Antimicrobial resistance (AMR) in veterinary medicine – a general selection of references

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1  "antimicrobial resistance".mp. (3079)
2  AMR.mp. (182)
3  drug resistance/ or ll882.cc. (56869)
4  (ll070 or ll000 or ll080 or ll110 or ll120 or mm110 or mm000).cc. (260949)
5  (1 or 2) and 3 and 4 (661)
6  limit 5 to english language (573)

Accession Number
20133278377
Author
St. Amand, J. A.; Otto, S. J. G.; Cassis, R.; Christianson, C. B. A.
Title
Antimicrobial resistance of Salmonella enterica serovar Heidelberg isolated from poultry in Alberta.
Source
Avian Pathology; 2013. 42(4):379-386. 35 ref.
Publisher
Taylor & Francis
Location of Publisher
Abingdon
Country of Publication
UK
Abstract
Salmonella enterica serovar Heidelberg is one of the top three serovars implicated in human infections in Canada. In 2003, the Canadian Integrated Program for Antimicrobial Resistance Surveillance reported antimicrobial resistance (AMR) in S. Heidelberg in Canada. The study objective was to investigate the AMR of S. Heidelberg isolated from poultry in Alberta. We examined 951 S. Heidelberg poultry isolates obtained during 1996 to 2010 and tested against 18 antibiotics using the Sensititre AVIAN1F system. Temporal resistance patterns were analysed using single-level logistic regression models. Continuous variables were included in the multivariable models. Multivariable models were built and variables and interactions were included in these final models. Data were analysed using Stata 11 Intercooled. Ceftiofur resistance ranged annually from 0 to 10.5% and gentamicin resistance ranged annually from 0 to 33.3%; no isolates were enrofloxacin resistant. Resistance to amoxicillin (annual range 0 to 42.6%) varied significantly by time and interaction with commodity type. Meat turkey S. Heidelberg isolates had higher ceftiofur resistance compared with chickens: layers plus layer breeders (odds ratio=22.6, P<0.01) and broiler breeders (odds ratio=9.1, P<0.01). Gentamicin resistance decreased significantly over the study period (odds ratio=0.72 per year, P<0.01). Tetracycline (TET) resistance changed significantly over time (annual range 0 to 39.6%), interacting with poultry commodity type. Meat turkey isolate TET resistance, higher overall than that of chicken, increased throughout the study. All turkey breeder isolates were resistant to TET. In conclusion, this study provides AMR data for S. Heidelberg isolates from the Alberta poultry industry and demonstrated significant trends in resistance, both temporal and between poultry commodities.
Accession Number
20133269369
Author
Craig, M.
Title
Logical use of antibiotics in canine skin disease.
Source
Publisher
UK Vet Publications
Location of Publisher
Newbury
Country of Publication
UK
Abstract
Antimicrobial resistance in companion animals is a growing problem, and veterinary practitioners must carefully select antimicrobial treatment. In this article, factors affecting antibiotic selection and common reasons for treatment failure in canine skin disease are discussed. A table of antibiotics licensed for systemic administration in dogs with skin disease is included.

Accession Number
20133254385
Author
Varela, N. P.; Gadbois, P.; Thibault, C.; Gottschalk, M.; Dick, P.; Wilson, J.
Title
Antimicrobial resistance and prudent drug use for Streptococcus suis.
Source
Publisher
Cambridge University Press
Location of Publisher
Cambridge
Country of Publication
UK
Abstract
This paper reviews information on antimicrobial resistance patterns and prudent use of antimicrobials to reduce the impact and spread of resistant Streptococcus suis strains. S. suis is an important pathogen in swine, which can cause significant economic loss. Prudent use of antimicrobials for S. suis is essential to preserve the therapeutic efficacy of broad-spectrum antimicrobials and to minimize selection of resistant S. suis strains. Resistance of S. suis to antimicrobials commonly used in swine, including lincosamides, macrolides, sulphonamides, and tetracycline, has been documented worldwide, with resistance in up to 85% of strains. Among antimicrobials examined, resistance of S. suis has been demonstrated to be relatively low for penicillin (0-27%), ampicillin (0.6-23%), and ceftiofur (0-23%). For penicillin, this result may be due in part to the unique mechanism by which resistance is acquired through modifications in the structure of penicillin-binding proteins. Recommendations to control S. suis infection include focused and careful choice and appropriate use of antimicrobials, together with preventive measures intended to improve swine management.

Accession Number
20133224401
Author
Occurrence of beta-lactamase genes among non-Typhi Salmonella enterica isolated from humans, food animals, and retail meats in the United States and Canada.

Source

Publisher
Mary Ann Liebert, Inc.

Location of Publisher
New Rochelle

Country of Publication
USA

Abstract
Non-Typhi Salmonella cause over 1.7 million cases of gastroenteritis in North America each year, and food-animal products are commonly implicated in human infections. For invasive infections, antimicrobial therapy is indicated. In North America, the antimicrobial susceptibility of Salmonella is monitored by the U.S. National Antimicrobial Resistance Monitoring System (NARMS) and The Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS). In this study, we determined the susceptibility to cephalosporins by broth microdilution among 5,041 non-Typhi Salmonella enterica isolated from food animals, retail meats, and humans. In the United States, 109 (4.6%) of isolates collected from humans, 77 (15.7%) from retail meat, and 140 (10.6%) from food animals displayed decreased susceptibility to cephalosporins (DSC). Among the Canadian retail meat and food animal isolates, 52 (13.0%) and 42 (9.4%) displayed DSC. All isolates displaying DSC were screened for beta-lactamase genes (bla<sub>TEM</sub>, bla<sub>SHV</sub>, bla<sub>CMY</sub>, bla<sub>CTX-M</sub>, and bla<sub>OXA-1</sub>) by polymerase chain reaction. At least one beta-lactamase gene was detected in 74/109 (67.9%) isolates collected from humans, and the bla<sub>CMY</sub> genes were most prevalent (69/109; 63.3%). Similarly, the bla<sub>CMY</sub> genes predominated among the beta-lactamase-producing isolates collected from retail meats and food animals. Three isolates from humans harbored a bla<sub>CTX-M-15</sub> gene. No animal or retail meat isolates harbored a bla<sub>CTX-M</sub> gene or bla<sub>OXA-1</sub> gene. A bla<sub>TEM</sub> gene was found in 5 human, 9 retail meat, and 17 animal isolates. Although serotype distributions varied among human, retail meat, and animal sources, overlap in bla<sub>CMY</sub>-positive serotypes across sample sources supports meat and food-animal sources as reservoirs for human infection.

The European Union summary report on antimicrobial resistance in zoonotic and indicator bacteria from humans, animals and food in 2011.

Source
EFSA Journal; 2013. 11(5):3196. many ref.

