Domestic animal diseases within the Pacific Islands region

Bibliography

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Objective

The objective of this bibliography is to compile references currently available on the disease status of domestic animals in the Pacific Islands region, with a view to highlighting knowledge gaps.

Methodology

Search strategy

In January–February 2013, a literature search was carried out to retrieve information about domestic animal diseases in Pacific Island countries and territories (PICTs). Various sources were consulted:

a. PubMED database (http://www.ncbi.nlm.nih.gov/pubmed);
b. Web of Knowledge database (http://apps.webofknowledge.com);
c. Secretariat of the Pacific Community (SPC) library in Suva, Fiji;
d. Archives of the Animal Health and Production Team, Land Resources Division (LRD) of the Secretariat of the Pacific Community.

Eligibility criteria

A study was considered eligible for this review if it included qualitative or quantitative information on any disease (bacterial, viral, parasitic and fungal) affecting domestic terrestrial animals in any of the PICTs. Following the World Organisation for Animal Health (OIE) definition, domestic terrestrial animals (mammals, birds and bees) are 'animals with a phenotype selected by humans and that live under supervision or control by humans'.

The selection of countries and territories included in this review was based on the official list of 22 PICT members of SPC: American Samoa, Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, Guam, Kiribati, Marshall Islands, Nauru, New Caledonia, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Pitcairn Islands, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, and Wallis and Futuna.

Results

A total of 203 references were extracted during this literature search and are presented in this bibliography. Where available, the references are complemented by the abstract written by the author(s) of the document. Unfortunately, no abstracts were available for 49 of the references.

Conclusion

Knowledge of animal diseases in PICTs is scarce and outdated. Further studies are required to provide more up-to-date data on animal disease status in the Pacific Islands region.

List of references

Country	Date	Species	Disease	Reference	Page
American Samoa	1981	Multi species	Ross River virus	(Tesh et al., 1981)	1
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Cook Islands	1994	Multi species	Animal diseases	(Saville, 1994)	2
Cook Islands	2004	Bee	Bee diseases	(SPC, 2004a)	2
Federated States of Micronesia	1969	Multi species	Toxoplasmosis	(Wallace, 1969)	2
Federated States of Micronesia	1972	Multi species	Toxoplasmosis	(Wallace et al., 1972)	3
Federated States of Micronesia	1998	Swine & Dog	Leptospirosis	(Simms, 1998)	3
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Fiji	1978	Goat & Cattle	Dermatophilosis	(Munro, 1978)	4
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Fiji	1978	Cattle & Pig	Sarcocystis	(Raju and Munro, 1978)	4
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Fiji	1984	Multi species	Leptospirosis	(Collings, 1984)	5
Fiji	1987	Bee	Bee diseases	(Anderson, 1987)	5
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Bibliography:

American Samoa

Tesh, R. B., McLean, R. G., et al. (1981). "Ross River virus (Togaviridae: Alphavirus) infection (epidemic polyarthritis) in American Samoa." Transactions of the Royal Society of Tropical Medicine and Hygiene 75(3): 426-431.

An outbreak of Ross River virus infection (epidemic polyarthritis), which occurred in American Samoa between August 1979 and January 1980, is described. On the basis of a serological survey performed near the end of the epidemic, it is estimated that at least 13,500 people were infected. Ross River virus was isolated from the blood of a single polyarthritis patient. Plaque reduction neutralization tests, using this virus strain, were done on 393 human and 143 animal sera collected on Tutuila island. Over-all, 43.8% of the people sampled had evidence of infection. Sera from 100 adult residents of the same island, collected in 1972, had no Ross River antibody, suggesting recent introduction of the virus. In contrast to the human serological data, the prevalence of Ross River antibodies among animals was relatively low. Dogs and pigs had the highest rates with 20% and 15%, respectively. Results of this study suggest that the Ross River virus cycle during the epidemic in American Samoa involved primarily humans and mosquitoes with animals less frequently infected. These observations plus the recent introduction of Ross River virus into new areas of the South Pacific suggest that a major change has occurred in the epidemiology of epidemic polyarthritis.

Commonwealth of Northern Mariana Islands

Tudor, E. G., Lee, A. C., et al. (2008). "Mammomonogamus auris infection in the middle ear of a domestic cat in Saipan, Northern Mariana Islands, USA." J Feline Med Surg 10(5): 501-504.

A 2-year-old female domestic shorthair cat on the island of Saipan was presented to a local veterinarian for headshaking. Otoscopic examination showed mild erythema of the right tympanic membrane, but was otherwise unremarkable. Headshaking resolved with topical gentamicin/betamethasone/clotrimazole therapy; however, erythema persisted. Further otoscopy revealed movement of the erythematous region, which was in fact the red-colored strongylid nematode, Mammomonogamus auris, residing within the middle ear. Myringotomy and a saline flush were performed under heavy sedation. A silastic tube was inserted into the incision and the worms were retrieved by applying negative pressure. Follow-up treatment included topical thiabendazole/dexamethasone/neomycin ointment as well as selamectin. Mammomonogamus auris has previously been documented only three times, once each in China, Sri Lanka and Japan. This is the first report of M auris in cats from Saipan.

Cook Islands

Saville, P. (1994). "The Animal Health Status of the Cook Islands." Secretariat of the Pacific Community: 14.

The Cook Islands would appear to be free of all the major exotic diseases of livestock. There is no clinical or serological evidence to suggest that any of the OIE List A diseases or rabies are present.
Future importation policies should seek to maintain this situation. Diseases which are known to be present elsewhere in the region such as bovine brucellosis, bovine tuberculosis, porcine brucellosis and Aujeszky's disease appear to be absent or exist at a very low level. Surveillance for these diseases should be maintained until it can be confirmed that the diseases are not present. A number of diseases of public health importance are widespread and consideration should be given to instituting control measures. Of particular concern from the public health viewpoint is the presence of porcine leptospirosis, the presence of toxoplasmosis, and the possible presence of trichinellosis (which requires further investigation). Reports suggest that certain diseases of economic importance are present and cause production losses namely Mycoplasmosis in cases of chronic respiratory disease and an undiagnosed syndrome in pigs which exhibits neurological signs. Further investigations are required to accurately diagnose the causal agents, establish the significance of the diseases and to institute appropriate control measures.

Secretariat of the Pacific Community (2004). "Apiculture in Cooks Islands, Country report and future strategy." Secretariat of the Pacific Community: 9.

No abstract available

Federated States of Micronesia

Wallace, G. D. (1969). "Serologic and epidemiologic observations on toxoplasmosis on three Pacific atolls." Am J Epidemiol 90(2): 103-111.

The epidemiology of toxoplasmosis was investigated on three remote and ecologically simple atolls in the western Pacific. The atolls, Eauripik, Ifalik, and Woleai, are located within 80 miles of each other but travel between them and contact with the outside world is infrequent. The Micronesian residents share the same culture, types of food, and similar environment in general. The prevalence of human infection, as measured by the presence of dye-test antibodies, was high on Ifalik, moderate on Woleai, and nearly absent on Eauripik. On Ifalik and Woleai, there was also serologic evidence of infection in rats, the only wild mammal present, and in the domestic animals, including cats, dogs, and pigs. On Eauripik, however, rats and cats had not become established and the dogs and pigs were serologically negative, except for one dog that had been imported from Woleai. Cats or rats appeared to be the most likely reservoir of Toxoplasma in the atolls. The consumption of raw meat did not appear to be an important source of human infection.

Wallace, G. D., Marshall, L., et al. (1972). "Cats, rats, and toxoplasmosis on a small Pacific island." American journal of epidemiology 95(5): 475-482.

A seroepidemiologic study of toxoplasmosis was conducted on a small ecologically simple atoll in the Western Pacific. The atoll offered an opportunity to investigate Toxoplasma on three adjacent islets with differing populations of homoiothermic animals. One islet was inhabited by people, cats, rats, pigs, fruit bats, chickens, and wild birds. Only cats, rats, bats, and wild birds lived on one of the other two islets, and only rats, bats, and wild birds lived on the last. Toxoplasma antibody (determined by the dye test) in man and the lower animals, indicated that the parasite was epidemic or endemic on the two islets where cats were present, but not on the islet without cats. Observations on the eating habits of the people inhabiting the atoll suggested that the consumption of raw meat was not the usual source of human infection. Information obtained from the investigation suggested that cats may have played an essential role in the life history and transmission of Toxoplasma on the atoll.

Simms, J. R. (1998). "Animal leptospirosis in the Federated States of Micronesia." Pacific Health Dialog 5(1): 30-37.

Results of previous studies of leptospirosis on the island of Kosrae, and Pohnpei suggested that the prevalences to be among the highest in the world. This study was to broaden the scope of investigation into the other islands in the Federated States of Micronesia and centered on documenting the prevalence of the disease in animals. Swine, dogs, and rodents were selected for the survey because of their close contact with the human inhabitants. Serum samples were collected and then tested for leptospirosis by the Microscopic Agglutination Test (MAT). In addition to serological testing, attempst were made to isolate leptospirosis organisms from the kidney and urine of pigs and rodents. The MAT indicated that the serological prevalence of leptospirosis is high in each animal species tested. Leptospires were isolated from cultures taken in Pohnpei, and have been typed to serogroup. Isolate results as to serovar typing have been atypical, and may be due to the isolates being a previously unidentified serovar. Animal leptospirosis surveys have been conducted in the Pacific. Results from such surveys indicate that leptospirosis is likely to be the most serious disease threat to humans in these oceanic regions. Suggestions for leptospirosis control is made based on these results.

Fiji

Donald, A. D. (1964). "Nematode Parasite Populations in Cattle in Fiji: A Humid Tropical Environment." Parasitology 54: 273-287.

Observations are reported on the fluctuations in populations of gastro-intestinal nematode parasites in 68 calves on two dairy farms in Fiji based on fortnightly faecal worm egg counts over a 3-year period. On one of the farms the calves began to graze soon after birth; on the other farm they were reared indoors until they were weaned at 6 months of age. The important species were Cooperia spp., Bunostomum phlebotomum, Haemonchus placei, H. similis and Oesophagostomum radiatum. Only small numbers of Trichostrongylixs spp., Mecistocirrus digitatus and Neoascaris vitulorum were present. Potentially pathogenic worm burdens were only found in young cattle, mostly between 2 and 15 months of age. Faecal egg counts for each parasite species rose independently to a peak and then declined to low levels. For most species there was a close relationship between the time at which the peak faecal egg count occurred and the age of calves on the same farm, irrespective of the season in which the calves began to graze. This is considered to be due to the high rainfall and constant high

temperatures throughout the year resulting in at least minimal favourable conditions for the development and survival of the pre-parasitic stages of all species in all months of the year. It is concluded that the succession of species which occurred must be strongly influenced by intrinsic factors in the lifehistory of each parasite. There were differences in the levels of peak egg counts between groups of calves which began to graze in different seasons but almost all parasite species examined were affected equally. The lowest levels were recorded in calves which were first exposed continuously to infection at the beginning of the dry season and the highest levels in those exposed at the beginning of the wet season. Protection of calves from parasite infection, by indoor rearing until weaning at 6 months of age, did not confer any striking advantage as the acquisition of potentially pathogenic worm burdens was merely delayed. The results are discussed in the light of recent theoretical concepts regarding the immunological control of helminth parasite infection.

Maguire, T., Macnamara, F. N., et al. (1971). "Mosquito-borne infections in Fiji. II. Arthropod-borne virus infections." J Hyg (Lond) 69(2): 287-296.

Surveys of arbovirus activity in Fiji were conducted over a 10-year period from December 1959 to December 1969. No arboviruses were isolated from over 200,000 mosquitoes, 9000 ticks, or 575 serum samples. Eight thousand human and 1117 bird, bat and animal sera were tested for haemagglutination-inhibiting arbovirus antibody using a variety of group A, group B and Bunyamwera group antigens. Only a small number of low-titre reactions were found among the non-human sera, but 14% of all human sera were found to contain Group B antibody. The antibody prevalence increased with increasing age, from less than 1% for persons born since 1950, to 70% for persons born before 1900. The age differences in prevalence could be used to estimate the time and size of previous epidemics. Differences were found in antibody prevalence between the sexes, between ethnic groups and between persons from different regions. These differences could be explained in terms of climate, location and custom.Historical and serological evidence both suggest that all the antibody detected was due to past exposure to dengue virus. The very high proportion of the population with no dengue antibody makes Fiji a high-risk area for a further dengue epidemic. Dengue virus is known to be active in the Pacific and South-East Asia.

Munro, R. (1978). "Caprine dermatophilosis in Fiji." Trop Anim Health Prod 10(4): 221-222.

No abstract available

Munro, R. and Munro, H. M. (1978). "Intestinal helminthiasis in dogs in Fiji." Aust Vet J 54(1): 44.

No abstract available

Raju, N. R. and Munro, R. (1978). "Sarcocystis infection in Fiji." Aust Vet J 54(12): 599.

No abstract available

Munro, R. and Munro, H. M. (1980). "Psoroptic mange in goats in Fiji." Trop Anim Health Prod 12(1): 1-5.

Mange caused by Psoroptes cuniculi was first recognised in goats in Fiji in 1977. Of 33 widely separated herds examined 16 were infested, 4 herds having the "extensive" type lesions in older goats. Treatment of the skin and superficial ear lesions with malathion or gamma-BHC was successful but mites survived in the proximal parts of the ear canal. Re-

appearance of the mites following treatment was a common problem.

Adams, D. S., Oliver, R. E., et al. (1984). "Global survey of serological evidence of caprine arthritis-encephalitis virus infection." Vet Rec 115(19): 493-495.

Using caprine arthritis-encephalitis virus antigen in the agar gel immunodiffusion test, 3729 serum samples from goats in over 112 locations around the world were tested for precipitating antibodies. Over 90 per cent of the 1265 positive samples came from Canada, France, Norway, Switzerland and the USA, all of which had 65 per cent reactors or greater. Fiji, Great Britain, Kenya, Mexico, New Zealand and Peru had fewer than 10 per cent positive samples; the majority of these could be traced to importations of goats from countries where there was a high occurrence of precipitating antibody. Somalia, Sudan and South Africa had no reactors among 306 samples. No reactors were found among 1116 samples from domestic and indigenous goats which were known to have had no contact with imported goats from countries which had a high occurrence.

