already under restriction, with six reactors and one inconclusive reactor being disclosed at test. With bovine tuberculosis continuing to spread nationally, the authors suggest that interaction between pigs and badgers could pose a real risk to the increasing numbers of outdoor reared pigs.

Publication Type
Journal article
Conference paper.

<36>
Accession Number
20063221307
Author
Buick, W.
Title
TB in domestic species other than cattle and badgers. (Special Issue: Bovine TB.)
Source
Publisher
Department for Environment, Food and Rural Affairs (DEFRA)
Abstract

New Zealand has a large reservoir of Mycobacterium bovis infection in wild and farmed animals. This study aimed to assess the extent of human infection with this organism and the potential contribution of these animal sources. Combined epidemiological and laboratory investigation of human tuberculosis cases over the period 1995-2002 showed that M. bovis accounted for 2.7% (54/1997) of laboratory-confirmed human tuberculosis cases, a rate of 0.2/100000 population. M. bovis isolates from humans (23) were typed using restriction endonuclease analysis (REA) and compared with isolates from wild and domestic animals (2600). Fourteen (61%) of the human isolates had REA patterns that were identical to patterns for isolates from cattle, deer, possums, ferrets, pigs, and occasionally cats. These results suggest a low level of ongoing M. bovis transmission from animal reservoirs to humans in New Zealand.


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Bovine tuberculosis is an important disease that has impacts on regional and international trade. The disease can affect both social and economic stability and have a deleterious affect on species diversity. The intradermal tuberculin test has been in use for almost a century and, despite the technological advances of the last two decades, is still the only prescribed test for the diagnosis of tuberculosis in cattle. Many other species of animal, including humans, can be
infected with Mycobacterium bovis. This paper reviews the various tests that have been used by researchers for detecting infection with M. bovis in a variety of animal species, and attempts to prioritise or comment on the importance of having appropriately validated diagnostics for the different species. The difficulties of test validation using small numbers of animals, especially when tuberculosis occurs in only a few instances or the species of animal affected is rare and/or valuable, are discussed.

Differential responses of bovine macrophages to infection with bovine-specific and non-bovine specific mycobacteria.

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Members of the Mycobacterium tuberculosis complex share a high level of genetic identity, however pathogenic ability appears to display host restriction. Interestingly M. tuberculosis, the primary cause of tuberculosis in humans, is non-pathogenic in cattle. Conversely Mycobacterium bovis, the cause of tuberculosis in cattle, is also responsible for a proportion of tuberculosis cases in humans. We hypothesise that differences in the abilities of M. bovis and M. tuberculosis to cause pathogenesis in cattle will be reflected in their interactions with bovine antigen presenting cells. To analyse the importance of host species in mycobacterial infection, bovine antigen presenting cells were infected with bovine or human mycobacterial strains. Levels of nitric oxide and tumour necrosis factor production, markers of antimicrobial activity, were found to be associated with a specific mycobacterial strain, and varied between cell subsets.