Publisher
European Food Safety Authority

Location of Publisher
Parma

Country of Publication
Italy

Abstract
The antimicrobial resistance data among zoonotic and indicator bacteria in 2011, submitted by 26 European Union Member States, were jointly analysed by the European Food Safety Authority and the European Centre for Disease Prevention and Control. Data covered resistance in zoonotic Salmonella and Campylobacter isolates from humans, food and animals, and in indicator Escherichia coli and enterococci isolates from animals and food. Data on methicillin-resistant Staphylococcus aureus in animals and food were also presented. Resistance in isolates from humans were mainly interpreted using clinical breakpoints, while animal and food isolate resistance was interpreted using epidemiological cut-off values. Resistance was commonly found in isolates from humans, animals and...
food, although disparities in resistance were frequently observed between Member States. High resistance levels were recorded to ampicillin, tetracyclines and sulfonamides in Salmonella isolates from humans, while resistance to third-generation cephalosporins and fluoroquinolones remained low. In Salmonella and indicator Escherichia coli isolates from fowl, pigs, cattle and meat thereof, resistance to ampicillin, tetracyclines and sulfonamides was also commonly detected, while resistance to third-generation cephalosporins was low. Moderate to high resistance to (fluoro)quinolones was observed in Salmonella isolates from turkeys, fowl and broiler meat. In Campylobacter isolates from human cases, resistance to ampicillin, ciprofloxacin, nalidixic acid and tetracyclines was high, while resistance to erythromycin was low to moderate. High resistance to ciprofloxacin, nalidixic acid and tetracyclines was observed in Campylobacter isolates from fowl, broiler meat, pigs and cattle, whereas much lower levels were observed for erythromycin and gentamicin. Among the indicator enterococci isolates from animals and food, resistance to tetracyclines and erythromycin was commonly detected. The report also presents for the first time results on multi-resistance and co-resistance to critically important antimicrobials in both human and animal isolates. Very few isolates from animals were co-resistant to critically important antimicrobials.

<6>
Accession Number
20133201480
Author
Kvaale, M. K.; Grave, K.; Kristoffersen, A. B.; Norstrom, M.
Title
The prescription rate of antibacterial agents in dogs in Norway - geographical patterns and trends during the period 2004-2008.
Source
Publisher
Wiley-Blackwell
Location of Publisher
Oxford
Country of Publication
UK
Abstract
The aim of the present study was to describe the prescription rate and patterns of antibacterial agents in the Norwegian dog population in relation to time and place during 2004-2008. Prescription data were collected from the Norwegian prescription database (NorPD), whereas an estimate of the dog population was obtained from the Norwegian Kennel Club (NKK). Maps of the geographical prescription rate patterns were generated in the software ArcGIS 9.2. This study indicates an increased usage of antibacterial agents in dogs in Norway during the study period in which antibacterial agents for systemic use and especially the combination amoxicillin and clavulanic acid accounted for the major part. Among antibacterial agents defined as critically important for human medicine, an increase was observed in the prescription rate of quinolones. The geographical prescription rate patterns were stable during the study period, which indicated that the identified increase in usage of antimicrobial agents occurred all over the country, but that there were regional differences in the prescribing behaviour. Prescription data from the NorPD of antibacterial agents to dogs can be used as a basis to perform a risk-based sampling approach to detect emerging antimicrobial resistance in the dog population.

<7>
Accession Number
20133189147
Author
Jong, A. de; Thomas, V.; Klein, U.; Marion, H.; Moyaert, H.; Simjee, S.; Valle, M.
Title
Pan-European resistance monitoring programmes encompassing food-borne bacteria and target pathogens of food-producing and companion animals.
Source
Antimicrobial resistance is a concern both for animal and human health. Veterinary programmes monitoring resistance of animal and zoonotic pathogens are therefore essential. Various European countries have implemented national surveillance programmes, particularly for zoonotic and commensal bacteria, and the European Food Safety Authority (EFSA) is compiling the data. However, harmonisation is identified as a weakness and an essential need in order to compare data across countries. Comparisons of resistance monitoring data among national programmes are hampered by differences between programmes, such as sampling and testing methodology, and different epidemiological cut-off values or clinical breakpoints. Moreover, only very few valid data are available regarding target pathogens both of farm and companion animals. The European Animal Health Study Centre (CEESA) attempts to fill these gaps. The resistance monitoring programmes of CEESA have been a collaboration of veterinary pharmaceutical companies for over a decade and include two different projects: the European Antimicrobial Susceptibility Surveillance in Animals (EASSA) programme, which collects food-borne bacteria at slaughter from healthy animals, and the pathogen programmes that collect first-intention target pathogens from acutely diseased animals. The latter comprises three subprogrammes: VetPath; MycoPath; and ComPath. All CEESA projects include uniform sample collection and bacterial identification to species level in various European Union (EU) member states. A central laboratory conducts quantitative susceptibility testing to antimicrobial agents either important in human medicine or commonly used in veterinary medicine. This methodology harmonisation allows easy comparisons among EU member states and makes the CEESA programmes invaluable to address food safety and antibiotic efficacy.

Antibioresistance profile of avian pathogenic Escherichia coli isolates recovered from broiler chicken farms with colibacillosis in Kermanshah province, Iran.

During 2012, antibacterial susceptibility tests were performed on 154 isolates of avian pathogenic Escherichia coli (APEC) recovered from broiler chicken flocks with signs of colibacillosis in Kermanshah province, west of Iran. A total of 18 antibiotic discs with gentamicin, neomycin, ampicillin, chloramphenicol, florfenicol, tetracycline, chlortetracycline, doxycycline, nalidixic acid, ciprofloxacin, enrofloxacin, flumequine, norfloxacin, erythromycin, tiamulin, lincomycin-spectinomycin, colistin and fosfomycin were used. There were resistance frequencies of 91.6% and 62.3% to chloramphenicol and florfenicol, respectively. The highest frequency of resistance (97.7%) was against nalidixic acid. Frequencies of resistance to other quinolones including flumequine, enrofloxacin, norfloxacin and ciprofloxacin were
also relatively high. Erythromycin and tiamulin resistance occurred at frequencies of 96.1% and 87.0%, respectively. Resistance expressed by the isolates to lincomycin-spectinomycin was at 49.4%. Relatively low frequency of resistance (30.5%) was against fosfomycin. Multi-drug resistance (MDR) was found in 63.3% of the isolates. Generally, the resistance frequencies of APEC isolates recovered from broiler chickens in this study were high. Studies examining isolates from various geographic locations are required to more accurately detect differences in antimicrobial resistance in isolates of Escherichia coli (E. coli). Appropriate use of antibiotics in humans and farm animals needs to be addressed in Iran and other developing countries.

<9>
Accession Number
20133118317
Title
NARMS retail meat annual report, 2011.
Source
Publisher
U. S. Food and Drug Administration
Location of Publisher
Silver Spring
Country of Publication
USA
Abstract
This annual report focuses on NARMS retail meat surveillance program in monitoring the prevalence and trends of antimicrobial resistance among foodborne isolates of Salmonella, Campylobacter, Enterococcus and Escherichia coli. Meat samples from chicken, ground turkey, ground beef and pork chops are collected monthly and analysed for the following bacteria: Salmonella, Campylobacter, Enterococcus and Escherichia coli, along with their antimicrobial susceptibility and resistance. Trends in antimicrobial resistance of foodborne bacteria from humans, retail meats, and animals are presented.

<10>
Accession Number
20133132112
Author
Lusis, I.
Title
Antimicrobial resistance of the mastitis pathogens in dairy cows.
Source
Publisher
Latvija University of Agriculture
Location of Publisher
Jelgava
Country of Publication
Latvia
Abstract
There has been a rapid awareness about multiresistant pathogens in the past 10 years and some bacteria are now resistant to most antimicrobial agents used in veterinary practice. Occurrence of multiresistant bacteria in milk from both dairy cows with high somatic cell count and clinical mastitis were analyzed. Multiple resistance of bacteria isolated from milk depends on bacteria species and is more prominent for coagulase negative staphylococci and Streptococcus agalactiae.
Suggested guidelines for using systemic antimicrobials in bacterial skin infections (2): Antimicrobial choice, treatment regimens and compliance.