Collings, D. F. (1984). "Leptospira interrogans infection in domestic and wild animals in Fiji." N Z Vet J 32(3): 21-24.

Clinical and serological evidence has indicated that human leptospirosis in Fiji is an important disease, and the prevalence of antibody is exceptionally high. A serological survey of the rural population showed that only 12% of the people studied did not have complement fixing (CF) leptospiral antibody. As the origin of this infection could not be explained by the known distribution of leptospiral infection in domestic and wild animals, a serological survey using the complement fixation test (CFT) was undertaken as the first stage of an epidemiological investigation into human and animal leptospirosis. Sera from domestic and wild animals were tested for CF antibody to 12 leptospiral serovars, namely: pomona, copenhageni, grippotyphosa, hardjo, ballum, tarassovi, canicola, australis, bratislava, autumnalis, pyrogenes and bataviae. Antibody was detected in 27.5% of 480 cattle, 17.1% of 70 sheep, 10.3% of 252 goats, 10.0% of 480 pigs, 57.0% of 100 dogs, 55.8% of 34 rats (Rattus rattus, R. frugivorus, R. exulans and R. norvegicus), 53.1% of 32 mongooses (Herpestes auropunctatus) and 40.0% of 10 mice (species unknown.) Cross-reactivity precluded the identification of infecting serogroups with the exception of pomona in pigs and icterohaemorrhagiae, ballum and australis in dogs. Infection of dogs with a serovar of the australis serogroup may explain the predominance of serological reactions to bratislava in man. The survey revealed a significant level of leptospiral antibody in the animal populations of Fiji and indicated that cattle, dogs, rats, mongooses and mice are probably the most important maintenance hosts. Consequently, further investigation will concentrate on the attempted isolation of leptospires from these species.

Anderson, D. L. (1987). "A survey of honey bee diseases in Fiji." Ministry of Foreign Affairs, Wellington, New Zealand: 66.

The diseases of the honey bee, *Apis mellifera L.*, were surveyed in Fiji during October and November 1986. A total of 208 hived colonies were inspected for symptoms of bee pests and diseases. Samples of abnormal or apparently healthy bee larvae, approximately 60 adult worker bees, and dead bees from bottom boards and entrances of colonies were collected from 96 of the 208 colonies inspected. These samples were later tested in the laboratory in New Zealand for the presence of known bee pests and diseases. American foulbrood (AFB), caused by the bacterium *Bacillus lavae* was the most serious bee disease found in Fiji. It was observed in 47% of colonies inspected at one locality, but in only 0.8% of all other colonies throughout Fiji. Laboratory tests confirmed the presence of *B. larvae* in samples collected from collonies showing AFB symptoms. Sacbrood, caused by sacbrood virus (SBV), was the

most common brood disease observed in Fiji, being present in 81% of colonies inspected and in 79% of colonies sampled. Bee paralysis of adult worker bees, which is caused by chronic bee paralysis virus (CBPV), was detected in 31% of colonies sampled. Other viruses detected were black queen cell virus (BQCV), Kashmir bee virus (KBV), slow bee paralysis virus (SBPV), bee virus X (BVX) and bee virus Y (BVY), but these were less common than SBV and CBPV. Inapparent SBV, BQCV and KBV infections were detected in apparently healthy honey bees. Nosema, caused by the protozoan *Nosema apis*, was the most common disease of adult worker bees in Fiji, being present in 47% of colonies sampled. The protozoan, *Malphighamoeba mellificae,* the cause of amoeba disease, was detected in a sample of adult bees from one locality. Infestations of wax moth, *Galleria mellonella* and *Achroia grisella* were observed in 70% of colonies inspected. Other pests observed included the cane toad, *Bufo marinus,* and unidentified species of ants. Despite extensive testing, the bacterium *Melissococcus pluton, the cause of European foulbrood, the fungus Ascophaera apis,* the cause of chalkbrood, the internal mite *Acarapis woodi*, the external parasitic mites *Varroa jacobsoni* and *Tropilaelaps clareae,* and other mites, were not detected in bee samples from Fiji. SBV, CBPV and *N. apis* were the only bee pathogens detected in samples from feral colonies in Fiji. Recommendations are suggested for monitoring and managing the diseases present in Fiji.

Hartley, W. J. and Clarkson, D. J. (1989). "An outbreak of spinal neuronopathy of goat kids in Fiji." N Z Vet J 37(4): 158-159.

A newly recognised caprine neuropathy is described in which goat kids developed rapidly progressive neurologic signs in association with widespread demyelination, spinal cord neuronal degeneration and active demyelination.

Banks, D. J., Singh, R., et al. (1990). "Development and survival of infective larvae of Haemonchus contortus and Trichostrongylus colubriformis on pasture in a tropical environment." Int J Parasitol 20(2): 155-160.

A trial to determine the seasonal pattern of egg hatching and larval survival on pasture was carried out in representative wet and dry zones of Fiji. Fourteen plots were established on parasite-free pasture at each of two sites. One plot at each site was contaminated every month with faeces from naturally infected goats containing a known proportion of Haemonchus contortus and Trichostrongylus colubriformis eggs. Pasture was sampled at regular intervals after contamination and infective larvae identified and counted. Larvae of both species developed throughout the year in the wet zone but development was more sporadic in the dry zone. Larval counts generally declined to below detectable levels within 9 weeks of contamination between September and March but longevity increased during the cooler weather from April to August. The comparatively short larval survival times noted in this experiment may present opportunities for manipulation of parasite population dynamics in the wet tropics.

Knox, M. and Steel, J. (1996). "Nutritional enhancement of parasite control in small ruminant production systems in developing countries of South-East Asia and the Pacific." International journal for parasitology 26(8-9): 963-970.

Nutritional insufficiency and gastrointestinal nematode parasitism are major constraints to small ruminant production in south-east Asia and the Pacific Islands. Research on the effects of low cost supplements which supply nitrogen and essential minerals on the ability of small ruminants to resist infection is summarised. In controlled pen studies in young Merino sheep offered a low quality roughage diet of oaten chaff and essential minerals, supplementation with urea reduced the effects of parasitic infection by increasing

weight gain and wool production and reducing faecal egg output and parasite burden. In Fiji, field studies have shown that supplementation with urea-molasses blocks can result in increased live-weights of lambs at weaning, increased reproduction rates in maiden ewes and reduction in faecal egg output in grazing sheep. Additional benefits were derived from the inclusion of anthelmintic in the blocks in similar groups of sheep particularly during periods of greater susceptibility to parasites. Pen studies with young goats have shown that urea supplements alone gave no production benefits, but when accompanied by 100 g/d of cotton seed meal beneficial responses were observed. It is expected that parasite control in the small ruminant production systems of developing countries in south-east Asia and the Pacific Islands will benefit from the introduction of low cost nitrogen supplements along with anthelmintic therapy delivered strategically by molasses blocks.

Manueli, P. R. (1996). "Sustainable control of parasites in small ruminants - Country paper: Fiji." International Workshop on Sustainable Parasite Control in Small Ruminants. Bogor, Indonesia: 92-97.

This paper discusses the present state of the small ruminant industries in Fiji and acknowledges that these industries will remain an important source of meat for the nation. This is ensured by the multicultural nature of the society and strong demand far goat and sheep meats. The Fiji government continues to support the industries through the provision of research anti extension services. However, the level of support is not likely to increase in the foreseeable future. Gastrointestinal parasites are the major cause of production loss in small ruminants in Fiji. Current parasite central methods rely heavily upon the use of anthelmintics. Given the occurrence of anthelmintic resistance there is a need for the development of sustainable parasite control measures. Optimising anthelmintic use, rotational grazing, improved nutrition, selection of resistant hosts, biological control, and anti-parasitic vaccines are identified as priority areas for research into the development of a sustainable parasite control program. The need for an integrated approach employing a number of control options is acknowledged, as is the need for external assistance in the development of the research program.

Manueli, P. R., Waller, P. J., et al. (1999). "Biological control of nematode parasites of livestock in Fiji: screening of fresh dung of small ruminants for the presence of nematophagous fungi." Vet Parasitol 81(1): 39-45.

Approximately 2500 faecal samples were collected per rectum from sheep and goats from 26 farms located on four of the Fijian islands where most of the small ruminants in this country are raised. The purpose was to screen these samples to isolate nematode-trapping fungi that had been acquired by these animals during the course of their feeding and which had remained viable following passage through their gastrointestinal tract. From these samples, 23 examples of nematophagous fungi were noted in the initial appraisal, from which 12 pure isolates (all of the genus Arthrobotrys) were made. A number of factors emerged from this work which may have restricted the opportunities in which nematophagous fungi were detected, or isolated.

Angus, S. D. (2001). "A survey to determine the status of the Fiji islands concerning Newcastle disease." Secretariat of the Pacific Community: 24.

Newcastle disease (ND) has never been reported from Fiji Islands, however the presence of low-virulence strains of avian paramyxovirus-1 (APMV-1), the virus that causes ND, in the commercial poultry sector, had never been tested for. A sero-survey was carried out on a random sample of the commercial poultry industry in Fiji Islands in 2000 to establish whether APMV-1 was present. The Fiji Island poultry industry does not practise prophylactic

vaccination against ND. There was no evidence of clinical nor were there any positive serum samples for the presence ND antibodies. It was concluded that within the specifications of the survey, the commercial poultry industry in Fiji Islands was most probably free of APMV-1, even of strains of low pathogenicity, with a confidence level greater than 95% at the time of the survey. Recommendations were given to the effect that Fiji Islands should adopt all practical measures at its disposal to maintain its presumed status of being free from Newcastle disease and apply for international recognition of this status.

Lupo, C. (2003). "Epidemiological study of animal Leptospirosis in Fiji Islands." Ecole Nationale Veterinaire de Toulouse: 151.

Leptospirosis is a very common disease of tropical countries, especially the South Pacific area. In humans, it is an acute generalized infection that can be lethal. Rodents are thought to be the reservoir of leptospira, but other species may transmit the infection to humans. In order to understand the epidemiological cycle of this zoonosis in the Fiji Islands, a serological survey was conducted on different animal species. The first aim was changed to measure the link between leptospirosis and exposition to the climatic factor. The protocol had to take into account the specificities of such a project performed in the particular context of a developing country. This survey highlights a high sero-prevalence in animal populations, especially cattle and horses. Serovar mwalok may be endemic in the whole Viti Levu Island, whereas serovars hardjo and australis may be endemic in the intermediate climatic area only. Special and specific associations of a climatic type seem to link a serovar to particular species.

Secretariat of the Pacific Community (2004). "Apiculture in Fiji, Country report and future strategy." Secretariat of the Pacific Community: 12.

No abstract available

French Polynesia

Raust, P. and Legros, F. (1980). "[First record in French Polynesia of an hepatic fluke of the domestic cat, Platynosomum fastosum Kossack, 1910 (author's transl)]." Annales de parasitologie humaine et comparee 55(5): 615-618.

The authors record, the first evidence of Platynosomum fastosum in a Polynesian cat. This fluke has been previously encountered but was misdiagnosed a Dicrocoelium dendriticum. A finest observation of the morphological characteristics permit to distinguish on the both genera.

Raust, P. and Legros, F. (1980). "[Inventory of the parasites of domestic animals in French Polynesia. 1st list]." Bulletin de la Societe de pathologie exotique et de ses filiales 73(3): 322-332.

After a parasitological survey in French Polynesia a first list of parasites of domestic animals has been drawn up. 42 helminthes and 23 protozoan parasites have been found in seven species of domestic animals. The pathogenicity and economic importance is discussed. The parasitic fauna is rather poor in spite of favourable environmental conditions for the evolution of parasites; therefore veterinary services must increase their surveillance to avoid any introduction of new parasite.

Raust, P. and Legros, F. (1980). "[Parasitic diseases in ruminants of French Polynesia]." Revue d'elevage et de medecine veterinaire des pays tropicaux 33(4): 393-398.

After a parasitological survey in French Polynesia, a first Iist of the helminths and protozoan parasites of cattle and goats has been drawn up. The only roundworms found are stomach and intestinal worms which cause economic losses. They are frequently associated together. No fluke, nor tapeworm was encountered. Babesiosis is the main parasitic disease among cattle because of its medical severity and the restrictions brought to cattle improvement in tick free islands. Fighting methods against these parasites are discussed.

Guerrier, G., Foster, H., et al. (2012). "Cultural contexts of swine-related infections in Polynesia." Clinical microbiology and infection: the official publication of the European Society of Clinical Microbiology and Infectious Diseases.

Pig-raising is an inherent element of ancestral Polynesian culture, but pigs constitute a reservoir of potentially severe diseases for humans. Little research in this area from a social science perspective has been performed, particularly in Oceania. The objective of this study was to assess swine brucellosis awareness and protection measures in two remote Polynesian French islands. We applied quantitative methods to a small clinic-based population selected according to the presence of a history of brucellosis serology, and semistructured interviews about public health measures and veterinary access were used among key informants for qualitative methods. Most individuals interviewed did not know about brucellosis, despite repeated public awareness campaigns. Standard hygiene recommendations to protect humans and animals were not compatible with traditional practice. Innovative approaches are required for effective awareness campaigns, and to gain the confidence and close cooperation of the community, in order to implement successful control measures for communicable diseases such as brucellosis.

Praud, A., Gimenez, O., et al. (2012). "Evaluation of five serological tests for the diagnosis of porcine brucellosis in French Polynesia." Tropical Animal Health and Production.

Porcine brucellosis due to Brucella suis biovar 1 raises important issues for pig breeders in French Polynesia. In this region, the disease is enzootic, spreads silently and engenders economic losses in infected farms as well as sporadic human cases. While serological tests are essential in surveillance and control programmes of animal diseases, to date none of the available tests have been shown to be reliable enough to be used as a gold standard in routine individual diagnosis of porcine brucellosis. Few studies about the estimation of the sensitivity and the specificity of porcine brucellosis screening tests have been published, none of them dealing with French Polynesia. The studied population included 1,595 pigs from French Polynesia. Five tests were evaluated: Rose Bengal test, fluorescence polarisation assay, indirect ELISA, and two competitive ELISAs (C-ELISA). The sensitivity and the specificity of each test were estimated. C-ELISA(2) was the most sensitive test (Se C-ELISA(2) = 0.954 [0.889; 0.992] 95 % credibility interval (CrI)) while both C-ELISA and Rose Bengal test (RBT) were the most specific ones (Sp C-ELISA(1) = 0.856 [0.806; 0.915] 95 % CrI; Sp C-ELISA(2) = 0.849 [0.817; 0.879] 95 % CrI; Sp RBT = 0.853 [0.812; 0.898] 95 % CrI).

