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DOGS AND DOG-ASSOCIATED PEOPLE IN THAILAND SHARED COMMON AND VARIOUS CLONES OF METHICILLIN-RESISTANT COAGULASE-POSITIVE STAPHYLOCOCCI

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Topic: 6. Epidemiology and Infectious Diseases / Zoonoses

The purposes of this study were to investigate the prevalence and relations of methicillin resistant coagulase-positive staphylococci (MRCoPS) colonization among Thai dogs, dog’s owners, veterinarians, and people who were not associated to pet, by mean of multilocus sequence typing (MLST). A high significant relation between MRCoPS and dog associated people was confirmed. Methicillin-resistant *Staphylococcus pseudintermedius* was majorly recovered from dogs (45%) followed by veterinarians (8%) and dog’s owners (3%), respectively. A total of 18 sequences types (STs) of MRSP were presented comprising 4 typeable and 2 untypeable SCC*mec*. The ST45 carrying *SCCmec* 131 was the major sequence type in both Thai dogs and veterinarians. The strain “ST45, *SCCmec* 131 and Cfr9I-B/PFGE” was the predominant MRSP. MLST-7 was revealed at least 13 novel types of MRSP. On the other hand, the low prevalence of methicillin-resistant *S. aureus* (MRSA) typed “ST398, *SCCmec* type V and Cfr9I” were the sole strain from dogs and veterinarians (at 1-1.5%). In addition, methicillin-resistant *S. schleiferi* subsp. *coagulans* were recovered from dogs, owners, and veterinarians at 17, 3, and 2%, respectively, with 6 different PFGE patterns. The high variety of canine methicillin resistant staphylococci in Thailand was detected together with proposal of the novel sequence types. The possibility of human carriage canine MRCoPS was strongly confirmed especially in veterinarians.
NOVEL TARGETING TOOLS FOR CONTROL OF DISEASE-BORNE VECTORS OF MEDICAL AND VETERINARY SIGNIFICANCE

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**Topic:** 6. Epidemiology and Infectious Diseases / Vector-Borne Diseases

Numerous ectoparasites present a significant vector risk to livestock, wildlife and companion animals. Many members of the Acari Family (ticks and mites) and numerous fly species serve as mechanical and/or biological vectors for multiple pathogens of concern. Minimising disease spread by targeting these vectors is hampered by limitations on pesticide development/use, efficacy (due to resistance), and the animal welfare and environmental implications of synthetic chemical use. Seeking new ways to target ectoparasites is therefore of critical importance.

To this end research our research group focuses strongly on the following interventions:

1. **NOVEL PRODUCTS:** Investigating plant derived products, such as essential oils and their terpenoid components, as novel pesticides and/or repellents.

2. **TARGETTING RESISTANCE:** Identifying metabolic enzymes, in particular cytochromes P450, involved in detoxification of pesticides leading to resistance.

3. **VACCINE DEVELOPMENT:** The identification of potential vaccine antigens for animal immunisation against ectoparasites employing a reverse vaccinology approach.

4. **BIOLOGICAL CONTROL:** Using conserved or augmented pest natural enemies to keep pest populations in check.

Our work focuses primarily on mosquitoes, ticks and mites, these being among the most significant vectors of veterinary disease, including (but not limited to); Lyme’s disease, encephalitis, fowlpox, babesiosis, tick-borne fever and salmonellosis. This presentation will review work that our group has undertaken in the last decade with these arthropod pests, with particular reference to *Anopheles* mosquitoes, ticks (*Rhipicephalus (Boophilus) microplus* and *Ixodes sp*) and the poultry red mite (*Dermanyssus gallinae*), also highlighting the known and emerging vector potential of each.
SEROSURVEY OF CANINE DISTEMPER, CANINE PARVOVIRUS, TOXOPLASMA GONDII AND FELINE LEUKEMIA VIRUS IN CARNIVORES IN THE ARAUCANIA REGION IN CHILE