Systemic antimicrobials are critically important in veterinary healthcare, and resistance is a major concern. Antimicrobial stewardship will be important in maintaining clinical efficacy by reducing the development and spread of antimicrobial resistance. Bacterial skin infections are one of the most common reasons for using systemic antimicrobials in dogs and cats. Appropriate management of these infections is, therefore, crucial in any policy for responsible antimicrobial use. The goals of therapy are to confirm that an infection is present, identify the causative bacteria, select the most appropriate antimicrobial, ensure that the infection is treated correctly, and to identify and manage any underlying conditions. This is the second of two articles providing evidence-led guidelines to help practitioners address these issues. The first article (VR, January 19, 2013, vol 172, pp 72-78) discussed the use of clinical signs, cytology and culture in diagnosis. This second article covers the rationale for topical and systemic antimicrobial therapy, including choice of first-, second- and third-line drugs, the dose, duration of therapy, compliance and identification of underlying predisposing conditions. In addition, there is guidance on cases of therapeutic failure and environmental hygiene. These guidelines should help veterinarians avoid the development and propagation of antimicrobial-resistant bacterial strains.

Antimicrobial resistance and genotypes of staphylococci from bovine milk and the cowshed environment.

Investigation of antimicrobial resistance and genetic relatedness of staphylococci from milk of cows with mastitis and cowshed environment was the aim of this study. Antimicrobial resistance against 14 antimicrobials were determined by using a disc diffusion method. Genetic similarity between the most frequently isolated species was analysed by PFGE (pulsed-field gel electrophoresis). Haemolytic activity, DNase, protease and esterase production was also investigated. Coagulase-negative Staphylococcus species were isolated from 30.8% of milk samples from cows with mastitis. The most frequently isolated species was Staphylococcus xylosus and yield of these organisms was significantly
associated with milk of mastitis cows. S. epidermidis was a predominant penicillin-resistant species.
High frequency of resistance to lincomycin was observed among isolates of S. sciuri (54.2%) and S. xylosus (25.9%) from cows with mastitis. PFGE (pulsed-field gel electrophoresis) analysis of 29 Staphylococcus aureus isolates showed the presence of 17 PFGE pulsotypes. Isolates of S. sciuri (n=36) had unique PFGE patterns. Some S. xylosus isolates from milk and milker's hands had the same PFGE pulsotypes, and this observation could indicate that dairyman may be a potential source of the infection. The pulsotype of each of the remaining isolates of S. xylosus suggested that they might have come from common environmental sources; however, these isolates differed in antibiotic resistance pattern or virulence traits. Therefore, knowledge about antibiotic sensitivity pattern and virulence factors of a CNS isolate, besides its genotype, may be informative in tracking the source of the infection.

<13>
Accession Number 20133053111
Author Agunos, A.; Leger, D.; Carson, C.
Title Review of antimicrobial therapy of selected bacterial diseases in broiler chickens in Canada.
Publisher Canadian Veterinary Medical Association
Location of Publisher Ottawa
Country of Publication Canada
Abstract This paper reviews common therapeutic applications of antimicrobials in broiler chicken production in relation to Canadian guidelines, surveillance data, and emerging public health concerns about antimicrobial use (AMU). Escherichia coli, Clostridium perfringens, and Staphylococcus spp., were reviewed because of their animal health and economic significance. Enterococcus cecorum and Salmonella were included because of their importance in antimicrobial resistance (AMR) surveillance. This review identified that (i) antimicrobials are available in Canada to treat infections by these agents, but may be through over the counter or extra-label use, (ii) prevalence rates for these diseases are unknown, (iii) antimicrobial use estimates in broilers are lacking, and (iv) AMR has emerged in clinical isolates, though data are very sparse. This review highlights the need for surveillance of AMU and AMR in broiler chickens in Canada.

<14>
Accession Number 20133033965
Author Beco, L.; Guaguere, E.; Mendez, C. L.; Noli, C.; Nuttall, T.; Vroom, M.
Title Suggested guidelines for using systemic antimicrobials in bacterial skin infections (1): diagnosis based on clinical presentation, cytology and culture.
Source Veterinary Record; 2013. 172(3):72.
Publisher BMJ Publishing Group
Location of Publisher London
Country of Publication UK
Abstract
Systemic antimicrobials are critically important in veterinary healthcare and resistance is a major concern. Antimicrobial stewardship will be important in maintaining clinical efficacy by reducing the development and spread of antimicrobial resistance. Bacterial skin infections are one of the most common reasons for using systemic antimicrobials in dogs and cats. Appropriate management of these infections is therefore crucial in any policy for responsible antimicrobial use. The goals of therapy are to confirm that an infection is present, identify the causative bacteria, select the most appropriate antimicrobial, ensure that the infection is treated correctly, and to identify and manage any underlying conditions. This is the first of two articles that will provide evidence-led guidelines to help practitioners address these issues. This article covers diagnosis, including descriptions of the different clinical presentations of surface, superficial and deep bacterial skin infections, how to perform and interpret cytology, and how to best use bacterial culture and sensitivity testing. The second article, to be published in a subsequent issue of Veterinary Record, will discuss therapy, including choice of drug and treatment regimens.
Aims: To evaluate the prevalence and antimicrobial resistance of Enterococcus species from chickens and pigs in Beijing and Shandong Province, China. Methods and Results: Swab samples were collected from four farms in Beijing and two in Shandong Province in 2009 and tested for Enterococcus. Minimum inhibitory concentrations of antimicrobial agents were determined using broth microdilution or agar screening methods. A total of 453 Enterococcus isolates were recovered, belonging to six different Enterococcus species. All isolates were sensitive to vancomycin. Resistance to tetracycline (92.5%), amikacin (89.4%), erythromycin (72.8%) and rifampin (58.1%), and high-level streptomycin resistance (HLSR, 50.3%) were prevalent, while resistance to penicillins (7.9% to penicillin and 4.2% to ampicillin) was rare. The resistance rates to phenicols (chloramphenicol and florfenicol) and enrofloxacin, and high-level gentamicin resistance (HLGR) were approximately 30%. The vast majority of the Enterococcus isolates were classified as multidrug-resistant organisms.

Conclusions: Resistance of Enterococcus sp. to most antimicrobials was more prevalent in China than in European or other Asian countries. Significance and Impact of the study: Our findings reveal a high level of antimicrobial resistance in Enterococcus isolates from food animals in China and underline the need for prudent use of antibiotics in chicken and pig production to minimize the spread of antibiotic-resistant enterococci.

<17>
Accession Number
20133028837
Author
Rato, M. G.; Bexiga, R.; Florindo, C.; Cavaco, L. M.; Vilela, C. L.; Santos-Sanches, I.
Title
Antimicrobial resistance and molecular epidemiology of streptococci from bovine mastitis.
Source
Publisher
Elsevier Ltd
Location of Publisher
Oxford
Country of Publication
UK
Abstract
Streptococcus agalactiae (Group B Streptococcus, GBS), Streptococcus dysgalactiae subsp. dysgalactiae (Group C Streptococcus, GCS) and Streptococcus uberis are relevant mastitis pathogens, a highly prevalent and costly disease in dairy industry due to antibiotherapy and loss in milk production. The aims of this study were the evaluation of antimicrobial drug resistance patterns, particularly important for streptococcal mastitis control and the identification of strain molecular features. Antimicrobial resistance was assessed by disk diffusion against amoxicillin-clavulanic acid, cefazolin, cefoperazone, pirlimycin-PRL, rifaximin, streptomycin, chloramphenicol, erythromycin-ERY, gentamicin, tetracycline-TET and vancomycin. Genotypic relationships were identified using pulsed-field gel electrophoresis (PFGE), macrolide and/or tetracycline resistance gene profiling, GBS capsular typing, GBS virulence gene profiling and GBS and S. uberis multi locus sequence typing (MLST). The majority of the isolates were susceptible to all drugs except to aminoglycoside, macrolide, lincomamide and tetracycline. Close to half of the TET resistant isolates have tetO and tetK and almost all ERY-PRL resistant isolates have ermB. A high degree of intra-species polymorphism was found for GCS. The GBS belonged to ST-2, -554, -61, -23 lineages and five new molecular serotypes and human GBS insertion sequences in the cpsE gene were found. Also, GBS of serotype V with scpB and lmb seem to be related with GBS isolates of human origin (same ST-2 and similar PFGE). Overall our results suggested that different therapeutic programs may have been implemented in the different farms and that in most cases clones were herd-specific.
This article discusses the virulence of bacterial pathogens; discovery and efficacy of antibiotics; risk factors contributing to the development of antimicrobial resistance; and the principle of mutant prevention concentration to prevent antibiotic resistance and to enhance long term preservation of drugs for clinical use.