Guam

Glosser, J. W. and Yarnell, E. P. (1970). "Rabies control on Guam." Public Health Rep 85(12): 1113-1120.

Guam's first known rabies epizootic, consisting of 89 reported cases, 12 of which were confirmed, was first detected in March 1967 and was effectively controlled within 8 months; there were no recognized cases of rabies in human beings. The control program included vaccinating pet dogs and cats and drastically suppressing the unusually large stray animal populations. An embargo was placed upon pets entering the island until dog and cat quarantine facilities could be built, an intensive campaign of education was put into effect, a system of reporting and investigating animal bites was established to insure medical attention for exposed persons, all animals who had bitten persons were quarantined and observed, rabies surveillance including laboratory diagnostic services was initiated, and rabies control activities were coordinated between the civilian and military jurisdictions on Guam. In the last 9 months of 1967, of 995 persons who were exposed to animals, 131 received antirabies treatment, and 4,928 dogs and cats were vaccinated against rabies. In 1967, in the civilian communities, 16,799 dogs and cats were destroyed. The poison, sodium monofluoroacetate 1080, was used in both urban and rural areas. It had not been used officially for the destruction of dogs and cats any place in the United States. This technique is believed to have been instrumental in stopping the epizootic, since the last case of rabies was reported within 1 month after the poisoning program began. No cases of rabies have been reported since October 20, 1967. The program was successful because of several factors: all jurisdictions cooperated, legislation was enacted to help meet the program's objectives, poison was used to suppress stray animals, and the setting was insular.

Savidge, J. A., Sileo, L., et al. (1992). "Was disease involved in the decimation of Guam's avifauna?" J Wildl Dis 28(2): 206-214.

Between 1982 and 1986, 402 (290 live, 112 dead) exotic, migrant or native resident birds on Guam were surveyed for disease-causing agents to determine the role of disease in the decline of native forest bird populations on Guam. Traumatic injury, primarily from collisions with motor vehicles and predation, was the most prevalent (46%) cause of death. Thirty-eight percent of the carcasses examined were in poor body condition largely as a result of inadequate nutrition in captive native birds and poultry and adipose exhaustion in errant migrants. A variety of commensal or opportunistic bacteria, including Salmonella spp., were cultured from 220 birds, and nothing remarkable was found in 15 fecal samples. Lastly, no haematozoans, the suspected cause for the decline of the Hawaiian avifauna, were observed in blood slides examined from 260 birds. Based on the results of the survey and other lines of evidence presented in the discussion, we concluded there were no data implicating disease in the decline of Guam's avifauna.

Duguies, M., Nusbaum, S., et al. (2000). "ADAP Animal Health Survey for Guam 1999." American Samoa Community College, College of Micronesia, Northern Marianas College, University of Guam, and University of Hawaii.: 24.

No abstract available

Kiribati

Saville, P. (1996). "The Animal Health Status of Kiribati." Secretariat of the Pacific Community: 13.

Kiribati appears to be free of all the major exotic diseases of livestock. There is no clinical evidence to suggest that any of the OIE List A diseases are present. Future importation policies should seek to maintain this situation. Diseases which are known to be present elsewhere in the region such as Aujeszky's Disease are either absent or present at a very low level. There is no evidence to suggest that porcine leptospirosis represents a public health risk however this situation should continue to be monitored. The possible presence of trichinellosis requires further investigation. Although there is serological evidence of Newcastle Disease virus, in the absence of clinical signs, it must be assumed that this is due to a lentogenic strain. This is consistent with findings elsewhere in the region (including Australia, Fiji and New Zealand which have supplied breeding stock to Kiribati) where lentogenic strains of Newcastle disease are known to be present. There is also serological evidence of infectious bronchitis, Mareks disease, mycoplasmosis and avian encephalomyelitis which are known to have caused losses in previous years. Although a number of birds were serologically positive for both infectious bursal disease and infectious laryngotracheitis clinical disease associated with infection has not been recognised. The strain of infectious bursal disease reported from Fiji and New Zealand is of low pathogenicity and it is assumed that a similar strain is present in Kiribati. The presence of toxoplasmosis in the caprine population is of public health concern. The cat population is though to constitute the reservoir for this disease. Infection with both endo- and ecto-parasites has been reported to be the most significant constraint to livestock production in Kiribati.

Secretariat of the Pacific Community (2004). "Apiculture in Kiribati, Country report and future strategy." Secretariat of the Pacific Community: 6.

No abstract available

New Caledonia

Daynes, P. and Gutierrez, J. (1980). "[Seasonal variations in the parasitic activity of the cattle tick Boophilus microplus (Acari, Ixodidae), in New Caledonia]." Revue d'elevage et de medecine veterinaire des pays tropicaux 33(3): 305-310.

Variations in population levels of the tick B. microplus were observed in New Caledonia over a period of 1 year. The degree of parasitic infestation was estimated by counting the number of partly engorged female ticks on five untreated animals of the Santa Gertrudis cattle breed. The study showed the advantage of using a moderately tick resistant breed. It suggested that, on the west coast of New Caledonia the highest level, of the parasitic population is reached during the dry months, at the beginning of the hot season, but B. microplus remains active all year long.

LeGonidec, G., Kuberski, T., et al. (1981). "A neurologic disease of horses in New Caledonia." Aust Vet J 57(4): 194-195.

No abstract available

Desoutter, D., Lechapt, M., et al. (1983). "[Incidence of canine piroplasmosis (Babesia canis) in New Caledonia]." Revue d'elevage et de medecine veterinaire des pays tropicaux 36(2): 157.

No abstract available

Domenech J. and Bregeat D. (1983). "Un cas de mortalité due à Clostridium sordellii chez un bovin [One mortality due to Clostridium sordellii in a bovine]." Revue d'élevage et de médecine vétérinaire de Nouvelle-Calédonie 1983(2):5-46. *No abstract available*

Grimaud P., Desouter D. et al. (1983). "Cas de Trichomonose du pigeon [A case of pigeon canker (Trichomoniais)]." Revue d'élevage et de médecine vétérinaire de Nouvelle-Calédonie 1983(2):5-46. *No abstract available*

Domenech, J., Boccas, B., et al. (1984). "[Fusarium moniliforme fusariosis of maize in New Caledonia and related equine pathology: toxic leukoencephalomalacia]." Revue d'elevage et de medecine veterinaire des pays tropicaux 37(3): 253-259.

No abstract available

Fortineau O. (1984). "Cas de Spirulose proventriculaire à Tetrameres sp. chez les poules [A case of proventricular spirurosis due to Tetrameres sp in chickens]. " Revue d'élevage et de médecine vétérinaire de Nouvelle-Calédonie 1984(1):63.

No abstract available

Fortineau, O. and Chesnel, G. (1984). "An outbreak of ornithostrongylosis in a flock of domestic pigeons." Revue Elev. Med. Vet. Nouv. Caledonie 1984(2): 59-60.

An outbreak of ornithostrongylosis in a flock of domestic pigeons is reported. An account is given of the symptoms and treatment, together with an illustrated description of the parasite.

Domenech, J., Boccas, B., et al. (1985). "Equine leucoencephalomalacia in New Caledonia." Australian veterinary journal 62(12): 422-423.

No abstract available

Fleury, H. J., Bonnici, J. F., et al. (1985). "Antibodies against paramyxoviruses of serotypes 1, 2 and 6 in birds from New Caledonia." Vet Rec 117(20): 530.

No abstract available

Philippe J.-P. and Dessouter D. (1985). "Un cas de mammite a Prototheca zopfii [A case of mastitis due to Prototheca zopfii]. " Revue d'élevage et de médecine vétérinaire de Nouvelle-Calédonie 1985(6):37.

No abstract available

Lambert, C. (1987). "A short survey of sarcosporidiosis (Sarcocystis sp.) in New Caledonia." Rev. El. Med. Vet. Nouvelle-Caledonie 1987(9): 5-8.

Cysts of a Sarcocystis sp. were identified for the first time in New Caledonia in 1986, in the muscles of two bovines displaying an unexplained pathology. A short abattoir survey provided histological evidence that all bovidae in New Caledonia, and probably horses as well, are infested with sarcocysts. Infestation was moderate in every case observed.

Lambert, C. and Lechapt, M. (1987). "Health monitoring of migratory birds in New Caledonia and Dependencies." Rev. El. Med. Vet. Nouvelle-Caledonie 1987(9): 9-10.

The good animal health status of New Caledonia requires monitoring of migratory birds, which are potential vectors of contagious fowl diseases. In a survey conducted on three outer islands of New Caledonie used by migratory birds as breeding grounds, no birds were found to carry any virus, although some had been in contact with a virus of Newcastle Disease. Monitoring should be continued.

Lechapt, M., Orezzoli, H., et al. (1987). "Assessment of one year's operation of the territorial abattoir at Bourail (1986): Considerations on breeding, nutrition and health." Revue Elev. Med. Vet. Nouv. Caledonie 1987 (9): 39-51.

The authors report and discuss the figures for the first full year of operation (1986) of the Teritorial Abattoir established at Bourail (West Coast of New Caledonia) in June 1985. The abattoir has a slaughtering capacity of 4 000 tonnes per year and fully meet EEC standards. It is managed by the New Caledonian Cold Storage and Marketing Board (OCEF). Figures for the year are as follows:

	Number	Total weight	Average weight
Adult cattle	6 958	1 562 273 kg	228 kg
Calves	6 490	698 797 kg	107 kg
Young cattle (max. 2 yean)	2 299	490 372 kg	188 kg
Pigs	3 591	258 516 kg	

From the point of view of meat production, these results are mediocre. Local stock-farmers produce animals of low average weight, for a number of reasons:
- genetic improvement, though started, is still inadequate;
- fattening on pasture is not well organised and fodder reserves quite insufficient;
- there is no local livestock trade to speak of.

From the health point of view, local stock is in good condition, with only 9 calves and 7 adult animals having been totally refused by the inspectors in the course of the year, and event in these few cases for unspecific disorders. However, the authors report a large number of partial refusals:
- of pig plucks (heart, Iiver, lungs, windpipe): 34%
- of livers of beef cattle (about 65%)

The former were damaged by mycoplasmosis which is widespread in all local piggeries and requires a considerable effort to be made to improve hygiene. The latter at first sight seemed to contain some foreign body, but the number of these cases being surprisingly large, an investigation is being conducted to ascertain the pathogeny and aetiology of these abscesses.

Brethes, B., Puech, P. L., et al. (1988). "[Epidemiological study of leptospirosis in New Caledonia]." Bull Soc Pathol Exot Filiales 81(2): 189-197.

This epidemiological survey includes the study of human and animal leptospirosis in New Caledonia from clinical cases as well as a systematic serological study about exposed human and animal populations. The results show that this disease is endemic on the whole territory with a few important focuses in agricultural area, especially on the Western coast. Leptospira icterohemorrhagiae is the main serotype and is responsible for serious human leptospirosis. The male farmers constitute the most exposed population, especially from March to May, end of the host season. In order to reduce the importance of this disease, it is desirable that the farmers are vaccinated and mass media campaigns are necessary to improve the prevention.

Chardonnet, P., Vassart, M., et al. (1988). "Survey of parasites on the first rusa deer farms set up in New Caledonia." Rev. El. Med. Vet. Nouvelle-Caledonie 1988(12): 3-11.

Between 1987 an 1988 several deer pilot farms were set up in New Caledonia. The Rusa species (Cervus Timorensis russa) being reared on these farms was investigated for parasites. In the first part of the paper, the authors describe the background of deer farming in New Caledonia. The Rusa deer, which hails from a sub-equatorial zone, has adapted well to the tropical climate of New-Caledonia. Nearly 120,000 feral deer at present exist on the island, mainly on its Northern tip and on the West coast. At the end of 1987, two deer farms were operational and two additional ones in the course of being established: wild deer were captured to form the initial herd of these commercial farms. In 1988 nearly 3,000 head of deer were being reared on farms located on both coasts of the island. The parasite survey is based on samples taken during autopsies, coproscopies or lung dissections, in 1987 and 1988, either from feral deer captured or from deer slaughtered on the farms. 86 tests were performed in 1987 and 251 in 1988, the latter involving a roughly equal number of animals from each of two farms, referred to as S and D, located at Boulouparis and Bourail (West coast). 70% of the coproscopic examinations performed in 1987 were negative and 56% of those done in 1988. The macroscopic investigations enabled the authors to list the parasites existing in New Caledonia. This inventory has been compared with the parasitic infestations described in Rusa deer elsewhere in the world (Table IV). These results are however incomplete since coproscopy in many cases leaves diagnosis open to doubt, particularly as regards of threadworm of the digestive tract. For instance, diagnosis was far from certain for Oesophagostomum radiatum, Ostertgia, Haemonchus, Toxocara vitulorum, the eggs of which were too few in number or deformed by the iodomercuarte solution. In addition, the coccidian cocysts inventoried were not cultured and could not therefore be clearly identified as belonging to Eimeria or Isopora. The parasites present were always in few numbers, although the incidence of positive coproscopies increased between 1987 and 1988. The parasites most often found were coccidian, and farm D (with a density of 6 deer to the hectare instead of 2/ha for farm S) had significantly more coccidian. The level of infestation was however nearly always non-pathogenic (cf Annex II and III). The only cases of pathogenic parasitic infestation were observed in three young stable fawns were affected by tapeworm. The last part of the paper deals with potential Rusa deer parasites, which are classified according to the threat they represent for New Caledonian deer, as follow (cf Table IV):

- High risk: Parasites present in New Caledonia in other species and known to affect Rusa deer or deer species.
- Risk in case of introduction: Parasites not yet present in New Caledonia but which could be accidentally introduced. These include specific Rusa parasites or non-specific parasites of deer.
- Low risk: Parasites with an indirect cycle not present in New Caledonia and whose intermediary host has never been reported either.