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Topic: 6. Epidemiology and Infectious Diseases / Emerging Diseases

Domestic carnivores are recognized as the reservoir for many pathogens of wild carnivores including canine distemper virus (CDV), canine parvovirus (CPV) Toxoplasma gondii and Feline Leukemia virus (FeLV). The goal of this study was to assess the exposure of these pathogens in domestic and free-ranging carnivores. From 2010 to 2012 dogs and cats from 804 households in the cities of Angol and Curacautin and rural areas around them in the Araucania region in Southern Chile were enrolled in the study. Additionally, 31 free-ranging foxes were trapped and sampled. Overall, 498 dogs and 172 cats were sampled, blood centrifuged and sera kept at -20°C until analysis. Seropositivity to CDV and CPV was analyzed using an IgG ImmunoComb® test for dogs and seroneutralization test in foxes. T. gondii was analyzed using an agglutination test and FeLV by an Elisa test in cats. Chi-square and Fisher test were used to compare seroprevalences between wild and domestic canids and between seroprevalences in rural and urban domestic carnivores. The seroprevalence of CDV was 32% and 6%, and for CPV was 54% and 16% for dogs and foxes, respectively. In cats, seroprevalences to T. gondii and FeLV was 29% and 13%, respectively. Higher prevalence was found for CDV and CPV in domestic canids. No differences were found in CPV and FeLV between cities or sites. In the more populated city of Angol a lower T. gondii infection in cats and higher CDV seroprevalence in dogs was found. This study was funded by Fondecyt Nº 11100303.
EFFECTIVENESS AND IMPORTANCE OF ON-FARM BIOSECURITY MEASURES IN SWITZERLAND

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Topic: 6. Epidemiology and Infectious Diseases / Biosecurity

In livestock production, the term biosecurity describes all measures implemented to prevent infectious agents from entering and spreading within an animal production unit. Although literature provides a number of recommendations on biosecurity measures to be implemented, few data are available on the effectiveness of individual measures. Expert elicitations are commonly used for gathering data when these are insufficient. In a modified Delphi method the effectiveness and the importance of on-farm biosecurity measures were evaluated by Swiss disease specialists for cattle and swine. The importance was assessed for the current situation in Switzerland, whereas the effectiveness was evaluated based on the characteristics of specific pathogens. The cattle pathogens considered were those causing Bluetongue (BT), Bovine Viral Diarrhea (BVD), Foot and Mouth Disease (FMD) and Infectious Bovine Rhinotracheitis (IBR). Swine experts assessed those causing African Swine Fever (ASF), Enzootic Pneumonia (EP), Porcine Reproductive and Respiratory Syndrome (PRRS) and again Foot and Mouth Disease (FMD). Examples of very important measures include “raising disease awareness” and “quarantine practices” for cattle and swine farms respectively. The effectiveness varied among the different pathogens evaluated, with “prevention of contact with wild animals” for ASF and “purchase of cattle from farms with known disease status” for BVD and IBR being examples of very effective measures. A medium to strong correlation between importance and effectiveness indicates that differentiating between these two terms was not always possible. Reliability of the cattle expert assessments was between 51% and 73% for the measures of importance and effectiveness.
RISK ANALYSIS OF BIOSECURITY PRACTICES OF SMALL RUMINANT VETERINARIANS

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Topic: 6. Epidemiology and Infectious Diseases / Biosecurity

Intensive farming systems as seen in the pig and poultry industry have had stringent biosecurity practices in place for many years. The fact that these farming practices use intensive farming on relatively small areas of land per animal allows for these industries to control the biosecurity practices more easily by making use of vehicle disinfection, “shower in” systems, footbaths and controlled access. These methods are not practical when it comes to extensive farming systems where larger areas of land per animal are utilised.

A survey was conducted during the course of the World Veterinary Congress in Cape Town 2011 where approximately 80 veterinarians participated. The survey assessed what practices are currently being used and which threats veterinarians felt were important to consider. Participants practiced in Africa, the United Kingdom, the United States of America and Europe with the majority of participants practicing in South Africa.