The number of pets has increased substantially in modern society and attention is increasingly devoted to pet welfare. The aim of this study is to investigate the occurrence of antimicrobial resistance in Escherichia coli strains present in cat intestinal microbiota. From January to December of 2009, 190 E. coli strain isolates from diarrheic (n=19) and healthy (n=21) cats from Ituverava, Sao Paulo state, Brazil were examined for resistance to 20 antimicrobial agents. The predominantly observed resistance was to cephalothin (42.1%), tetracycline (20.0%), and ampicillin (15.8%) among the isolates from diarrheic cats and to tetracycline (30.5%), cotrimoxazole (17.9%), and ampicillin (20.0%) among the isolates from healthy cats. Multidrug-resistance to three or more antimicrobial agents was found among 8.4% and 17.8% of the isolates from diarrheic and healthy cats, respectively. It is obvious that the E. coli strains from cats may act as a reservoir of resistance genes. To support the development of antimicrobial usage policies, regular updates on the status of resistance to antimicrobials used in veterinary medicine are needed.
This report presents the first face-to-face meeting of the 4 subcommittees of the World Health Organization Advisory Group on Integrated Surveillance of Antimicrobial Resistance (WHO-AGISAR): Data Management and Software Development, Country Pilot Projects and Capacity Building, Surveillance of Usage of Antimicrobial agents, and Surveillance of Antimicrobial Resistance. Emerging threats related to antimicrobials from the food-chain are discussed: (1) extended-spectrum beta-lactamase-producing Escherichia coli in the community and its association with use of cephalosporins in food animals; (2) in ovo use of ceftiofur and prevalence of ceftiofur resistance among retail chicken E. coli and retail chicken and human Salmonella Heidelberg; and (3) emerging antimicrobial resistance issues and challenges. The terms of references, action plans and recommendations arising from the 4 subcommittees are discussed.

In this report, proposals to improve the harmonisation of monitoring of prevalence, genetic diversity and antimicrobial resistance in methicillin-resistant Staphylococcus aureus (MRSA) from food-producing animals and food derived thereof by the European Union Member States are presented. The primary route of zoonotic transmission of MRSA is considered to be the direct or indirect occupational contact of livestock professionals with colonised animals, while the role of food as a source of human colonisation or infection is presently considered to be low. Sampling recommendations have therefore prioritised several different food-producing animal populations previously described as MRSA reservoirs and, to a lesser extent, food produced by these animals. Monitoring in primary production, including at slaughter, is pivotal because of the main transmission route, while additional monitoring in food may help with the assessment of consumers’ exposure via this route. A consistent monitoring in broiler flocks, fattening pigs and dairy cattle, as well as in veal calves under 1 year of age and fattening turkey flocks, in those countries where production exceeds 10 million tonnes slaughtered/year, is recommended every third year on a rotating basis. It is proposed that breeding poultry flocks and breeding pigs, as well as meat and raw milk products, are monitored on a voluntary basis. Representative sampling should be made within the framework of the national Salmonella control programmes for the poultry populations targeted, at the slaughterhouse for calves and either on farm or at the slaughterhouse for fattening pigs. Harmonised analytical methodologies for identification, typing and further characterisation of MRSA are proposed. The use of the microdilution method applied to a harmonised set of antimicrobials, and interpreted using EUCAST epidemiological cut-off values for antimicrobial susceptibility testing of MRSA, is recommended. Finally, full support is given to collection and reporting of isolate-based data, in particular to enable analysis of multi-resistance.
Antimicrobial resistance in staphylococci in small animals. (Special Issue: Clinical dermatology.)


Risk-mitigation for antimicrobial resistance in Danish swine herds at a national level.


In Denmark, actions to mitigate the risk related to antimicrobial resistance have been put in place continuously. Due to an increase in the consumption of antimicrobials in the Danish pig production further actions were implemented in July 2010. These were: a voluntary ban on use of cephalosporin in Danish swine herds for a 2-year period and a so-called Yellow Card scheme from the DVFA (Danish Veterinary and Food Administration). Farmers with the highest use of antibiotics receive a Yellow Card. In 2010, approximately 10% of Danish herds were above the Yellow Card threshold value. The consumption of antimicrobials in pigs is evaluated as ADD (animal daily doses) per 100 animals over the last 9 months (by age group). Current permit limits for a Yellow Card in ADD/100 animal days are 5.2 (sows and piglets), 28 (weaners), and 8 (finishers). In July 2010, farmers with an antimicrobial use close to these limits were warned by the DVFA, that unless actions were taken to reduce their antimicrobial use, they would receive a Yellow Card in December 2010. The means are, for instance, restrictions on oral medication usage and supervision from the authorities to which most expenses are to be covered by the farmer. The warning resulted in a decrease in the national consumption to pigs of 12.5% during the last half-year of 2010 compared to the same half-year in 2009. This decrease continued into 2011 where the consumption in January-February was 24.5% lower than for January-February 2010.
This report describes the annual consumption of antimicrobial agents by animals (pigs, cattle, poultry, aquaculture/fish and companion animals such as pets and horses) and humans and the occurrence of resistance in zoonotic, indicator and animal and human clinical bacteria in Denmark in 2011. Results from the monitoring programme as well as from selected research projects are presented in overview tables and figures. The report also includes a list of abbreviations, explanations of terminology and description of materials and methods. The specific minimum inhibitory concentration (MIC) distributions as well as some detailed tables of antimicrobial consumption in animals and humans are presented in a web annex located at www.danmap.org.