In conclusion, the survey revealed no lung parasitism, only a very low level of gastro-intestinal parasitism and virtually no external parasitism in 1988. However, the protection afforded by insularity may not last indefinitely and there is a real risk of gastro-intestinal parasitism developing, especially among young deer, as deer farming becomes more intensive in New Caledonia.

Laille, M., Dessouter, D., et al. (1988). "The Ross River virus and epidemic polyarthritis." Revue Elev. Med. Vet. Nouv. Caledonie 1988(12): 21-23.

The Ross River virus is a mosquito-borne alphavirus endemic to Australia and Papua New-Guinea, which has recently appeared in other Pacific contries. Human Ross River virus infection is often accompanied by polyarthritis and rash, but diagnosis is based on geographic

considerations, specific serology and virus isolation as well as the clinical signs present. Skin and synovial lesions are characterized by infiltration of mononuclear cells. The disease has so far remained mild in New-Cadedonia, but could become more serious and/or entail major sequelae if virus variations or charges in epidemiological factors were to occur. No clinical case of the disease has been recorded to date in animals, but a large percentage of horses were found to be sero-positive.

Lechapt, M. (1988). "Larval tapeworm infections of ruminants. Problems caused by the importation of livestock from Australia." Revue Elev. Med. Vet. Nouv. Caledonie 1988: 9-16.

Larval tapewom infections are diseases caused by Cestodes larvae. These parasitoses, which are often not pathogenic for the intermediate host, are of great interest from the epidemiological point of view, especially since some of them cause zoonoses. A summary of the parasites concerned is given, chiefly in the formn of tables listing the relevant parasites with their imaginal and larval characters. The list includes *Echinococcus granulosus, Taenia ovis, Taenia saginata, Taenia hydatigena and Taenia multiceps.* Diagnosis of the larval form is often complicated by the occurence of abscesses and calcification. The health situations of Australia and New Caledonia are compared. In Australia, there is a fairly high incidence of larval tapeworms with the exception of *Coenurus cerebralis,* the larval stage of *Taenia multiceps.* The information given for New Caledonia is drawn from a variety of sources (abattoirs, butchers, autopsies and health service statistics) but has never yet shown Cestodes larvae to be responsible for lesions suggesting such infection in various domestic animals. The Territory is therefore considered as disease-free in this respect and only genera Dypylidium and Dyplopylidium are listed. Importation of livestock from Australia therefore represent a potential danger and in particular the introduction of large numbers of sheep for the purpose of developing sheep farming. Dogs should be quarantines using Praziquantel (Droncit N.D.) under a clearly-established procedure. With regard to intermediate hosts, the problem is harder to resolve because no standard test yet exists enabling the detection of larva-carrying subjects at the present time. In order to break the cycle of such parasitoses, the author describes the action to take beginning with the absolute necessity of preventing dogs eating the offal of small ruminants. The next measure to be taken is the systematic worming of dogs in exposed rural areas, every six weeks, using Praziquantel (Droncit N.D.). Other sources of infestation are also referred to before the author concludes by pointing out that good general hygiene must prevail and that risks would be minimised by conducting a campaign to raise the awarness of the people concerned as well as establishing procedures for monitoring sheep farming.

Thevenon J. (1989). "Contribution à l'étude de la Leptospirose bovine en Nouvelle-Calédonie [Contribution to the bovine leptospirosis study in New Caledonia]. " École Nationale Vétérinaire de Lyon – Thèse.

No abstract available

Thevenon, J., Vassart, M., et al. (1989). "Survey of contagious-diseases in New Caledonian apiaries." Recueil De Medecine Veterinaire 165(11): 899-903.

No abstract available

Thevenon, J. G., Lambert, C., et al. (1990). "Epidemiologic-study of bovine leptospirosis in New Caledonia." Recueil De Medecine Veterinaire 166(10): 903-909.

A serological survey carried out on a representative sample of 350 animals from the new-caledonian herds shows by microscopic agglutination test a high prevalence rate of

leptospirosis infection (58,3 +/- 5,2 p. cent). Sejroe, Tarassovi and Pomona Serogroups are mainly concerned. Middle West region appears to be the most infected. The prevalence rate increases significantly with the animals' age and the herds' size. Females are more subject to infection than males.

Thevenon, J., Rantoen, D., et al. (1992). "Avian chlamydiosis infection on pigeon breeding in New-Caledonia." Annales De Recherches Veterinaires 23(1): 63-71.

An epidemiological survey on avian chlamydiosis, carried out by serological probing in 8 pigeon breeders' representative of New Caledonian livestock, combined with bacteriological research on pigeon organs and droppings was set up in New Caledonia in order to determine the prevalence rate of this infection and to adapt sanitary regulations concerning pigeon imports. All sera collected (230) were analysed by complement fixation test (CFT). The organs were diluted in sucrose solution, then stored frozen (-70-degrees-C), until inoculation of the yolk-sac of 3 6-8-day-old embryonated eggs (2 blind passages). Yolk-sac smears stained according to the Gimenez method were made in order to detect intracellular chlamydial organisms. Seventeen sera out of 230 were found to be positive, ie 7.4% of the test sample (confidence interval to 95% = 4.0 to 10.8%). The carrier pigeons were significantly more infected (17.8%) than pigeons of other breeds in New Caledonia. These results resulted in the sanitary authorities easing restrictions on imports of seropositive pigeons by imposing a 45-day compulsory quarantine with daily administration of chlortetracycline at the rate of 150 mg per l of drinking water.

Beugnet, F. and Gadat, R. (1993). "Survey on Toxocara spp eggs and Ancylostoma spp larvae in soil extracts from Noumea, New-Caledonia." Revue De Medecine Veterinaire 144(6): 523-525.

Larval toxocariasis and ankylostomiasis are parasitic zoonosis transmitted to human by dogs and cats. Human infections are frequent in tropical areas. A survey was made on the presence of Toxocara canis and Ankylostoma spp. in soil extracts from Noumea, Nouvelle-Caledonie. Fifty per cent of the samples and 11 tested areas from 12 showed T. canis eggs. The soil of an enclosed playground contained T. canis and T. cati eggs. Infectious larvae of Ankylostoma ceylanicum were found in the grass of two picnic areas.

Beugnet, F., Costa, R., et al. (1993). "Ecologic and pathological-studies of seabirds from French South-Pacific Islet - Isle Surprise (18-Degrees-29'S, 162-Degrees-05'E) as example." Revue De Medecine Veterinaire 144(7): 607-613.

French South Pacific Islet are coralien ecosystems. A lot of seabirds and migratory birds are present. They can fly hundred miles, and carry pathogenic agents for them or domestic avian species (as well as for mammals and humans). Zoosanitary situation of New Caledonia is exceptional. Its preservation is an important objective for veterinarians from different organisms. The author presents zoological studies and sanitary propects for seabirds from south pacific islet. Surprise Islet is taken as example.

Beugnet, F., Bimablum, S., et al. (1993). "Epidemiologic-study of dog dirofilariasis in New-Caledonia - Choice of a diagnosis methodology." Revue De Medecine Veterinaire 144(11): 891-897.

Canine dirofiariasis is an endemic helminthiasis in New-Caledonia. Estimated prevalence is 57 +/- 8 %. Two epidemiologic situations may be distinguished between stray dogs (or semi-domestic dogs) and real domestic dogs populations, in which prevalences are respectively 66 % and 38,6 %. Females seem to be a little more receptive than males. Eighty seven p. cent positive dogs are detected by filtration techniques compared to 58 % by ELISA.

Filtration techniques are more sensitive. Several explanations may be proposed. Laboratory diagnosis has to associate filtration and serological techniques to be enough sensitive and specific.

Beugnet, F., Costa, R., et al. (1994). "Adaptation of strategies of tick control to the problem of resistance - Example of tick resistance due to Boophilus-Microplus in New-Caledonia." Revue De Medecine Veterinaire 145(12): 931-940.

Boophilus microplus is the common cattle tick in New Caledonia and Australia. Treatments at regular times allowed to control population of ticks for a long time. Now, the increase of chemoresistance to acaricids forces to modify control strategies. Factors of resistance selection are discussed. Few acaricids remain effective in New Caledonia. A moderation strategy, based on rotation of acaricids and limitation of treatments, is proposed to control population of Boophilus microplus. Control strategies will become integrated, with the association of chemical, vaccination, agronomical and biological measures.

Beugnet, F., Rous, V., et al. (1994). "Age in cardiopulmonary Dirofilariasis of dog - Consequences on chemoprophylaxis." Revue De Medecine Veterinaire 145(1): 59-64.

Canine dirofilariasis is an endemic helminthiasis in New-Caledonia. Its prevalence has been studied in 124 stray dogs. Diagnosis based on filtration technique and research of microfilariae. A strong correlation was found between age of dogs and prevalence : 7,7 p. 100 of 6 months to 1 year-old dogs were infected, as compared to 33,33 p. 100 of the dogs in the range 1-2 years-old, 53 p. 100 of the 2-3 years-old ones, 77,4 p. 100 of the 3-5 years-old ones and 80 p. 100 of the animals that were older than five. Regression studies showed that the evolution was not linear, and that age has an epidemiologic impact which is not a simple cumulative effect. Thus, the infection risk depends on age. Dogs less than 1 year are less receptive or less infected than older ones. Infections seem to be uncommon in animals less than 6 months. Therefore chemoprophylaxis should begin at this age.

Germani, Y., Morillon, M., et al. (1994). "Two-year study of endemic enteric pathogens associated with acute diarrhea in New Caledonia." J Clin Microbiol 32(6): 1532-1536.

A longitudinal study of diarrheal disease among patients of all ages with acute diarrhea was carried out in New Caledonia from January 1990 to December 1991. Stool samples from 2,088 diarrheal patients were examined for parasites, rotavirus, and bacterial pathogens. Potential sources of contamination (drinking water, seawater and bovine and porcine feces) were investigated. One or more enteric pathogens were identified in 41.8 and 40.6% of the persons with diarrhea, in 1990 and 1991, respectively. Salmonella spp., Shigella spp., HEp-2 cell adherent Escherichia coli (diffuse adherent and enteroaggregative), enteropathogenic E. coli (EPEC) (EPEC adherence factor-positive strains belonging to classical serotypes), localized adherent E. coli (non-EPEC), and enterotoxigenic E. coli were the frequently identified enteropathogenic bacteria. Other major enteropathogens were Entamoeba histolytica and Giardia lamblia. Campylobacter jejuni, Clostridium difficile, Clostridium perfringens, Yersinia enterocolitica, and rotavirus were isolated from only a few patients. No Vibrio spp., Aeromonas spp., Plesiomonas spp., Shiga-like-toxin-producing E. coli, enterohemorrhagic E. coli, or enteroinvasive E. coli were identified. Shiga-like toxin I-producing E. coli were present in adult bovines and calves, and heat-stable enterotoxin II-producing enterotoxigenic E. coli were found in pigs.

Lebel, S. and Beugnet, F. (1994). "Ringworm cases on rusa deer in New-Caledonia." Revue De Medecine Veterinaire 145(10): 721-721.

Dermatophytosis is uncommon on wild and stock deers. In New Caledonia, ringworms due to Trichophyton verrucosum appear to be common on Rusa deer. Male and female young deers under two years of age are infected. Epizootie are seen in certain conditions. Death after few weeks of evolution is usual, so predispositions are researched. The deficiency in zinc is suspected during the dry season and seems to be treatment with enilconazole and complementation in oligoelements and vitamins.

Vilain, O., Thevenon, J., et al. (1994). "Serologic survey for antibodies to IBR IPV virus in cattle in New-Caledonia." Recueil De Medecine Veterinaire 170(8-9): 539-545.

A sero-epidemiological survey conducted in New Caledonia in 1991 on 2432 sera, showed a high rate of IBR/IPV infection in animals (45.8 +/- 2 p. cent). This rate of infection is higher in reproducing animals, especially bulls, which suggests the existence of IPV type Viruses. The rate of infection is lower in small rearing herds than in larger herds. Also infection seems to be greater in those rearing herds which have imported animals from Australia or New Zealand. The mixing between herds native to the islands does not appear to alter the rate of infection. There seems to be no reason, at present, to vaccinate livestock, but this could be considered for herds which exhibit symptoms of IBR/IPV infection. Methods of prophylaxis on animals and genetic material used for exportation could become necessary.

Beugnet, F. and Chardonnet, L. (1995). "Tick resistance to pyrethroids in New Caledonia." Veterinary parasitology 56(4): 325-338.

Boophilus microplus is the common cattle tick of great economic importance in New Caledonia. Since 1986, deltamethrin has been used for dipping. In 1992, an increase of tick infestations was seen on some ranches. Field and laboratory studies were conducted to determine if resistant ticks were present. Ticks resistant to deltamethrin were detected on three ranches, with resistance factors from 8.3 to 97.7. All deltamethrin-resistant isolates were also resistant to fenvalerate, but only one was also resistant to flumethrin. The combination of deltamethrin and ethion seemed to be active on isolates. This is the second description of isolates of Boophilus microplus resistant to pyrethroids, the first being in Australia and points to future problems in the management of tick control. Some organophosphates like chlorpyriphos or fenthion were studied as replacements for deltamethrin, in spite of the fact that most ticks are resistant to ethion. The authors propose a rotation strategy based on the alternation of several compounds together with a minimal frequency of dipping.

Beugnet, F., Gadat, R., et al. (1995). "Parasites of kagu (Rhinochetos jubatus), a bird from New Caledonia." Revue De Medecine Veterinaire 146(11): 737-742.

The Kagu is an endemic bird from New Caledonia. One trematode Brachylaemidae, one cestode Dilepididae and two nematodes, a Capillariidae and a Heterakidae, have been detected. The only isolated ectoparasite is a Dipteran Hippoboscidae. The specificity of parasites of Kagu should be examined. The incidence of parasitism on the population of birds is discussed. Cagourakis dorsalata is seen on all two years old or more Kagus. A coproscopic study showed a variation of bird infestation during the year.

Beugnet, F. and Chardonnet, L. (1996). "Endemism and parasitism - The case of two birds in New Caledonia: The cagou (Rhynochetos jubatus) and the notou (Ducula goliath)." Bulletin de la Societe Zoologique de France-Evolution et Zoologie 121(1): 133-134.