While the South African participants perceived the purchasing of new stock to be the largest biosecurity risk, participants from Europe, the UK and USA perceived vehicle movement to be a large threat and ranked the purchase of new stock second. None of the participants expressed concern that veterinarians could be transmitting diseases between farms as this was ranked very low on the list. The relevant threats involved in vehicle movement, purchasing of new stock, the role veterinarians play in controlling these, the biosecurity risk that veterinarians themselves pose and practical measures that can be taken to reduced these risks, are discussed.
Farmers in the UK have expressed concern with regards to the ‘best practice’ to vaccinate their cattle. The existing evidence indicates a lack of compliance from farmers with regards to correct application of a vaccine. The aim of this study was to investigate current uptake and use of vaccines available to the dairy and beef industry in the UK.

An online and paper based questionnaire was distributed to dairy and beef farmers throughout the UK between September and October 2011. The questionnaire collected information on which vaccines were used, how and why farmers were using these vaccines and requested descriptive information about the respondent.

Results indicate a vast variety of vaccine uptake and use amongst farmers. In addition, the farmer’s assumptions with regards to the effect of vaccination are frequently inaccurate. Compliance of respondents with regards to the correct execution of the vaccination appeared to be adequate. The veterinarian is seen as an influential adviser on vaccination. The reason to choose a particular type of vaccine and vaccination protocol against a disease syndrome (e.g. respiratory disease) is often unclear to the farmer. There is opportunity to improve evidence based advice from an independent adviser, such as the veterinarian. The research was confined to the UK, however conclusions from this study are expected to be relevant in countries where vaccination of cattle is common.

This presentation will provide evidence for the notion that successful disease control by vaccination is dependent on more than the quality aspects of the vaccine alone.
WEST NILE VIRUS SEROSURVEILLANCE IN HORSES – A EARLY WARNING MODEL FOR HUMAN CLINICAL CASES

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Topic: 6. Epidemiology and Infectious Diseases / Zoonoses

West Nile Virus (WNV) is emergent pathogen of different species including horses and humans as an incidental host. Surveillance of WNV as important zoonotic pathogen is established in many countries with different surveillance program which in general includes surveillance of birds, vectors, sentinel animals and clinical cases.

In Croatia surveillance program has been introduced since 2010 and it is based on detection of WNV specific IgG antibodies in randomly selected horses. During 2012 bird and mosquito surveillance program had been introduced. Also equine surveillance system was expanded with detection of IgM positive horses, as confirmation of acute infection.

In the summer 2012 first clinical cases of WNV infection in human were confirmed in Croatia. Epidemiological analysis showed that human clinical cases were recorded in the areas with increased WNV seroprevalence in horses. In these areas acute infections in horses were confirmed almost a month earlier. No increased bird mortality or positive mosquito pools were recorded in that transmission season.

Based on the results we concluded that increase in seroprevalence in horses determined the areas of high risk for public health. Furthermore, confirmation of acute infections in horses made possible to predict even the time when human cases are most probable to occur.

Absence of bird mortality and lack of positive mosquito pools in Croatian areas with confirmed WNV activity makes WNV serosurveillance in horses the most suitable method to predict area and even the time of highest risk of WNV infection in humans in Croatia.
DETECTION OF HUMAN-INFECTIVE TRYPANOSOMES IN CLINICAL SAMPLES FROM DOMESTIC ANIMALS AND TSETSE FLIES FROM ZAMBIA’S TSETSE-INFESTED REGIONS USING LAMP

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Topic: 6. Epidemiology and Infectious Diseases / Zoonoses