This work examines the antimicrobial resistance of potentially pathogenic bacteria (Staphylococcus pseudintermedius, Streptococcus canis, Escherichia coli) found in the vaginal tract in prepartum mammary secretions and postpartum milk of bitches housed in breeding kennels (N=20; 92 bitches). The kennels were divided into three categories: no routine antimicrobial administration around parturition (category 1); routine administration of one antibiotic around parturition (category 2); routine administration of multiple antimicrobials around parturition (category 3). Bacteriological cultures and antibiotic susceptibility tests were performed on vaginal specimens, prepartum mammary secretions, and postpartum milk. Stillbirths and neonatal deaths were recorded for each whelping and analyzed as "within-litter stillbirths" and "within-litter neonatal deaths" according to kennel category, by Pearson chi <sup>2</sup> test and the Kruskal-Wallis nonparametric test, respectively. The frequency of isolation and antimicrobial resistance of bacteria were analyzed according to kennel category by Pearson chi <sup>2</sup> test. Kennel category was not significantly associated with differing numbers of stillbirths or neonatal death events, nor was the frequency of isolation of potentially pathogenic bacteria in the three kennel categories significantly different. Kennel category 3 had a significantly higher frequency of isolation of multi-resistant gram-positive bacterial strains. Our results show that intense administration of antibiotics to breeding bitches does not effectively reduce neonatal mortality; on the contrary, it induces multi-resistance in potentially pathogenic bacteria. Breeders and veterinarians should be aware of the risk of selecting pathogenic bacteria by uncontrolled treatment in prepartum bitches.
This study aimed to determine the frequency as well as the antimicrobial susceptibility profile of staphylococci isolated from canine pyoderma. The isolated strains were identified by biochemical tests and characterized by their susceptibility to antibacterial agents. The coagulase positive specie S. pseudintermedius was the most prevalent (82.4%, 28/34), followed by coagulase negative species S. chromogenes (6.0%, 2/34), S. epidermidis (2.9%, 1/34), S. warneri (2.9%, 1/34), S. sciuri (2.9%, 1/34) and S. haemolyticus (2.9%, 1/34). High rates of resistance to lincomycin, ampicillin, penicillin G and tetracycline were observed, what is probably due to the frequent use of these antibiotics in veterinary practice. A 32.4% percentage of the strains has shown multi-drug resistance, including a S. pseudintermedius strain resistant to oxacillin. All strains were sensitive to gentamycin, amikacin, tobramycin, chloranphenicol, imipenem, cephalothin and vancomycin. These results indicate the occurrence of resistant staphylococci associated with canine pyoderma and point to the need of careful selection of antibiotics based on results of the susceptibility testing, in order to reduce the selection of multiresistant strains.

To determine associations between antimicrobial use and antimicrobial resistance in Campylobacter coli from grow-finish pigs in Japan. Logistic regression was used to identify risk factors to antimicrobial resistance in C. coli in pigs for the following antimicrobials: ampicillin, dihydrostreptomycin, erythromycin, oxytetracycline, chloramphenicol, and enrofloxacin. The data suggested the involvement of several different mechanisms of resistance selection. The statistical relationships were suggestive of co-selection; use of macrolides was associated with enrofloxacin.
resistance (OR=2.94; CI<sub>95%</sub>: 0.997, 8.68) and use of tetracyclines was associated with chloramphenicol resistance (OR=2.37; CI<sub>95%</sub>: 1.08, 5.19). The statistical relationships were suggestive of cross-resistance: use of macrolides was associated with erythromycin resistance (OR=9.36; CI<sub>95%</sub>: 2.96, 29.62) and the use of phenicols was associated with chloramphenicol resistance (OR=11.83; CI<sub>95%</sub>: 1.41, 99.44). These data showed that the use of antimicrobials in pigs selects for resistance in C. coli within and between classes of antimicrobials.

Accession Number
20123312610
Author
Kaesbohrer, A.; Schroeter, A.; Tenhagen, B. A.; Alt, K.; Guerra, B.; Appel, B.
Title
Emerging antimicrobial resistance in commensal Escherichia coli with public health relevance.
Source
Zoonoses and Public Health; 2012. 59(Suppl. 2):158-165. 27 ref.
Publisher
Wiley-Blackwell
Location of Publisher
Berlin
Country of Publication
Germany
Abstract
In 2009, 1462 Escherichia coli isolates were collected in a systematic resistance monitoring approach from primary production, slaughterhouses and at retail and evaluated on the basis of epidemiological cut-off values. Besides resistance to antimicrobial classes that have been extensively used for a long time (e.g. sulphonamides and tetracyclines), resistance to (fluoro)quinolones and third-generation cephalosporins was observed. While in the poultry production chain the majority (60%) of isolates from laying hens was susceptible to all antimicrobials tested, most isolates from broilers, chicken meat and turkey meat showed resistance to at least one (85-93%) but frequently even to several antimicrobial classes (73-84%). In the cattle and pig production chain, the share of isolates showing resistance to at least one antimicrobial was lowest (16%) in dairy cows, whereas resistance to at least one antimicrobial ranged between 43% and 73% in veal calves, veal and pork. Resistance rates to ciprofloxacin and nalidixic acid in isolates from broilers were 41.1% and 43.1%, respectively. Likewise, high resistance rates to (fluoro)quinolones were observed in isolates from chicken meat and turkey meat. In contrast, ciprofloxacin resistance was less frequent in E. coli isolates from the cattle and pig production chain with highest rate in veal calves (13.3%). Highest resistance rates to cephalosporins were observed in broilers and chicken meat, with 5.9% and 6.2% of the isolates showing resistance. In dairy cattle and veal, no isolates with cephalosporin resistance were detected, whereas 3.3% of the isolates from veal calves showed resistance to ceftazidime. Resistance to (fluoro)quinolones and cephalosporins in E. coli isolates is of special concern because they are critically important antimicrobials in human antimicrobial therapy. The emergence of this resistance warrants increased monitoring. Together with continuous monitoring of antimicrobial usage, management strategies should be regularly assessed and adapted.

Accession Number
20123289505
Author
Title
Prophylactic and metaphylactic antimicrobial use in Belgian fattening pig herds.
Source
Publisher
The monitoring of antimicrobial use is an essential step to control the selection and spread of antimicrobial resistance. Between January and October 2010 data on prophylactic and metaphylactic antimicrobial use were collected retrospectively on 50 closed or semi-closed pig herds. Ninety-three percent of the group treatments were prophylactic whereas only 7% were metaphylactic. The most frequently used antimicrobials orally applied at group level were colistin (30.7%), amoxicillin (30.0%), trimethoprim-sulfonamides (13.1%), doxycycline (9.9%) and tylosin (8.1%). The most frequently applied injectable antimicrobials were tulathromycin (45.0%), long acting ceftiofur (40.1%) and long acting amoxicillin (8.4%). The treatment incidences (TI) based on the used daily dose pig (UDD<sub>pig</sub>) or the actually administered dose per day per kg pig of a drug) for all oral and injectable antimicrobial drugs was on average 200.7 per 1000 pigs at risk per day (min=0, max=699.0), while the TI based on the animal daily dose pig (ADD<sub>pig</sub>) or the national defined average maintenance dose per day per kg pig of a drug used for its main indication) was slightly higher (average=235.8, min=0, max=1322.1). This indicates that in reality fewer pigs were treated with the same amount of antimicrobials than theoretically possible. Injectable products were generally overdosed (79.5%), whereas oral treatments were often underdosed (47.3%). In conclusion, this study shows that prophylactic group treatment was applied in 98% of the visited herds and often includes the use of critically important and broad-spectrum antimicrobials. In Belgium, the guidelines for prudent use of antimicrobials are not yet implemented.

Accession Number
20123270430

Author
Dias, C.; Mota, V.; Martinez-Murcia, A.; Saavedra, M. J.

Title
Antimicrobial resistance patterns of Aeromonas spp. isolated from ornamental fish.

Source
Journal of Aquaculture Research and Development; 2012. 3(3):131. 33 ref.