No abstract available

Beugnet, F., Gadat, R., et al. (1996). "Parasitologic note: Parasites of Notu (Ducula goliath, Columbiform). About some observations." Recueil De Medecine Veterinaire 172(7-8): 421-424.

The Notu is an endemic arboricole pigeon from New Caledonia. A two years study of these birds permitted the observation of parasites. The parasites isolated from Notus are one Hippoboscidae, two Mallophaga lice species, and a subcutaneous filarial worm. Eggs from Nematoda and coccidian oocysts have also been observed by coproscopic studies. The pathogenicity of the parasites is discussed.

Le Bars, J. and Le Bars, P. (1996). "Recent acute and subacute mycotoxicoses recognized in France." Vet Res 27(4-5): 383-394.

Successful investigation and prevention of mycotoxic problems requires close collaboration between scientists from several disciplines ranging from agronomists and technologists required during production of food and feeds, to toxicologists and pathologists examining the effects of mycotoxins on animals and man. Zootoxic metabolites following fungal infection result from four general mechanisms: (i) secondary fungal metabolism (mycotoxins, eg, aflatoxins); (ii) bioconversion of vegetal compounds (eg, dicoumarol); (iii) plant reactions (phytoalexins, eg, coumestrol); and (iv) plant-fungus associations (endophytes, eg, Acremonium/Festuca). In reported pathologic field cases, close cooperation through a selected veterinary network has allowed diagnosis of acute and subacute mycotoxicoses in France. Natural stachybotryotoxicosis may not be limited only to cold climates, but may also occur in mild and warm ones (eg, south west of France, Morocco). A considerable variation was observed in symptoms and lesions depending on toxin levels, ranging from a poor performance in a horse race to a general haemorrhagic syndrome. Several cases of acute equine leucoencephalomalacia, characterized by pathognomonic lesions and recently supported by fumonisin analysis, have been diagnosed in the southern part of France and other countries (eg, New Caledonia and the Ivory Coast). Facial eczema in sheep is endemic in the Basque country, as a result of specific bioclimatic and zootechnic conditions. Reproductive disorders in sheep, cattle, goats and rabbits have been associated with high levels of coumestrol in alfalfa, clover and their derivatives. A few cases of fescue foot disease, associated with the endophyte Acremonium, have been diagnosed recently. In addition, several nervous disorders may be due to unknown mycotoxins. These acute or subacute mycotoxicoses suggest a potentially widespread occurrence of low level toxins and insidious asymptomatic mycotoxicoses, and justify interdisciplinary research in order to improve diagnosis and preventative measures.

Beugnet, F., Chalvet-Monfray, K., et al. (1998). "Use of a mathematical model to study the control measures of the cattle tick Boophilus microplus population in New Caledonia." Vet Parasitol 77(4): 277-288.

Boophilus microplus is a common cattle tick of great economic importance in various tropical and subtropical countries like New Caledonia. The proposed model describes the population dynamics of female Boophilus microplus in the absence of resistant ticks. It is a system of six difference equations which can be mathematically analyzed. The analysis of the

system shows the great importance of the eigenvalue denoted by lambda1. The population of ticks increases if lambda1 < 1 and decreases if lambda1 > 1. The lambda1 eigenvalue depends, in particular, on the parasitic surviving rate and encounter rate between the larvae and the cows. The treatments decrease the parasitic surviving rate as the agronomic measures decrease the encounter rate. This model permits to quantify the conditions of treatments (or of the efficacy of a vaccine) and of agronomic measures by which the populations are controlled. It shows that the different treatment rhythms and the presence or not of the wild or domestic refuges plays a major role on the dynamics of tick population.

Barre, N., Bianchi, M., et al. (2001). "Role of Rusa deer Cervus timorensis russa in the cycle of the cattle tick Boophilus microplus in New Caledonia." Experimental & applied acarology 25(1): 79-96.

Two field experiments were conducted to evaluate the efficiency of Rusa deer in the development of the cattle tick Boaphilus microplus in comparison with that of steers in the same pastures and under the same conditions of infestation. No difference was noted between a mixed steer/deer herd and a pure steer or pure deer herd in the infestation pattern of each host, suggesting that attachment to the alternative host is mechanical and not affected by the simultaneous presence of the primary host on the pasture. Deer are capable of producing engorged viable females, with weight and reproductive performances similar to or even better than females fed on steers. For moderate levels (1 million larvae per hectare) and high levels (32 million larvae per hectare) of pasture infestation, tick burdens on steers were not very different (e.g. average 1,911 and 2,681 ticks per m2 skin, respectively, on day 24). This may be because of saturation of steer skin sites at the moderate larval dose. Deer harboured 2.7-33 times fewer ticks than steers and produce no engorged females at the moderate larval level and 32 times fewer engorged females than steers at the high larval level. Infestation of deer was dose-dependent with average of 12 and 399 ticks per m2 skin on day 25 at the moderate and high larval levels, respectively. At a high infestation level of the environment, Rusa deer may contribute, but to a limited extent, to infestation of pastures and, consequently, of cattle. However, their role in sustaining a viable tick population requires further investigation.

Barre, N., Bianchi, M., et al. (2002). "Effect of the association of cattle and rusa deer (Cervus timorensis russa) on populations of cattle ticks (Boophilus microplus)." Ann N Y Acad Sci 969: 280-289.

The wild population of rusa deer (Cervus timorensis russa) in New Caledonia (South Pacific) is nearly as large as the cattle population. The cattle tick is widespread and occurs all year round. Opinions are divided on the role of deer in the biological cycle of the tick: i) Do they maintain a sustainable tick population that is secondarily available for cattle? ii) Do they decrease the infestation of the environment by collecting larvae on the pasture, but preventing their development to the engorged female stage? or iii) Do they contribute to both situations? An experiment was conducted in three groups of pastures, each seeded with 450 000 larvae/ha and allowed to be grazed only by cattle, only by deer, and by a mixed herd of deer and cattle (deer representing 30% of the biomass), at approximately the same stocking rate (470-510 kg/ha). After 15 months of exposure, the tick burden per weight unit of host was 42 ticks/kg for the steers-only herd and 0.01/kg for the deer-only herd. The steers in the "mixed group" harbored 7 times fewer ticks (6.2/kg) than the cattle-only group, and the deer in the "mixed group," 130 times more (1.3/kg) than the deer-only group. Five emergency acaricide treatments had to be applied in the cattle-only group, but none in the other groups. The long-term sustainability of a viable tick population on deer as well as the potential benefit resulting from the association of deer and susceptible cattle in the tick control of cattle are highlighted.

Bianchi, M. W. and Barre, N. (2003). "Factors affecting the detachment rhythm of engorged Boophilus microplus female ticks (Acari: Ixodidae) from Charolais steers in New Caledonia." Veterinary parasitology 112(4): 325-336.

As in most parts of the world where the cattle tick Boophilus microplus is established, resistance of ticks to acaricides occurs in New Caledonia. In order to implement laboratory resistance tests on larvae, engorged females collected in suspected farms are necessary. Investigations on the detachment schedule of the engorged females were conducted to explain certain field situations such as the lack or scarcity of engorged females on highly infested cattle driven from the pasture to the pen in the morning. Three experiments on Charolais steers naturally infested on pastures showed that: (1) engorged female burdens at sunrise are similar whether the steers spend the night in pasture or in a pen; (2) compared with steers maintained in a pen, morning detachment of females increases when the steers stay on the pasture or move from the pasture to the pen; (3) detachment rhythm of engorged females on steers staying the morning in a pen, is not influenced by feeding activity or exposition of steers to sun; (4) detachment occurs earlier for females attached on anatomical sites exposed to sun, and earlier from these sites for the steers in pasture or walking than for steers in a pen.

Bianchi, M. W., Barre, N., et al. (2003). "Factors related to cattle infestation level and resistance to acaricides in Boophilus microplus tick populations in New Caledonia." Veterinary Parasitology 112(1-2): 75-89.

Boophilus microplus, even in the absence of babesiosis, is a major disease of the cattle in New Caledonia where the particular farming system associates continental European breeds and a tropical climate tempered by the Pacific Ocean. In order to have a better understanding of the factors involved in cattle tick infestation, to decrease the possible wastage and use of chemicals and to increase the lifetime of the acaricides, the veterinary authorities investigated the conditions of the chemical treatments. A survey among 148 cattle farms of the whole of New Caledonia was carried out and factors that explain the development of tick resistance and cattle infestation have been determined. From this survey, three typologies for the main characteristics of the farms have been set up, the technical practices of the farmers and the tick control measures applied by the farmers, respectively. Some variables are significantly associated with the tick resistance to deltamethrin but their contribution to the explanation model is always moderate: farms in the south, with a positive resistance gradient from east to west, absence of bush fire and membership to a cattle farmer’s organization. The more the farmers have intensified their breeding-male castration, weaning, heifer separation, drenching, etc-and pasture-high stock rate, mowing, extra feeding of the cows, many paddocks, etc. techniques, the higher was the probability for the ticks in their farm to be resistant to deltamethrin. The technical details of the acaricide treatment had a low contribution to the explanation model. However, the use of a spray generated more resistance than a dip. Furthermore, there is a negative resistance gradient when the farmers increased the treatment interval average. Considering infestation, none of the variables from the three typologies were associated with the two infestation variables (1: semi-engorged tick females and 2: other ticks) at the herd level. However, the seven studied variables-the three typologies, breed, age, body condition score and breeding status-affected significantly the two infestation variables at the cow level, but their predictive ability remained very low (R-2 < 3.5%). This result-individual effect more important than herd effect on the infestation-is confirmed by the importance of the variance of the intra-farm factors (99%) when compared with inter-farm factors (1%). Cows of Charolais breed, in poor body condition, old, pregnant or lactating, and those of the farms with irrational and high pressure control of ticks are the most infested.

Ducornez, S., Barre, N., et al. (2005). "Diagnosis of amitraz resistance in Boophilus microplus in New Caledonia with the modified Larval Packet Test." Vet Parasitol 130(3-4): 285-292.

The tick Boophilus microplus represents a serious pathological constraint to livestock production in New Caledonia. Cattle ticks are controlled by chemical application of two acaricides that are currently used in New Caledonia; deltamethrin is used at 46% of the cattle production facilities and amitraz at the remaining 54% premises where resistance to deltamethrin has been identified. In 2003, a modified Larval Packet Test (LPT) was used to conduct a survey for amitraz resistance. Ticks were collected from 29 farms, including farms using deltamethrin (n=8) or amitraz (n=21). Of eighteen different tick populations, sixteen populations were defined susceptible to amitraz and two populations were considered amitraz-resistant. This is the first report of populations of B. microplus being resistant to amitraz, using the modified LPT in New Caledonia. A thorough survey of tick susceptibility to amitraz in cattle farms of the country should be conducted to assess the presence of amitraz-resistant populations. The emergence of amitraz resistance so soon after its introduction has some important implications for the strategy and organisation of tick control in New Caledonia, and this paper discusses some of the urgent actions that should be undertaken.

Koffi, B. B., de Meeus, T., et al. (2006). "Founder effects, inbreeding and effective sizes in the Southern cattle tick: the effect of transmission dynamics and implications for pest management." Molecular ecology 15(14): 4603-4611.

Since its immigration in the Pacific island of New Caledonia in 1942 (i.e. about 240 tick-generations ago), the cattle tick Boophilus microplus has experienced a remarkable adaptive diversification there. In order to better understand the population factors involved, we have investigated the B. microplus population structure on that main host-species, Bos taurus. This study was based microsatellite loci and confirmed that the island colonization came along with a significant bottleneck. Knowledge on B. microplus biology led us to expect B. microplus populations to be composed of highly inbred lineages irregularly dispatched among the individual hosts belonging to the same herds. Instead, this study evidenced a weak inbreeding level and an absence of genetic differentiation within herds. Complementarily, a significant signal of isolation by distance exhibited that human-traffic of cattle does not promote high tick dispersal within the island. Finally, the tick density was found to be about a few hundreds of reproducing adults per squared kilometre, for a gene dispersal range of about a few hundred metres per tick generation. Results are discussed with regard to the evolution of new adaptive changes.

Salaun, L., Merien, F., et al. (2006). "Application of multilocus variable-number tandem-repeat analysis for molecular typing of the agent of leptospirosis." J Clin Microbiol 44(11): 3954-3962.

Leptospirosis is a worldwide-distributed zoonosis, endemic in tropical areas. Epidemiologic investigations of leptospirosis still rely on tedious serological identification tests. Recently, molecular typing systems based on variable-number tandem-repeat (VNTR) analysis have been described and have been used to identify Leptospira interrogans strains. Although L. interrogans is the most common Leptospira species encountered in human infections around the world, other pathogenic species, such as Leptospira kirschneri and Leptospira borgpetersenii, are also frequently associated with human leptospirosis. In this study, we aimed to extend multilocus VNTR analysis (MLVA) identification of strains to species other than L. interrogans. We designed primers for VNTR loci found in L. interrogans, L. kirschneri, and L. borgpetersenii. The discriminatory power of the redefined

primers was evaluated on collection strains and then on clinical strains. We also carried out a retrospective study on 156 strains isolated from patients and animals from New Caledonia, an area of high endemicity in the South Pacific. Our results show that this simple PCR-based MLVA typing technique is a powerful methodology for the epidemiology of leptospirosis.

Chevillon, C., Ducornez, S., et al. (2007). "Accumulation of acaricide resistance mechanisms in Rhipicephalus (Boophilus) microplus (Acari: Ixodidae) populations from New Caledonia Island." Veterinary parasitology 147(3-4): 276-288.

Rhipicephalus (Boophilus) microplus has been pesticide-controlled for several decades in the pacific island of New Caledonia. Since 1996, pesticide-control has been based on either deltamethrin (Butox) or amitraz (Taktic) in herds harbouring deltamethrin-resistant ticks. In this island, the first R. microplus deltamethrin- and amitraz-resistances were detected in 1992 and 2003, respectively. Using LPT bioassays, we have undertaken to update data regarding the geographical distribution and the physiological diversity likely to be involved in these resistances. We confirmed that after 17 years of intensive use of deltamethrin, several resistances of moderate levels (<30-fold) have evolved and/or diffused in any part of the island. We also evidenced that amitraz-resistant phenotypes have recently evolved in diverse western tick populations, although none has reached fixation in any tick population yet. According to synergists' bioassays, the physiological changes involved in amitraz-resistance in New Caledonia would involve target modification and detoxifying P450 cytochrom oxydase(s). It may also involve detoxifying esterase(s) although this later point will need confirmation on samples bearing higher frequency of resistant phenotypes. Results are discussed with regard to the local evolutionary dynamics of resistance.