Trypanosomiasis is one of the re-emerging debilitating diseases of livestock and humans in sub-Saharan Africa, caused by various trypanosome species transmitted by tsetse flies. Several domestic and wild animals act as reservoirs of various trypanosome species. In Zambia, Human African trypanosomiasis (HAT) is endemic in Luangwa valley and there are increasing unpublished cases being reported in HAT old foci. Current available parasitological methods used for trypanosomiasis diagnosis are either less sensitive, unable to accurately identify species and may sometimes be laborious. Loop-mediated isothermal amplification (LAMP) is a novel strategy which amplifies DNA with high sensitivity and rapidity under isothermal conditions. In the present study, the performance of trypanosome-species-specific LAMP including the human serum resistance-associated gene (SRA)-LAMP assay were evaluated using clinical specimens obtained from domestic animals and tsetse flies from Zambia’s Luangwa and Zambezi river valleys.

Various animal-infective trypanosome species including Trypanosoma congolense, T. brucei brucei and T. vivax were detected by trypanosome-species-specific LAMP. Importantly, we detected the human-infective T. b. rhodesiense by SRA-LAMP (confirmed by SRA-PCR) in cattle (1%), and dogs (5.3%), suggesting their possible role in HAT epidemiology. The prevalence of T. b. rhodesiense in tsetse vectors was 3.3% (19/576), exclusively involving Glossina morsitans morsitans. LAMP is thus a potential simple and cost-effective tool for diagnosis of trypanosomes and other infections in resource-limited endemic regions. Satellite analysis further revealed a similar genotype of T. b. rhodesiense circulating among tsetse vectors and mammalian hosts.
ECO-EPIDEMIOLOGY APPROACH AND ENVIRONMENTAL SURVEILLANCE AS STRATEGIES FOR UNDERSTANDING MOVEMENT OF BRAZILIAN SPOTTED FEVER RICKETTSIAE IN DISTRITO FEDERAL, BRAZIL.

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Topic: 6. Epidemiology and Infectious Diseases / Vector-Borne Diseases

Known as Brazilian Spotted Fever (BSF) this rickettsiosis mainly caused by *Rickettsia rickettsii* is the only and the most important tick borne infectious disease of compulsory notification in Brazil. The great importance of the BSF in Brazilian Public Health is related to the increasing number of cases, the identification of new areas of transmission and its epidemiological characteristics presenting high endemicity and lethality. This zoonosis is maintained in nature by a complex epidemiological scenario involving mainly arthropods (especially ticks) and mammals. The Project "Rickettsiosis from Cerrado" studies the biodiversity of potential vectors of rickettsial diseases in domestic and wild animals in the Distritio Federal, Brazil. The preliminary results demonstrate high titers for seroepidemiological rickettsiae of the spotted fever group (GFM), between the canine population highlighting these animals as excellent epidemiological sentinels for the infection. This project is being carried out by a technical-scientific partnership between the University of Brasilia (UnB), the Government of the Distritio Federal (GDF), the National Reference Laboratory of Vectors of Rickettsial Diseases (Fiocruz, RJ), and also with the collaboration of the Surveillance and Control Ticks Program (PVCC), from Americana municipality in São Paulo, Brazil. This project shows the importance of this inter institutional partnership and mainly discusses under an eco-epidemiological approach (ecosystemic approach in health) the supports for the environmental surveillance program as a successful strategies for understanding the occurrence and circulation of rickettsiae GFM. More than treat clinical cases is important to know about the biological and social scenario in which these pathogens circulate.
VACCINE TRIAL OF RECOMBINANT SCHISTOSOMA JAPONICUM PARAMYOSIN IN WATER BUFFALOES

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Topic: 6. Epidemiology and Infectious Diseases / Zoonoses