Publisher
OMICS Publishing Group

Abstract
The potential risk of occurrence of new diseases associated with the trade of live animals is well known. However, little importance is still given to the problematic of the dissemination of resistance genes that pass along with the animal trade. In this study we aimed to isolate Aeromonas spp. strains from water and skin of ornamental fish and test their resistance to antibiotics. The samples were collected from a national ornamental fish importer, with the intent of obtaining a collection of Aeromonas strains. The identification of the strains was made by gyrB and rpoD gene sequencing. A total of 288 strains grouped in seven different species - Aeromonas veronii, Aeromonas media, Aeromonas jandaei, Aeromonas hydrophila, Aeromonas caviae, Aeromonas culicicola, Aeromonas auricularum, were isolated. The susceptibility profile was determined for 28 antibiotics commonly used. All the strains presented multi-resistance to the tested antibiotics. The antibiotic susceptibility profile to tetracycline, ticarcillin, carbenicillin, ampicillin and erythromycin revealed resistance levels of more than 80%. Few strains resistant to aztreonam and imipenem were identified. On the other hand, all were sensitive to cefotaxime and cefepime. The results show that these Aeromonas spp. strains are potentially reservoirs of antibiotic resistance genes.
Antimicrobial resistance, virulence profiles, and phylogenetic groups of fecal Escherichia coli isolates: a comparative analysis between dogs and their owners in Japan.

In this study, fecal Escherichia coli isolates (n=188) from 34 dog-owner pairs and 26 healthy control humans (2 isolates per individual) were tested for susceptibility to 6 antimicrobials and screened for virulence genes. Genetic diversity between canine and owner isolates was evaluated by pulsed-field gel electrophoresis (PFGE). Canine isolates exhibited significantly different rates of resistance to four and two antimicrobials, compared to control and owner isolates, respectively. Of the genes examined, the prevalence of sfa, hly, and cnf genes in canine isolates were higher than in control isolates, but not than in owner isolates. These results suggest that characteristics of owner isolates are somewhat similar to canine isolates, compared to isolates from non-dog owners. In addition, PFGE analysis revealed that transfer of E. coli between owners and their dogs had occurred within 3/34 (8.8%) households. Considering the effects of dog ownership on the population of E. coli isolates from owners, further epidemiological studies are required.

Staphylococcus pseudintermedius, Staphylococcus intermedius and Staphylococcus delphini together comprise the S. intermedius group (SIG). Within the SIG, S. pseudintermedius represents the major pathogenic species and is involved in a wide variety of infections, mainly in dogs, but to a lesser degree also in other animal species and humans. Antimicrobial agents are commonly applied to control S. pseudintermedius infections; however, during recent years S. pseudintermedius isolates have been identified that are meticillin-resistant and have also proved to be resistant to most of the antimicrobial agents approved for veterinary applications. This review deals with the genetic basis of antimicrobial resistance properties in S. pseudintermedius and other SIG members. A summary of the known resistance genes and their association with mobile genetic elements is given, as well as an update of the known resistance-mediating mutations. These data show that, in contrast to other staphylococcal species, S. pseudintermedius seems to prefer transposon-borne resistance genes, which are then incorporated into the chromosomal DNA, over plasmid-located resistance genes.
Monitoring of antimicrobial resistance (AMR) in bacteria has clinical and public health significance. The present study determined prevalence of AMR in common mastitis pathogens Staphylococcus aureus, including methicillin-resistant Staph. aureus (MRSA; n=1,810), Escherichia coli (n=394), and Klebsiella species (n=139), including extended-spectrum beta-lactamase (ESBL)-producing E. coli and Klebsiella species, isolated from milk samples on 89 dairy farms in 6 Canadian provinces. Minimum inhibitory concentrations (MIC) were determined using the Sensititer bovine mastitis plate (Trek Diagnostic Systems Inc., Cleveland, OH) and a National Antimicrobial Resistance Monitoring System gram-negative panel containing antimicrobials commonly used for mastitis treatment and control. Denim blue chromogenic agar and real-time PCR were used to screen and confirm MRSA, respectively. Resistance proportion estimates ranged from 0% for cephalothin and oxacillin to 8.8% for penicillin in Staph. aureus isolates, and 15% of the resistant Staph. aureus isolates were multidrug resistant. One MRSA isolate was confirmed (prevalence: 0.05%). Resistance proportion estimates ranged from 0% for ceftriaxone and ciprofloxacin to 14.8% for tetracycline in E. coli, and 0% for amikacin, ceftiofur, ciprofloxacin, and nalidixic acid to 18.6% for tetracycline in Klebsiella species isolates. Further, 62.8 and 55% of the resistant E. coli and Klebsiella species isolates were multidrug resistant, respectively. Resistance to >5 and >2 antimicrobials was most common in E. coli and Klebsiella species isolates, respectively, and no ESBL producers were found. Prevalence of AMR in bovine mastitis pathogens was low. Most gram-negative udder pathogens were multidrug resistant; MRSA was rarely found, and ESBL E. coli and Klebsiella species isolates were absent in Canadian milk samples.

Objective - To compare methicillin-resistant Staphylococcus pseudintermedius (MRSP) and methicillin-susceptible S. pseudintermedius (MSSP) infections in dogs. Design - Multicenter case-control study. Animals - Dogs with MRSP infections were matched, by hospital, with 2 MSSP controls,
with the infections occurring immediately before and after the case infection. Procedures - Signalment, historical, clinical, treatment, and outcome data were documented. Conditional logistic regression was performed. A manual stepwise backward elimination procedure was used to build the multivariable model. Results - 56 case and 112 control dogs were enrolled. Pyoderma was the most common infection type in both groups. In the final multivariable model, systemic administration of antimicrobials within 30 days prior to infection was significantly associated with an MRSP versus an MSSP infection (OR, 9.9; 95% confidence interval, 3.59 to 27.53). Conclusions and Clinical Relevance - The association of prior antimicrobial administration and MRSP infection indicated the potential impact of routine antimicrobial use in veterinary medicine on antimicrobial resistance and the need for prudent use of these important drugs. Mortality rate was not significantly different between MRSP and MSSP infections; the lack of a significant difference suggested that MRSP was inherently no more virulent than MSSP, provided the infection was properly diagnosed and appropriate treatment was started. Basic concepts such as prudent antimicrobial use and early diagnosis through timely submission of appropriate culture specimens therefore can be important measures to try to reduce the impact of this pathogen.

<35>
Accession Number
20123180137
Author
Scott, L.; Menzies, P.; Reid-Smith, R. J.; Avery, B. P.; McEwen, S. A.; Moon, C. S.; Berke, O.
Title
Antimicrobial resistance in Campylobacter spp. isolated from Ontario sheep flocks and associations between antimicrobial use and antimicrobial resistance.
Source
Publisher
Wiley-Blackwell
Location of Publisher
Berlin
Country of Publication
Germany
Abstract
The objectives of this study were to determine the prevalence of antimicrobial resistance (AMR) in faecal Campylobacter spp. from lambs and adult sheep and associations between antimicrobial use (AMU) and AMR. A total of 275 faecal samples collected during initial and final visits from 51 sheep flocks, including one feedlot, across southern Ontario were tested for the presence of Campylobacter spp. Campylobacter jejuni was detected in 52% (143/275) of the faecal samples, Campylobacter coli in 7% (19/275), Campylobacter lari in 1% (2/275) and 2% (4/275) were non-speciated Campylobacter. Broth microdilution was used to test antimicrobial susceptibility of 162 isolates to nine antimicrobials. Campylobacter jejuni isolates (n=142) were resistant to tetracycline (39%), ciprofloxacin (4%), nalidixic acid (4%) and telithromycin (1%). C. coli isolates (n=19) were resistant to tetracycline (74%), and azithromycin, clindamycin, erythromycin, and telithromycin (5%). The C. lari isolate displayed resistance to nalidixic acid. No statistically significant associations were found between AMU and AMR during multivariate modelling in this study.