Jonsson, N. N. and Hope, M. (2007). "Progress in the epidemiology and diagnosis of amitraz resistance in the cattle tick Boophilus microplus." Vet Parasitol 146(3-4): 193-198.

Amitraz is a rapidly acting acaricide that has been in use for the control of cattle ticks for more than 30 years. Resistance against amitraz was first reported in Boophilus microplus in Australia in 1980 but has been slow to spread in comparison to resistance against synthetic pyrethroids. The most recent estimate of prevalence of amitraz resistance in Australia is 10.8%. In Mexico, the development and distribution of amitraz appears to have been more rapid and the prevalence has been estimated to be 19.4% in Yucatan State. In New Caledonia, about 10% of properties were confirmed to have amitraz resistance. There is little reliable information on the prevalence of amitraz resistance in southern Africa. Risk factors have been identified, but the small sample sizes in the studies that have attempted to identify risk factors using survey data suggest caution in their interpretation. Regional variation in prevalence has been reported, as has a positive relationship with frequency of acaricide application. There is evidence to suggest that in Australia, amitraz resistance might have emerged on a small number of properties and been disseminated by cattle movements. There is also some evidence to suggest that amitraz resistance can diminish in the field when selection pressure is not applied. The mode of inheritance of amitraz resistance is uncertain and it has been suggested that it is a polygenic trait. The mechanism of amitraz resistance is unknown. Two possibilities have been proposed: octopamine receptor and monoamine oxidase. There is some equivocal support for both possibilities. The larval packet test bioassay is the most reliable method of diagnosing amitraz resistance in B. microplus, and this test has been modified by Miller to provide more accuracy and repeatability. Molecular tests are in development but will not eliminate the need for the bioassay.

Barre, N., Li, A. Y., et al. (2008). "In vitro and in vivo evaluation of deltamethrin and amitraz mixtures for the control of Rhipicephalus (Boophilus) microplus (Acari: Ixodidae) in New Caledonia." Vet Parasitol 155(1-2): 110-119.

Acaricide resistance is a major problem that hinders the control of the tropical cattle tick, Rhipicephalus (Boophilus) microplus (Canestrini), in many parts of the world where cattle production continues to suffer severe economic losses to tick infestation. Deltamethrin and amitraz have been used alone to control R. microplus in New Caledonia for the past decade, and tick populations have developed resistance to both acaricides. A study was conducted to evaluate the effectiveness of deltamethrin and amitraz mixtures, through in vitro laboratory bioassays and in vivo on-animal efficacy trials, for the control of resistant R. microplus on cattle at two dairy farms in New Caledonia. Results of laboratory bioassays using modified larval packet tests (LPT) revealed up to 16.59-fold resistance to deltamethrin, and up to 5.86-fold resistance to amitraz. Significant synergism was observed when amitraz was used as a synergist in deltamethrin bioassays. Amitraz significantly increased deltamethrin toxicity to tick larvae, while deltamethrin was much less effective on amitraz toxicity. Synergism of amitraz by deltamethrin only occurred when the deltamethrin concentration was relatively high. Results of on animal efficacy trials of deltamethrin and amitraz alone and mixtures of both at different concentrations revealed a similar pattern of synergism. Adding amitraz to a deltamethrin formulation led to dramatic increases of percent reduction of both immature and adult ticks. In contrast, adding deltamethrin to an amitraz formulation did not increase control efficacy. Results from this study may lead to the adoption of an acaricide mixture strategy for the control of pyrethroid-resistant R. microplus in New Caledonia and elsewhere.

Martin, S. (2009). "Bovine Babesiosis in New Caledonia." Report of the first FAO/OIE subregional meeting of the GF-TADs for the Pacific Community region in collaboration with SPC, Nadi, Fiji Islands, Secretariat of the Pacific Community.

First clinical signs of bovine babesiosis were observed in New Caledonia in March 2008 on a Charolais bull that had been in contact with one of the 43 imported live cattle in Nov 2007 and disseminated in 17 different farms. Imported cattle from Australia had been accidentally vaccinated before departure with trivalent tick fever vaccine (live attenuated vaccine that contains strains of Babesia bovis, Babesia bigemina and Anaplasma centrale). Babesia bovis strain has been reactivated by passing through ticks and the naive cattle of NC caught the disease. A total of 22 farms with about 5000 animals imported or having been in contact with imported animals are distributed in six municipalities in the south of New Caledonia and one in the North. Only 5 farms had animals presenting clinical signs. Tick Rhipicephalus microplus is widespread in New Caledonia (since second world war) but NC was free of tick-borne diseases. An eradication programme has then been launched with the support of the Australian Government. At the time of the conference presentation (2009), a total of 23 animals died of the disease but the number of tick on pasture had dropped thanks to the intensive tick control programme and the disease did not spread out of the 22 farms concerned.

Barre, N. and Uilenberg, G. (2010). "Spread of parasites transported with their hosts: case study of two species of cattle tick." Rev Sci Tech 29(1): 149-160, 135-147.

Like all parasites, ticks can be spread easily along with their hosts. Ticks are obligate parasites of vertebrates, to which they attach themselves for varying periods of time, and are well-adapted to this mode of transport. Once the transport stage is complete and they have detached at destination, they are also able to wait several months for the arrival of a new host on which they will continue their life cycle. This leads to the establishment of a secondary

tick population. Two tropical cattle tick species, Rhipicephalus microplus and Amblyomma variegatum, have perfected this strategy of colonisation and occupation of favourable zones. Rhipicephalus microplus, which originated from South and Southeast Asia, is highly specific for ungulates, and thanks to cattle movements it has spread throughout the tropical belt, apart from the remotest areas. Amblyomma variegatum, which originated in Africa, was transported to Madagascar and the Mascarene Islands, as well as to the West Indies, during the time of the Atlantic triangular trade. These two ticks are vectors of particularly serious cattle diseases: babesiosis and anaplasmosis in the case of R. microplus, and heartwater (cowdriosis) in the case of A. variegatum. Anticipated climate changes are likely to modify the potential geographical range of these two parasite species and numerous others. Even now there are still many areas of the Americas, Asia and Oceania into which A. variegatum has not yet spread, but which it would find favourable. It could be spread not only by the transport of cattle, but also by the migration of some of its other hosts, such as birds. Surveillance--and know-how--is needed to identify these parasites when they first appear and to rapidly contain new outbreaks. Efforts should be made to raise the awareness of livestock professionals about the risks of transporting cattle. Regulations should be implemented and precautions taken to avoid such artificial expansion of the range of ticks and the diseases they transmit.

De Meeus, T., Koffi, B. B., et al. (2010). "Swift sympatric adaptation of a species of cattle tick to a new deer host in New Caledonia." Infect Genet Evol 10(7): 976-983.

The occurrence and frequency of sympatric speciation in natural systems continue to be hotly debated issues in evolutionary biology. This might reflect the timescale over which evolution occurs resulting in there being few compelling observations of the phenomenon (lake fishes, phytophagous insects and Island trees). Despite predictions, few examples of sympatric speciation have been recorded in animal parasites, at least widely accepted as such. Here we show that, in New Caledonia, the monophasic (exploiting one individual host per generation) cattle tick Rhipicephalus microplus has evolved in contact with two sympatric host species into two differentiated genetic pools: on the cattle, its original host and on rusa deer, a new host for this tick. This sympatric isolation has occurred over a relative short period of time (i.e. less than 244 tick generations) as a consequence of differential selection pressure imposed by hosts. It is most likely that this phenomenon has occurred in many other places across the globe where this tick has come in contact with different host species in sympatry with cattle.

Barre, N., Happold, J., et al. (2011). "A campaign to eradicate bovine babesiosis from New Caledonia." Ticks Tick Borne Dis 2(1): 55-61.

In December 2007, Babesia bovis was introduced to New Caledonia through the importation of cattle that had been vaccinated with a live tick fever (babesiosis and anaplasmosis) vaccine. Although the tick Rhipicephalus (Boophilus) microplus is common in New Caledonia, the territory had previously been free of tick-borne diseases of cattle. This paper describes the initial extent of the outbreak, the measures and rationale for disease control, and the progress to date of the eradication campaign. Initially, 22 properties were affected involving approximately 2300 cattle in 'high risk' zones and 1600 in adjoining 'suspect' zones. Rather than slaughtering infected herds or attempting to eliminate the tick vector, the campaign was based on quarantine of affected properties, and aggressive tick control in conjunction with 3-monthly treatments of the high risk cattle with the antiprotozoal drug imidocarb dipropionate. Subsequent surveillance by ELISA and PCR showed a progressive and dramatic decline in seroprevalence among infected herds and the absence of new infections. All 22 properties were considered to be free of Babesia within 12 months of

the start of the disease control program. These results indicate that the strategy was effective in eliminating Babesia from infected herds and feasible as an eradication strategy on a moderately large scale. Unfortunately, early in the campaign, babesiosis spread to a herd of feral cattle on a property in the 'suspect' zone, and this reservoir of infection subsequently resulted in the infection (or reinfection) of cattle on several neighbouring commercial farms. The eradication campaign in New Caledonia is currently focussed on destocking the feral cattle - extensive surveillance suggests that this is the only remaining nidus of infection.

Kaba, M., Davoust, B., et al. (2011). "Hepatitis E virus genotype 3f in pigs in New Caledonia." Aust Vet J 89(12): 496-499.

BACKGROUND: Hepatitis E virus (HEV) is highly prevalent in farm pigs worldwide and an increasing body of data from industrialised countries suggests that it is an agent of a porcine zoonosis. METHODS: We used in-house real-time reverse transcription polymerase chain reaction to study HEV infection in 4-26-week-old pigs on a pig farm in New Caledonia, Oceania, for which no data are available. RESULTS: HEV RNA was detected in faeces from 6 of 92 (6.5%) pigs tested and all were 9-16 weeks old. Phylogenetic analysis showed that the HEV open reading frame 1 and 2 sequences recovered in this study formed a single cluster among HEV genotype 3 subtype f. CONCLUSIONS: Our work shows for the first time that pigs are a reservoir for HEV in New Caledonia. Further studies are needed to assess the prevalence and phylogenetic relationships of HEV in pigs and humans in this French overseas collectivity.

Mediannikov, O., Davoust, B., et al. (2011). "Bartonellae in animals and vectors in New Caledonia." Comparative immunology, microbiology and infectious diseases 34(6): 497-501.

Bartonellae are gram-negative facultative intracellular alpha-proteobacteria from the family Bartonellaceae. The natural history of bartonellae consists of a reservoir/host, which is a vertebrate with chronic intravascular infection with sustained bacteremia, and a vector (usually an arthropod) that transfers the bacteria from the reservoir to a susceptible yet uninfected host. In order to reveal the sources and reservoirs of Bartonella infection in animals and vectors in New Caledonia, we collected the blood samples of 64 dogs, 8 cats, 30 bovines, 25 horses and 29 wild deer Cervus timorensis russa and 308 associated blood-sucking parasites (14 keds Hippobosca equina, 258 ticks (22 Rhipicephalus microplus, 235 Rhipicephalus sanguineus, and 1 Haemaphysalis longicornis), 12 fleas Ctenocephalides felis and 24 dog lice Trichodectes canis). We isolated ten strains of Bartonella: four Bartonella henselae from cats and six Bartonella chomelii from cattle. The strains were characterized by sequencing of five genes (16S, ITS, rpoB, gltA and ftsZ). The six strains isolated from cattle were close to the reference strain of B. chomelii and were, probably, imported from France with cattle of Limousin race. PCR showed that 35% of keds collected from deer and 31% of deer were infected by B. aff. schoenbuchensis; all other samples were negative. Our data confirmed that in New Caledonia, as in other regions of the world, cats are the major reservoirs of B. henselae. We also confirmed that Hippoboscidae flies may serve as the vectors of ruminant-associated bartonellae.

Roqueplo, C., Halos, L., et al. (2011). "Toxoplasma gondii in wild and domestic animals from New Caledonia." Parasite 18(4): 345-348.

Samples (serum or meat juice) collected from 205 animals in New Caledonia in April 2009 were tested for antibodies against Toxoplasma gondii by ELISA using the multi-species ID Screen(R) Toxoplasmosis Indirect kit (IDVET, Montpellier). Antibodies to T. gondii were detected in 2% (1/49) of the pigs, in 3.3% (1/30) of the cattle, in 13.8% (4/29) of Rusa deers,

in 16% (4/25) of the horses, in 32.8% (21/64) of the dogs, and in 50% (4/8) of cats. Statistically, no significant difference was observed between T. gondii seroprevalence and age or sex. No survey on the prevalence of T. gondii in animals has ever been conducted in New Caledonia and this is the first serological evidence of T. gondii in Rusa deer (Cervus timorensis russa). These results indicate an important circulation of T. gondii exists in the animal populations of New Caledonia. In view of humans being exposed, it is advisable to insist on sanitary education and on respect for good hygienic and food practice.

Watier-Grillot, S., Marie, J. L., et al. (2011). "Survey of Canine Dirofilaria immitis Infection in New Caledonia." Veterinary medicine international 2011: 380680.

Canine dirofilariosis is a frequent parasitic disease in New-Caledonia. A survey of canine heartworm (Dirofilaria immitis) infection among dogs from the cities of Tontouta, Nandai and Noumea, was performed in March 2009 using two antigen test kits; the microwell ELISA test: DiroCHE (Synbiotics Europe) and the Rapid Immuno Migration (RIM) test: WITNESS DIROFILARIA (Synbiotics Europe). Blood samples were collected from 64 dogs: 49 strays and 15 military working dogs. The military dogs received a permanent chemoprophylaxis (moxidectin). In 11 stray dogs, both tests were positive (22.4%). All the military dogs were negative, showing efficiency of chemoprophaxis. Results were discrepant in 6 dogs, negative with one test and doubtful with the other. Antigen heartworm test kits are available and reliable diagnostic tools. They are useful to evaluate the efficiency of chemoprophylaxis and to detect infected animals in order to treat them and to prevent the spreading of the disease.