The overall aim of this project is to assess the safety and immunogenicity of the Schistosoma japonicum vaccine Paramyosin among water buffalos residing in endemic areas. The study was conducted in four villages in Leyte, Philippines, an area highly endemic for schistosomiasis japonica. One hundred fifteen (N=115) animals provided baseline stool samples for coprologic examination, with preliminary results using FLOTAC showing a 10% prevalence of schistosomiasis. Forty-nine (N=49) animals consented to treatment with 25 mg/kg Praziquantel, and 40, 36 and 32 animals consented to the first, second and third dose of the paramyosin vaccine, respectively. The safety trial involved the first 20 animals and included skin testing, vaccination, anaphylaxis monitoring, and hematology and serum chemistry analysis. Skin tests revealed that only 3 out of 20 animals exhibited redness at the injection site, with none greater than 1 cm. None of the animals exhibited anaphylaxis, and all hematology and serum chemistry markers were within normal range or were similar to pre-vaccination levels. None of the 40 animals administered with the first dose exhibited anaphylaxis, nor any of the subsequent vaccine doses. Immunogenicity assessment of sera collected prior to every vaccination and one month after the last dose showed that the paramyosin vaccine induced robust antibody responses to all animals, as assessed by ELISA. Analysis of cytokine levels of whole blood culture supernates are forthcoming. Overall, this project has demonstrated that the Schistosoma japonicum paramyosin vaccine is safe, well-tolerated, and immunogenic among water buffalos residing in endemic areas.
THE REPTILES AS A RESERVOIR OF VIRAL INFECTIONS: IS A REAL THREAT FOR HUMANS AND WARM-BLOODED ANIMALS HEALTH?

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**Topic:** 6. Epidemiology and Infectious Diseases / Emerging Diseases

In the last decades, due to changing environments, increasing tourism, international traffic and trade in exotic animals, concern about the risks of spreading pathogens remains high among epidemiologists, virologists and veterinary authorities. It is true that risk is proportional to the volume of trade and the volume of animal trade is increasing significantly. Particularly acute this issue is in Eastern Europe. These countries are not only an outlet for such animals, but also their transit, export, and reexport nidus. The main suppliers of reptiles, amphibians and other exotic animals for Russian and Ukrainian «black market» are countries of South-Eastern Asia, South America, and Africa; most of them are source of numerous dangerous viral infections. Among such infections there are also ones whose vectors and/or intermediate hosts may be also cold-blooded animals.

Also the question of viruses of lower vertebrates recently became a field of interest to the public due to increasing epizootics and economic losses of poikilothermal animals. These were reported worldwide from both wildlife and collections of poikilothermal animals. Some viruses seem to be emerging pathogens involved in the worldwide decline in wildlife. The virus infections may be involved in the reduction in the numbers of endangered amphibian and reptile species.
DESCRIPTIVE EPIDEMIOLOGY OF MORTALITY IN CAPTIVE UNGULATES

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Postmortem record of 217 captive ungulates including Black buck (31), Chinkara (20), Hog deer (116), Spotted deer (35), Red Deer (04) and Rusa deer (11) submitted to the Veterinary Research Institute, Lahore, Pakistan was analyzed to determine the primary cause of mortality in these animals. The submissions included temporal distribution from Government wildlife captive farms, zoo and private ownerships, over a three year period (2007-2009). The most common cause of death was found to be trauma (20.27%), followed by parasitic diseases (15.67%), bacterial diseases (11.98%), still births (9.21%), snakebites (2.76%), gut affections (2.30%), neoplasia (1.38%) and starvation (0.92%). The exact cause of death could not be determined in 77 of 217 animals. Pneumonia (8.29%) and tuberculosis (3.69%) were the most common bacterial diseases. Analyses for parasitic infestation revealed tapeworms to be highest (11.05%), followed by roundworms (8.29%) and hemoparasitism (5.07%) (babesiosis and theileriosis). Mortality rate in young ungulates was lower as compared to adults (32.26% and 67.74%). Gender wise data presented higher mortality in females (55.30%) compared to males (44.70%). In conclusion, highest mortality factor in captive ungulates was trauma, followed by parasitic and bacterial infestations/infections of tapeworms and pneumonia, respectively. Furthermore, necropsies provided substantial information on etiology of death and other related epidemiological aspects.
In 2001, New Zealand introduced controls on the import of uncooked pig meat from countries where the disease porcine reproductive and respiratory syndrome (PRRS) was present. This was in response to research showing PRRS may be transmitted to uninfected animals by feeding them on meat taken from the carcasses of pigs with PRRS. This decision was considered to be a ‘provisional measure’, permitted under the World Trade Organisation Sanitary and Phytosanitary (SPS) Agreement when decisions must be made without full information being available.