<36>
Accession Number
20113184562
Author
Title
Surveillance of resistance to beta-lactams in Escherichia coli: results from the Resapath surveillance network in France.
Source
Publisher
The Resapath is the French surveillance network for antimicrobial resistance in pathogenic bacteria of animal origin created by Anses in 2000. We analysed the Resapath findings about the resistance of Escherichia coli - the most common bacteria isolated from diseased food-producing animals - to beta-lactams - an antimicrobial class of major importance for both human and animal health - for the period 2006 to 2009. Resistance to amoxicillin is high in food-producing animals (45 to 77%), even if the effect is partially restored by clavulanic acid, but the phenomenon is stable for the past years. Resistance to last generation compounds of cephalosporin class is much lower (1 to 12%), but of major concern as it is increasing rapidly over the last few years in all animal sectors, mainly due to the presence of extended spectrum beta-lactamases. Resapath is an essential tool to provide the scientific community and authorities with reliable information on resistance trends by bacterial species and animal sectors in France, in order to implement recommendations and control measures.


The potential public and animal health impact of antimicrobial use and resistance in food animals is a contentious issue for industry, producers and veterinarians. To build collaboration in the development and implementation of a farm-based surveillance system that protects the biosecurity and confidentiality of data providers requires extensive consultation and transparency. Taking this approach, the CIPARS Farm program developed as a national network of volunteer sentinel swine veterinarians and producers that provides trend data on antimicrobial use and resistance. These data contribute to related animal and public health policies in Canada.
The increase in the prevalence of antimicrobial resistance has resulted in both human and veterinary antimicrobial use coming under increased scrutiny. The aim of this study was to characterise antimicrobial prescribing patterns in small-animal veterinary practices in the UK. A cross-sectional survey of UK small animal veterinarians was undertaken. A postal questionnaire to evaluate antimicrobial prescribing habits was sent to 900 clinicians. Data were collected on the clinicians, their practices and their sources of information regarding antimicrobials and their use. Respondents were asked if they would prescribe antimicrobials to animals described in four clinical scenarios, and, if so, to provide details of the prescription(s). Questionnaires were completed by 51% of the veterinarians. Only 3.5% of clinicians reported that their practice had an antimicrobial use policy. Penicillins were most commonly prescribed in three clinical scenarios, and 1st generation cephalosporins were most commonly prescribed in a scenario about canine pyoderma. In one scenario, fluoroquinolones and 3rd generation cephalosporins accounted for 10% and 13% of prescriptions respectively. Five percent of all prescriptions were under the recommended dose and 20% were over the recommended dose. Overall, 2.3% of prescriptions were not licensed for use in dogs or cats in the UK. Associations between the use of various antimicrobial drugs and independent variables were analysed using multivariable logistic regression models. Off-license prescriptions and inaccurate dosing of antimicrobials by small-animal clinicians in the UK appears to occur. Antimicrobial use guidelines are rare in small animal practice. The introduction of such guidelines has been shown to lead to more appropriate use of antimicrobials and is therefore recommended.
Surveillance of antimicrobial use and resistance is needed to manage antimicrobial resistance in bacteria. In this study, data were collected on antimicrobial use and resistance in Staphylococcus aureus (n=562), isolated from intramammary infections and (sub)clinical mastitis cases on 89 dairy farms in 4 regions of Canada [Alberta, Ontario, Quebec, and the Maritime Provinces (Prince Edward Island, Nova Scotia, and New Brunswick)]. Dairy producers were asked to deposit empty drug containers into specially provided receptacles, and antimicrobial drug use rate was calculated to quantify antimicrobial use. Minimum inhibitory concentrations were determined using the Sensititer bovine mastitis plate system (TREK Diagnostic Systems Inc., Cleveland, OH), containing antimicrobials commonly used for mastitis treatment and control. Multivariable logistic regression models were built to determine herd-level risk factors of penicillin, ampicillin, pirlimycin, penicillin-novobiocin combination, tetracycline and sulfadimethoxine resistance in Staph. aureus isolates. Intramammary administration of the penicillin-novobiocin combination for dry cow therapy was associated with penicillin and ampicillin resistance [odds ratio (OR): 2.17 and 3.10, respectively]. Systemic administration of penicillin was associated with penicillin resistance (OR: 1.63). Intramammary administration of pirlimycin for lactating cow mastitis treatment was associated with pirlimycin resistance as well (OR: 2.07). Average herd parity was associated with ampicillin and tetracycline resistance (OR: 3.88 and 0.02, respectively). Average herd size was also associated with tetracycline resistance (OR: 1.02). Dairy herds in the Maritime region had higher odds of penicillin and lower odds of ampicillin resistance than dairy herds in Quebec (OR: 2.18 and 0.19, respectively). Alberta dairy herds had lower odds of ampicillin and sulfadimethoxine resistance than dairy herds in Quebec (OR: 0.04 and 0.08, respectively). Ontario dairy herds had lower odds of tetracycline and sulfadimethoxine resistance than dairy herds in Quebec (OR: 0.05 and 0.33, respectively). Herd-level use of certain antimicrobials administered for mastitis treatment and control, such as intramammary penicillin and pirlimycin as well as systemically administered penicillin and florfenicol, was positively associated with antimicrobial resistance in bovine mastitis pathogens in the field conditions. Differences in antimicrobial resistance outcomes across 4 regions of Canada were observed.
surveys. Two experiments were performed to colonize pigs and quantify transmission of LA-MRSA between pigs. In the first experiment, colonization of six-week old piglets failed after intranasal inoculation, confirming the complexity of MRSA-colonization. In the second experiment, naive pigs got colonized after exposure to orally inoculated pigs. Subsequently, these contact-infected pigs transmitted MRSA to a new group of naive pigs. The reproduction ratio, R<sub>0</sub>, was estimated with a SIS-model to quantify transmission between the first and second contact pigs as this resembles more the natural transmission. Two scenarios were evaluated, with different assumptions regarding infection status of individual pigs. R<sub>0</sub> varied between 3.7 and 4.3 and was significantly above 1, indicating a high probability of persistence of LA-MRSA, even without antimicrobial use.

Accession Number
20123129030
Author
Boothe, D. M.
Title
Impact of routine antimicrobial therapy on canine fecal Escherichia coli antimicrobial resistance: a pilot study.
Source
Publisher
Veterinary Solutions LLC
Location of Publisher
Apopka
Country of Publication
USA
Abstract
Increased prevalence of antimicrobial resistance in various bacterial species from pet animals has been reported in the United States and the United Kingdom, with resistance generally associated with antimicrobial therapy. Increased prevalence of antimicrobial resistance in various bacterial species from pet animals has been reported in the United States and the United Kingdom, with resistance generally associated with antimicrobial therapy. This study was performed in order to investigate the feasibility of a larger scale study that would focus on the impact of antimicrobial therapy on the fecal flora of normal dogs. Either amoxicillin or enrofloxacin administered at recommended dosing regimens is associated with rapid development of high level antimicrobial resistance to that drug by the majority of fecal coliform, and particularly E. coli. Resistance associated with amoxicillin resolved when therapy is discontinued. In contrast, resistance to enrofloxacin persisted.

Accession Number
20123128193
Author
Jensen, L. B.; Angulo, F. J.; Molbak, K.; Wegener, H. C.
Title
Human health risks associated with antimicrobial use in animals.
Source
Publisher
Wiley-Blackwell
Location of Publisher
Chichester
Country of Publication
UK
Abstract
This chapter discusses the association between antimicrobial use and occurrence of antimicrobial resistance in animals, foodborne, direct and environmental transmission of antimicrobial resistance.
from animals to humans and consequences of antimicrobial resistance in human infections with zoonotic bacteria.