Garin, B., Gouali, M., et al. (2012). "Prevalence, quantification and antimicrobial resistance of Campylobacter spp. on chicken neck-skins at points of slaughter in 5 major cities located on 4 continents." International Journal of Food Microbiology 157(1):102-107.

Quantitative data on Campylobacter contamination of food are lacking, notably in developing countries. We assessed Campylobacter contamination of chicken neck-skins at points of slaughter in 5 major cities in Africa (Dakar in Senegal, Yaounde in Cameroon), Oceania (Noumea in New Caledonia), the Indian Ocean (Antananarivo in Madagascar) and Asia (Ho Chi Minh City (HCMC) in Vietnam. One hundred and fifty slaughtered chickens were collected in each of the 5major cities from semi-industrial abattoirs or markets (direct slaughter by the seller), and 65.5% (491/750) were found to be Campylobacter-positive. Two cities, Yaounde and Noumea, demonstrated high prevalence Campylobacter detection rates (92.7% and 96.7% respectively) in contrast with HCMC (15.3%). Four species were identified among 633 isolates, namely C. jejuni (48.3%), C. coli (37.3%), C. lari (11.7%) and C. upsaliensis (1%). HCMC was the only city with C. lari isolation as was Antananarivo for C. upsaliensis. C. coli was highly prevalent only in Yaounde (69.5%). Among the 491 samples positive in Campylobacter detection, 329 were also positive with the enumeration method. The number of Campylobacter colony-forming units (CFU) per gram of neck-skin in samples positive in enumeration was high (mean of the log10: 3.2 log10 CFU/g, arithmetic mean: 7900 CFU/g). All the cities showed close enumeration means except HCMC with a 1.81 log10 CFU/g mean for positive samples. Semi-industrial abattoir was linked to a significant lower count of Campylobacter contamination than direct slaughter by the seller ($p=0.006$). On 546 isolates (546/633, 86.3%) tested for antibiotic susceptibility, resistance to erythromycin, ampicillin and ciprofloxacin was observed for respectively 11%, 19% and 50%. HCMC was the city where antibiotic resistant rates were the highest (95%, $p=0.014$). Considering the 329 positive chickens in Campylobacter enumeration, the mean number of resistant isolates to at least 2 different antibiotic families (19.8%), may be estimated ca. 1500

CFU/g; the corresponding mean of the log10 would be 2.5 log10CFU/g. As chickens are sold at slaughter and brought directly at home to be cooked, these data suggest a high probability of cross-contamination. A substantial proportion of isolates are drug-resistant, which could lead to potential public health issues. Health authorities should consider measures to reduce Campylobacter contamination of chicken during farming and at slaughter, and to provide appropriate food hygiene education. Further studies are needed in particular to investigate food-handling practices in domestic kitchens.

Julian, L., Varsani, A., et al. (2012). "Evidence of multiple introductions of beak and feather disease virus into the Pacific islands of Nouvelle-Caledonie (New Caledonia)." Journal of general virology 93(Journal Article): 2466-2472.

Beak and feather disease virus (BFDV) is a circular ssDNA virus that causes psittacine beak and feather disease and has almost global presence. Here, we report for the first time the presence of this virus in Nouvelle-Caledonie (New Caledonia). One hundred and sixty-eight exotic and 79 endemic birds were sampled in Nouvelle-Caledonie, 26 were found to be positive for BFDV. We characterized the full genomes of 26 isolates and phylogenetic analysis placed nine of the isolates into the BFDV-J strain, with the remaining 17 isolates from Deplanche's Rainbow Lorikeet (Trichoglossus haematodus deplanchii) forming a novel strain, BFDV-P. Of more concern was the discovery of an infected bird from the vulnerable and endemic New Caledonian Parakeet (Cyanoramphus saisseti). Our results reveal that there have been at least two introductions of BFDV into Nouvelle-Caledonie.

Niue

Saville, P. (1996). "The Animal Health Status of Niue." Secretariat of the Pacific Community: 18.

Aspects of the animal health status of Niue have been investigated on a number of occasions by visiting consultants. This paper seeks primarily to record the findings from two visits which took place in September 1992 and March 1994. The results of earlier surveys are also included as appropriate. The findings indicate that all species in Niue are free from all major diseases. Diseases of public health concern elsewhere (brucellosis and tuberculosis) have not been detected on Niue. Although there has been serological evidence of infectious bovine rhinotracheitis/infectious pustular vulvovaginitis in the cattle, this appears to have been eliminated. The absence of all Ixodid ticks is a major benefit. The pig population shows evidence of parvovirus infection but appears to be free of other important diseases. A number of samples were inconclusive for leptospirosis, but no positive cases were recorded. Although the number of poultry samples examined was small and not representative, results served to confirm that poultry diseases which are widespread elsewhere in the region are also present on Niue. These include infectious bursal disease, infectious bronchitis, Marek's disease and Mycoplasma gallisepticum. The high incidence of toxoplasmosis in the caprine population is of public health concern. The feral cat population is thought to constitute the reservoir for this disease. The survey for bee diseases confirmed the presence of nosemosis and certain viral diseases. However there was no evidence of any major disease which could limit trade in Niue honey.

Secretariat of the Pacific Community (2004). "Apiculture in Niue, Country report and future strategy." Secretariat of the Pacific Community: 11.

No abstract available

Oceania

Anonymous (1946). "Control of infectious animal diseases in the South-West Pacific area." The Veterinary record 58: 165.

No abstract available

Aslanian, R. G. and Cheliadinova, E. B. (1970). "[Current nosoareal of brucellosis. II. The distribution of brucellosis in the countries of Africa, Asia and Oceania]." Zhurnal mikrobiologii, epidemiologii, i immunobiologii 47(5): 72-77.

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Osborne, H. G. (1974). "Animal quarantine in the South Pacific commission area." Brisbane, Queensland, Australia, University of Queensland: 56.

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Steele, J. H. (1977). "The zoonoses in the South Pacific and their public health significance." International journal of zoonoses 4(1): 1-20.

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Quatermain, A. R. (1979). "South Pacific agricultural survey 1979 - Sector paper on livestock." Asian Development Bank: 66.

No abstract available

Angus, S. D. (1986). "Epidemiology and control of Helminth infections of domestic livestock on Pacific atolls." Center for Tropical Veterinary Medicine Edinburgh, University of Edinburgh. Master of Science in Tropical Veterinary Medicine: 75.

The importance of climate, soil type and vegetation are discussed as to their role in the epidemiology of helminthiasis on Pacific atolls. There is a brief description of animal husbandry systems practiced on these islands. The main helminth infections of pigs, poultry and goats, the most important domestic animals, are described under the headings of epidemiology and control. In conclusion a general discussion examines the main points and indicates the likely direction of future trends.

Sammels, L. M., Coelen, R. J., et al. (1995). "Geographic distribution and evolution of Ross River virus in Australia and the Pacific Islands." Virology 212(1): 20-29.

We examined the molecular epidemiology and evolution of Ross River (RR) virus in Australia and the Pacific Islands. Nucleotide sequences of the E2 and E3 genes of five RR virus strains revealed remarkable conservation between 1959 and 1989 with a maximum divergence of only 3.3%. Sequence data from a 505-base pair fragment of the E2 gene from 51 additional strains showed that RR virus has diverged genetically into three separate groups although at least 95% sequence homology was still maintained between all 56 strains. Each genetic type predominates in a particular geographic region of Australia and can be broadly defined as occurring in the western, northeastern, and southeastern regions of Australia. However, some RR virus strains did not follow this pattern of geographic distribution indicating movement of virus by the travel of viremic humans or livestock across the continent. The Pacific Islands isolates all belong to the southeastern genotype. These findings suggest genetic divergence and independent evolution of RR virus within geographically isolated enzootic foci; however, selective pressures maintain high nucleotide conservation in nature.

Bergin, B. (1996). "Parker Ranch: Pacific pioneer in animal health." Veterinary heritage: bulletin of the American Veterinary History Society 19(2): 30-32.

No abstract available

Saville, P. (1996). "The animal health status of the Pacific islands countries and territories - 1994." Secretariat of the Pacific Community, Noumea, New Caledonia: 17p.

This report seeks to correlate the available information on the animal health status of the 22 Pacific Island countries and territories. Although most countries are now familiar with the need to report annually or quaterly to organisations such as the Office International des Epizooties (OIE) or the Food and Agriculture Organization (FAO), for many of the smaller countries this report provides the first opportunity to report on all of the recognised List A, B and C diseases. No case of any List A disease was reported from the Pacific Island countries and territories and the region can be considered to be free of all the major epizootics. The region may also be considered free of rabies. Leptospirosis appears to be the most important disease within the region at present, both economically and from the public health perspective. Bovine brucellosis and tubercullosis appear to be under control or eliminated in most countries. A number of diseases of poultry are also widespread throughout the region.

Fukunaga, Y., Kumanomido, T., et al. (2000). "Getah virus as an equine pathogen." Vet Clin North Am Equine Pract 16(3): 605-617.

Getah virus is a member of the genus Alphavirus in the family Togaviridae and has been frequently isolated from mosquitoes. Seroepizootiologic studies indicate that the virus is mosquito-borne and widespread, ranging from Eurasia to southeast and far eastern Asia, the Pacific islands, and Australasia. The natural host animal of the virus was not known until the first recognized occurrence of Getah virus infection among racehorses in two training centers in Japan in 1978. Outbreaks of clinical disease due to Getah virus infection occur infrequently, and only one outbreak has been reported outside Japan; this was in India in 1990. Clinical signs of the disease are mild and nonlife-threatening and are characterized by pyrexia, edema of the hind limbs, swelling of the submandibular lymph nodes, and urticarial rash, as reported in the 1978 epizootic. The morbidity was 37.9% (722 of 1903 horses) in one training center, with 96% of 722 affected horses making a full clinical recovery within a week without any significant sequelae. Antibodies against Getah virus were detected in 61.2% (172 of 281) and 55.8% (254 of 455) of horses at two training centers, respectively. Virus isolation can be attempted in VERO, RK-13, BHK-21, and many other cell lines as well as in suckling mouse brain. Blood plasma collected from suspect cases of infection at the onset of pyrexia is the specimen of choice. A diagnosis of Getah virus infection can also be confirmed serologically based on testing acute and convalescent phase sera by using SN, CF, HI, and ELISA tests. An inactivated vaccine is available for the prevention and control of Getah virus infection in horses in Japan.

Reid, S., Puana, I., et al. (2001). "The identification of constraints and possible remedies to livestock production by zoonotic diseases in the South Pacific." ACIAR: 47.

No abstract available

Reid, S. A. (2002). "Trypanosoma evansi control and containment in Australasia." Trends Parasitol 18(5): 219-224.

Animal trypanosomosis caused by Trypanosoma evansi is endemic throughout Southeast Asia, where it is an important constraint on the productivity of smallholder livestock. In the past decade, T. evansi has emerged as a serious threat to the viability of smallholder livestock industries in the Philippines and causes severe disease outbreaks with

high mortality. Trypanosoma evansi also poses a threat to livestock and native fauna in Australia and Papua New Guinea (PNG) where it is absent, but the risk of it spreading from Indonesia is high. Surveillance for T. evansi in PNG and Australia, and its control in the Philippines is restricted by the poor sensitivity and inadequate validation of existing diagnostic tests and lack of information on the determinants of infection.

Senne, D. A. (2003). "Avian influenza in the Western Hemisphere including the Pacific Islands and Australia." Avian diseases 47(3 Suppl): 798-805.

Between 1997 and 2001, there was one report of highly pathogenic avian influenza (HPAI) in the Western Hemisphere and Pacific Basin. In 1997, in New South Wales, Australia, an outbreak caused by avian influenza (AI) virus subtype H7N4 involved both chickens and emus. All other reports of infections in poultry and isolations from wild bird species in the region pertained to low pathogenicity (LP) AI virus. Animal Health Officials in Canada reported isolations of subtypes H1, H6, H7, and H10 from domestic poultry and subtypes H3 and H13 from imported and wild bird species. In Mexico, the H5N2 LPAI virus, the precursor of the HPAI outbreak in 1994-95, was isolated from poultry in each year from 1997 to 2001. Since 1997, Mexico has used approximately 708 million doses of a killed H5N2 vaccine and an additional 459 million doses of a recombinant fowlpox-H5 vaccine in their H5N2 control program. In Central America, avian influenza was diagnosed for the first time when H5N2 LPAI virus was isolated from chickens in Guatemala and El Salvador in 2000 and 2001, respectively. The H5N2 virus was genetically similar to the H5N2 virus found in Mexico. Surveillance activities in the United States resulted in the detection of AI virus or specific antibodies in domestic poultry from 24 states. Eleven of the fifteen hemagglutinin (H1, H2, H3, H4, H5, H6, H7, H9, H10, H11, and H13) and eight of the nine neuraminidase (N1, N2, N3, N4, N6, N7, N8, and N9) subtypes were identified. Two outbreaks of LPAI virus were reported in commercial table-egg producing chickens; one caused by H7N2 virus in Pennsylvania in 1996-98 and the other caused by H6N2 virus in California in 2000-01. In addition, isolations of H5 and H7 LPAI virus were recovered from the live-bird markets (LBMs) in the northeast United States.

Junker, K. and Boomker, J. (2006). "Check-list of the pentastomid parasites crocodilians and freshwater chelonians." The Onderstepoort journal of veterinary research 73(1): 27-36.