A qualitative import risk analysis in 2006 estimated a non-negligible risk for PRRS virus (PRRSv) in imported pig meat for small, non-commercial, or marginally commercial breeding herds that are not complying with New Zealand’s garbage feeding regulations and for herds with inadequate biosecurity practices. It was proposed that this risk could be managed by restricting pig meat imports from countries with PRRSv to cuts that would require minimal trimming or cutting during preparation as these would be associated with a lower likelihood of generating scraps prior to cooking.

A series of qualitative models were developed to explore the likelihood of PRRSv entry and exposure associated with this proposed risk management measure. The final model developed from this process estimated that the proposed risk management measure would result in 1,200 years between PRRSv introductions resulting in outbreaks, with 95% confidence that this time ranges roughly from 52 to 6,150 years.
THE ILLEGAL WILDLIFE TRADE AND ITS IMPLICATIONS FOR VETERINARY AND PUBLIC HEALTH

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Topic: 6. Epidemiology and Infectious Diseases / Spread of Pathogens through International Trade

For decades the illegal trade of wild animals has been thriving. This has again be shown during the 16th CITES (Convention on Illegal Trade in Endangered Species) meeting of the Conference of the Parties (CoP16) in Bangkok, Thailand, in March 2013.

Despite continuing law enforcement efforts, increasing numbers of wild animal species are traded illegally worldwide.

Using the example of the illegal ape trade from Africa to Europe, the Middle East and Asia we highlight the danger of the spread of pathogens to animals and humans through this illegal trade.

Apes, mainly babies and youngsters, are captured illegally from the wild, often by extinguishing the rest of their families, and are shipped to far away destinations.

In many cases these animals are accompanied by fraudulent veterinary health and CITES certificates. Therefore, nothing is known about their real disease status.

The stress of capture, transport and captivity, which seriously weakens their immune system, can furthermore contribute to the emergence of disease. At the same time, most of these animals are exhibited to the public and tourists are encouraged to get close to them and get their pictures taken with them.

This close contact with wild, non-human primates of often unknown origin and health status entails a serious public health risk as well as a serious risk of disease spread to other animal species they come in contact with during their journey and at their final destination.
CONSENSUS-BASED APPROACH TO ASSESS THE RISK OF ENTRY OF THE BEE PEST AETHINA TUMIDA


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Topic: 6. Epidemiology and Infectious Diseases / Spread of Pathogens through International Trade

A consensus-based import risk assessment approach was developed that provides an overall risk score per risk pathway as well as the possibility to rank risk factors between pathways, even in absence of quantitative data. The approach is applied to assess the risk of entry of the bee pest Aethina tumida (small hive beetle, SHB). In the late nineties, SHB started its spread, at least partially mediated by international trade, from sub-Saharan Africa to North America and later to Australia. Further spread of SHB is possible via import of bees, bee products, non-bee products (e.g. fruit and soil), beekeeping equipment or movement of bees and/or pest. Expert elicitation sessions were run in analogy with the evaluation of the probability of entry performed in pest risk assessments of invasive species in the plant health field. Every risk factor was scored by consensus and in a horizontal way over the different pathways to allow direct comparison of risk scores between the pathways. In addition, an overall risk score for each pathway was determined by combining risk scores per pathway using a combination matrix that is used in the animal health risk assessment field. Validation of this new approach was done by comparing the determined overall risk scores with overall risk scores that the individual experts assigned at the beginning of the process based on their personal experience and knowledge. This confrontation between ‘matrix determined’ and ‘expert assigned’ overall scores led to additional discussion and resulted in confirmation of the most important risk factors.