Accession Number
20123104181
Author
KuKanich, K. S.; Ghosh, A.; Skarbek, J. V.; Lothamer, K. M.; Zurek, L.
Title
Surveillance of bacterial contamination in small animal veterinary hospitals with special focus on antimicrobial resistance and virulence traits of enterococci.
Source
Publisher
American Veterinary Medical Association
Location of Publisher
Schaumburg
Country of Publication
USA
Abstract
Objective - To determine the prevalence of bacterial contamination on 4 surfaces of 4 types of standard equipment in small animal veterinary hospitals. Design - Surveillance study. Sample - 10 small animal veterinary hospitals. Procedures - Each hospital was visited 3 times at 4-month intervals; at each visit, a cage door, stethoscope, rectal thermometer, and mouth gag were swabbed. Swab samples were each plated onto media for culture of enterococci and organisms in the family Enterobacteriaceae. Enterococci were identified via a species-specific PCR assay and sodA gene sequencing; species of Enterobacteriaceae were identified with a biochemical test kit. Antimicrobial susceptibility was assessed via the disk diffusion method. Enterococci were screened for virulence traits and genotyped to assess clonality. Results - Among the 10 hospitals, enterococci were isolated from cage doors in 7, from stethoscopes in 7, from thermometers in 6, and from mouth gags in 1; contamination with species of Enterobacteriaceae was rare. Enterococci were mainly represented by Enterococcus faecium (35.4%), Enterococcus faecalis (33.2%), and Enterococcus hirae (28.3%). Antimicrobial resistance was common in E. faecium, whereas virulence traits were present in 99% of E. faecalis isolates but not in E. faecium isolates. Clonal multidrug-resistant E. faecium was isolated from several surfaces at 1 hospital over multiple visits, whereas sporadic nonclonal contamination was detected in other hospitals. Conclusions and Clinical Relevance - Contamination of surfaces in small animal veterinary hospitals with multidrug-resistant enterococci is a potential concern for pets and humans contacting these surfaces. Implementing precautions to minimize enterococcal contamination on these surfaces is recommended.

Accession Number
20123082505
Author
Pipova, M.; Jevinova, P.; Kmet', V.; Regecova, I.; Maruskova, K.
Title
Antimicrobial resistance and species identification of staphylococci isolated from the meat of wild rabbits (Oryctolagus cuniculus) in Slovakia.
Source
Publisher
Springer Berlin
Location of Publisher
Heidelberg
Country of Publication
Germany
Abstract
In 2009, a total of 113 strains of staphylococci were isolated from the thigh muscles of ten hunted and 20 farmed wild rabbits (Oryctolagus cuniculus) in the Slovak Republic. Only two isolates (1.8%) possessed coagulase activity, the rest of 111 staphylococcal isolates were coagulase-negative. Among them, six isolates (5.4%) showed the production of DNase. In each isolate, resistance to eight antibiotics by means of agar dilution test was tested. Based on these results, 110 isolates were found to be resistant to at least one antibiotic. Only one isolate was susceptible to all eight antibiotics tested. Another two isolates were susceptible, however, they showed intermediate susceptibility to cefoxitin. Resistance to ampicillin (78.8%), erythromycin (58.4%), penicillin (51.3%) and oxacillin (46.0%) was found most frequently. Twenty-six isolates (23.0%) were resistant to novobiocin. On the other hand, resistance to cefoxitin (8.0%) and gentamicin (1.8%) were quite rare. Fifteen percent of isolates were resistant to one antibiotic, simultaneous resistance to two, three, four and five antibiotics was confirmed in 22.1%, 23.9%, 21.2% and 13.3% of isolates, respectively. Except for two coagulase-positive Staphylococcus aureus isolates (1.8%), seven species of coagulase-negative staphylococci were identified using the MALDI BioTyper (TM) system as follows: Staphylococcus warneri (45.1%), Staphylococcus epidermidis (21.2%), Staphylococcus pasteurii (13.3%), Staphylococcus xylosus (8.0%), Staphylococcus capitis (7.1%), Staphylococcus haemolyticus (1.8%) and Staphylococcus cohnii ssp. cohnii (1.8%).

### Accession Number
20123023937

### Title
The FECAVA Hygiene and Antimicrobial Resistance Symposium, Geneva, Switzerland, June 2010.

### Source

### Publisher
Federation of European Companion Animal Veterinary Associations (FECAVA)

### Location of Publisher
Paris

### Country of Publication
France

### Abstract
The Federation of European Companion Animal Veterinary Associations (FECAVA) Hygiene and Antimicrobial Resistance Symposium was held during the FECAVA/WSAVA Congress in Geneva Switzerland last June 2010. Some of the world's most well know speakers with expertise on the subject were invited as guest speakers. The Symposium was attended by a large number of delegates and the lectures were very much appreciated. The topics of papers focused on hygiene and the importance of preventing the transmission of nosocomial infection present or incubating on admission but acquired in the hospital. Factors on how infections are spread from the environment, between staff and patient or between patients, through direct or indirect transmission were also highlighted. Emphasis on one of the most serious nosocomial transmissions such as methicillin-resistant Staphylococcus aureus (MRSA) and methicillin-resistant Staphylococcus pseudintermedius (MRSP) were the focused of some of the papers. Effective implementation of hygienic measures to prevent and contain the transmission of nosocomial infections to animals and humans both within veterinary settings and in the community was also given special attention. The role of veterinarians to communicate, educate and give guidelines to animal owners was also included.

### Accession Number
20123014447

### Author
Leonard, E. K.; Pearl, D. L.; Finley, R. L.; Janecko, N.; Reid-Smith, R. J.; Peregrine, A. S.; Weese, J. S.

### Title
Comparison of antimicrobial resistance patterns of Salmonella spp. and Escherichia coli recovered from pet dogs from volunteer households in Ontario (2005-06).

### Source
Objectives: To compare the antimicrobial resistance (AMR) patterns of Salmonella spp. and Escherichia coli in the faeces of pet dogs from volunteer households in Southwestern Ontario, Canada. Methods: From October 2005 to May 2006, 138 dogs from 84 Ontario households were recruited to participate in a cross-sectional study. Five consecutive daily faecal samples were collected from each dog and cultured for Salmonella spp. and E. coli. A panel of 15 antimicrobials from seven antimicrobial classes was used for susceptibility testing. Results: E. coli and Salmonella spp. were recovered from 96.4% and 23.2% of dogs, respectively. In total, 515 bacterial isolates from 136 dogs from 83 households were sent for antimicrobial susceptibility testing with 80.4% of isolates being pan-susceptible. The most common resistance pattern was to amoxicillin/clavulanic acid, ampicillin, cefoxitin, cephtriur and cefotaxone, present in 13.3% of Salmonella isolates and 1.3% of E. coli isolates. Fifty-eight of the isolates were resistant to two or more drug classes, with 70.7% and 29.3% being E. coli and Salmonella, respectively. Based on multilevel logistic regression, the odds of resistance were greater in E. coli than Salmonella [odds ratio=3.2; 95% confidence interval (CI)=1.22-8.43]. Agreement in resistance between E. coli and Salmonella isolates from the same dog was low [prevalence-adjusted, bias-adjusted kappa (PABAK)=0.38; 95% CI=0.30-0.46]. Conclusions: Pet dogs are a potential household source of antimicrobial-resistant Salmonella spp. and E. coli. However, extrapolating the epidemiology of antimicrobial resistance in pathogens, like Salmonella, from E. coli should be done with caution.