Based on published records and own data a summary is given of the geographical distribution of the currently known species of pentastomid parasites infecting crocodiles and alligators, as well as freshwater chelonians. A brief generic diagnosis is provided for each genus. Fourteen out of the currently 23 living crocodilian species have been recorded as being host to one or more pentastomes. Out of the 32 pentastome species six are considered species inquirendae. Presently, six genera of crocodilian pentastomes, Agema, Alofia, Leiperia, Sebekia, Selfia and Subtriquetra are recognized. African crocodiles harbour eight pentastome species, six of which have been recorded from the Nile crocodile, Crocodylus niloticus. Three species belong to the genus Sebekia, Alofia being represented by two and Leiperia by only one species. Two species, Alofia parva and Agema silvae-palustris, occur in the dwarf crocodile, Osteolaemus tetraspis, and the slender-snouted crocodile, Crocodylus cataphractus, exclusively, but a single Sebekia species is shared with the Nile crocodile. The genus Agema is endemic to the African region. Infective stages of the pentastome Subtriquetra rileyi, thought to utilize Nile crocodiles as final hosts, have been recovered only from fishes. The largest number of pentastome species is found in the Australasian region. Of these, the Indo-Pacific crocodile, Crocodylus porosus, harbours seven, representing the genera Alofia, Sebekia, Leiperia and Selfia. Selfia is exclusive to the latter host. The genus

Subtriquetra has been reported from "Indian crocodiles", a term possibly referring to either Crocodylus palustris, Crocodylus porosus or Gavialis gangeticus. Ten species of pentastomes parasitizing the crocodilian genera Alligator, Caiman, Crocodylus and Melanosuchus have been recorded from the Neotropical region including the southern states of the North American continent. The two most wide-spread pentastome genera, Alofia and Sebekia, have been recorded together with representatives of the genus Subtriquetra and immature and larval forms of Leiperia. To date the two monospecific genera, Pelonia, from two terrapin species, Pelusios sinuatus and Pelomedusa subrufa, in South Africa, and Diesingia from Hydraspis geoffroyana and Hydromedusa tectifera in South America, are the only chelonian pentastomes recovered world-wide. A possible exception is the crocodilian pentastome Sebekia mississippiensis which can reach maturity in experimentally infected terrapins.

Cokanasiga, K. (2007). "The Pacific Regional Influenza Pandemic Preparedness Project." Journal of Commonwealth Veterinary Association 23(2): 35-39.

The Pacific Regional Influenza Pandemic Preparedness Project (PRIPPP) was designed to build the capacity of the Pacific Island Countries and Territories (PICTs) in dealing with potential threats of pandemic and emerging diseases, in line with regional and international guidelines and regulations. Pre-project activities, led by the Secretariat of the Pacific Community (SPC), have been in progress for the last 18 months. This work has focused on country capacity assessments, preliminary capacity building and training activities and communication concerning the objectives of this Project. Priorities for the initial stages of the Project are to assist PICTs prepare and complete their comprehensive plans to identify, and respond to possible highly pathogenic avian influenza (HPAI) and pandemic influenza outbreaks, begin institutional strengthening building in earnest, and to procure and store essential infection control material, including vaccines and medicines. The project components reflect three broad areas of intervention: preparedness and broader emergency plans; surveillance and response by animal and human health systems; and regional coordination and project management. As the project progresses, the focus will shift on sustainable capacity building. Animal health capacity in the Pacific is particularly weak. The project is considered to provide an excellent opportunity to build up much needed capacity in this sector.

Desvars, A., Cardinale, E., et al. (2011). "Animal leptospirosis in small tropical areas." Epidemiol Infect 139(2): 167-188.

Leptospirosis is the most widespread zoonosis in the world. Humans become infected through contact with the urine of carrier animals, directly or via contaminated environments. This review reports available data on animal leptospirosis in ten tropical islands: Barbados, Martinique, Guadeloupe, Grenada, Trinidad, New Caledonia, Hawaii, French Polynesia, La Reunion and Mayotte. Leptospirosis is endemic in these insular wild and domestic fauna. Each island presents a specific panel of circulating serovars, closely linked with animal and environmental biodiversity, making it epidemiologically different from the mainland. Rats, mongooses and mice are proven major renal carriers of leptospires in these areas but dogs also constitute a significant potential reservoir. In some islands seroprevalence of leptospirosis in animals evolves with time, inducing changes in the epidemiology of the human disease. Consequently more investigations on animal leptospirosis in these ecosystems and use of molecular tools are essential for prevention and control of the human disease.

Eldin, C., Mediannikov, O., et al. (2011). "Emergence of Rickettsia africae, Oceania." Emerg Infect Dis 17(1): 100-102.

We detected Rickettsia africae, the agent of African tick-bite fever (ATBF), by amplification of fragments of gltA, ompA, and ompB genes from 3 specimens of Amblyomma loculosum ticks collected from humans and birds in New Caledonia. Clinicians who treat persons in this region should be on alert for ATBF.

Palau

Saville, P. (1999). "The Animal Health Status of Palau." Secretariat of the Pacific Community: 21.

Aspects of the animal health status of Palau have been investigated during a series of visits between March 1993 and November 1996. The findings of other surveys are also included as appropriate. The results indicate that there is no serological or clinical evidence of the major exotic diseases in any species present in Palau. Diseases of public health concern elsewhere (bovine brucellosis and tuberculosis) have not been recognised in Palau, however cattle, goats and pigs exhibit serological evidence of the widespread distribution of leptospirosis. Although the number of poultry samples examined was small and not representative, results served to confirm that poultry diseases, which are widespread elsewhere in the region, are also present on Palau. These include infectious bursal disease, infectious bronchitis, Marek's disease. The high incidence of toxoplasmosis in the caprine population is of public health concern. The feral cat population is thought to constitute the reservoir for this disease. There is no clinical evidence and no reports to indicate that canine rabies is present or has occurred in Palau.

Papua New Guinea

Aldrick, S. J. (1968). "Typing of Brucella strains from Australia and Papua-New Guinea received by the regional W.H.O. Brucellosis Centre." Aust Vet J 44(4): 130-133.

Since August 1965, 137 Brucella cultures have been examined at the Brucella reference laboratory of the W.H.O. Brucellosis Centre at the Commonwealth Serum Laboratories. Eight different types of Brucella were found among cultures from various sources in all states of Australia, and Papua-New Guinea, These included Br. abortus biotypes 1 and 2, probably Br. ubortus strain 19, Br. suis biotypes I , 2, and possibly 3, and Br. melitensis biotypes 1 and 2.

Talbot, N. (1968). "Respiratory mites of poultry in Papua New Guinea." Aust Vet J 44(11): 530.

No abstract available

Talbot, N. T. (1969). "Speleognathopsis galli--a respiratory mite of the fowl in Papua and New Guinea." Australian veterinary journal 45(12): 582-583.

A respiratory mite, Speleognathopsis galli, of the domestic fowl, not previously recorded from the Australasian region is described. In a territory-wide parasite survey a low incidence of infection (4%) was reported and was restricted to village-reared fowls only in the Vanimo area of the West Sepik District. The differences between this mite and Cytodites nudis are discussed.

Talbot, N. T. (1971). "An acantocephalan parasite, mediorhynchus gallinarum, of the domestic fowl in Papua and New Guinea." Australian veterinary journal 47(7): 334-336.

An acanthocephalan parasite, Mediorhynchus gallinarum, is a relatively common parasite of village fowls in Papua and New Guinea. The highest incidence (25%) was recorded from the West Irian border areas during a recent survey of approximately 120 birds. The life cycle is unknown and the parasite is not considered to be of major economic significance even in heavy infections.

Talbot, N. T. (1971). "Incidence of Spirocerca lupi in dogs in the Port Moresby area of Papua and New Guinea." Australian veterinary journal 47(5): 189-191.

Spirocerca lupi is reported as a relatively common parasite of dogs in the Port Moresby area of Papua and New Guinea. 103 dogs and 117 cats were examined post mortem, and 12 dogs over six months of age were found to be infected with the parasitc; none of the cats were infected. Only one dog showed evidence of clinical spirocercosis.

Caley, J. E. (1972). "Salmonella in pigs in Papua New Guinea." Aust Vet J 48(11): 601-604.

A comparison between the Salmonella carrier rate in pigs raised under village conditions, 9%, and pigs reared in intensive piggeries, 54%, was made using a new primary enrichment medium (brilliant green mannitol broth) and associated identification media. From the results obtained the cultivation of mesenteric lymph nodes from pigs raised in intensive piggeries must be considered the richest source of Salmonella serotypes, since the carrier rate of pigs on free range is apparently very much lower. Of the Salmonella serotypes isolated, six (S. bovis morbificans, S. cubana, S. lagos, S. litchfield, S. singapore and S. wandsbek) had not been previously isolated in this country. S. wandsbek wandsbek and S. cubam would not have been detected using the locally available polyvalent agglutination antisera as these serotypes belong to uncommon groupings. S. cholerue suis was not isolated from village-raised pigs, although it occurred in 5% of the serotypes isolated from intensive piggeries.

Ewers, W. H. (1973). "A host-parasite list of the protozoan and helminth parasites of New Guinea animals." International journal for parasitology 3(1): 89-110.

This paper provides a host-parasite list for protozoan and helminth parasites recorded from native animals of New Guinea. The synonomy of both hosts and parasites are given together with references to the literature of each species of parasite.

Reid, M. A. and Harvey, P. R. (1972). "The use of Brucella abortus 45-20 adjuvant vaccine as a diagnostic aid in the brucellosis eradication campaign in Papua New Guinea." Aust Vet J 48(9): 495-499.

During brucellosis eradication campaigns, early latent infection in cattle, not detectable by serological testing, are a major problem. Brucella 45/20 killed adjuvant vaccine has been used in the Territory of Papua New Guinea to induce serologically detectable anamnestic response in these animals. This vaccine has also been used to find latent carriers in groups of cattle being selected for importation into the Territory from brucellosis infected herds in Australia.

Talbot, N. T. (1972). "Incidence and distribution of helminth and arthropod parasites of indigenous owned pigs in Papua New Guinea." Trop Anim Health Prod 4(3): 182-190.

Twenty-five species of helminth and arthropod parasites were recorded from village

reared pigs in Papua New Guinea during a survey carried out during 1966-69. Infection with the lungworm Metastrongylus sp. is considered to be a major contributing cause of mortality in highland areas. Other helminths of economic importance under village management systems are the kidney worm (Stephanurus dentatus), Gnathostoma sp., Ascaris suum, Oesophagostomum sp. and Macrocanthorhynchus hirudinaceus. The possible role of the New Guinea village pig in transmission of parasitic zoonoses is briefly discussed.

Copland, J. W. (1974). "Metastrongylus spp. infections of village pigs in Papua New Guinea." J Helminthol 48(1): 25-32.

A high incidence of lungworm infection occurs in young village pigs, 5 and 11 months old. The mean count was 215 and 315 adult lungworms for eleven 5 month and ten 11 month village pigs respectively. All infections were mixed infections comprising M. pudendodectis (69 %), M. apri (18 %) and M. salmi (13 %). No seasonal variation was observed in the rate of infection. A partial immunity to lungworms is evident in the 11 month old pigs.

Copland, J. W. (1974). "Swine Pox in Papua New Guinea." Tropical animal health and production 6(3): 153-157.

The first confirmed outbreak of swine pox in Papua New Guinea is described. Young stocks only were affected. The virus was identified by host specificity in transmission tests using pigs, rabbits, guinea-pigs and chicken embryos. The gross pathology and histology described did not differ from swine pox outbreaks reported elsewhere. The stable fly, Stomoxys calcitrans, is thought to have acted as a mechanical vector in the outbreak. The origin of infection could not be traced.

Norris, K. R. and Ferrar, P. (1974). "Musca inferior, a livestock fly new to Papua New Guinea." Aust Vet J 50(8): 363-364.

No abstract available

Copland, J. W. (1975). "Letter: Enzootic calcinosis of cattle in Papua, New Guinea." Australian veterinary journal 51(6): 326.

No abstract available

Copland, J. W. (1976). "A study of acute "short-wind" (pneumonia) in village pigs of Papua New Guinea." Tropical animal health and production 8(4): 187-194.

Observations were made over a 12-month period in two villages of the incidence and nature of an acute pneumonia syndrome of village pigs. A detailed ante-mortem and post-mortem examination was made of seven pigs with acute pneumonia, "short-wind". The principal ante-mortem findings were gross malnourished stunted young pigs with severe respiratory embarrassment. Post-mortem examination revealed acute bacterial pneumonia, superimposed on existing chronic enzootic and lungworm pneumonia. No single bacterial species was constantly isolated; Pastuerella spp. and Staphylococcus were the most frequently isolated. The pathogenesis of the disease is discussed. It is suggested that enzootic pneumonia is not a significant limiting factor in traditional pig husbandry. Low nutritional status and heavy nematode infections resulting in increased susceptibility to bacterial pneumonia of pigs are thought to be responsible for the high incidence and mortality from acute pneumonia.

Copland, J. W. (1976). "Normal haematological parameters of pigs in Papua New Guinea." Trop Anim Health Prod 8(2): 63-69.

The normal haematological parameters of pure Native and Crossbred Native pigs under intensive management are listed. The values for both groups are within the wide range of normal values for conventional breeds under intensive management. The "normal" haematological values 5-month and 11-month Village pigs are also listed. Compared with the corresponding age group of both pure Native and Crossbred Native pigs, the Village pigs had significantly lower haemoglobin, red blood cell counts and haematocrit values. The cause of the lower values in Village pigs is thought to be due to the malnutrition-parasite complex of Village pigs. The significantly higher leucocyte count of Village pigs is thought to be due to chronic pneumonia and parasitism of the Village pigs.

Copland, J. W. (1976). "Some normal biochemical parameters of pigs in Papua New Guinea." Tropical animal health and production 8(2): 71-81.

The normal values of serum glutamic oxaloacetic transminase, serum glutamic pyruvic transaminase, serum lactic dehydrogenase and serum alkaline phosphatase, total protein, urea, creatine, cholesterol, glucose, magnesium, calcium and inorganic phosphorus were measured monthly over a 12-month period from 10 "pure" Native and 10 Native X British Crossbred pigs. Except for cholesterol, no significant difference was found between the two groups. Similar estimations were made for 5-month and 11-month Village pigs in which the serum alkaline phosphatase, inorganic phosphorus, total protein, urea, creatinine and calcium were significantly lower when compared with the corresponding age group of the pure Native pigs and Crossbred pigs. These lower values are thought to be due to the effects of the malnutrition-parasite complex of Village pigs.

Della-Porta, A. J., Murray, M. D., et al. (1976). "Congenital bovine epizootic arthrogryposis and hydranencephaly in Australia. Distribution of antibodies to Akabane virus in Australian Cattle after the 1974 epizootic." Aust Vet J 52(11): 496-501.

At the end of the 1974 epizootic of bovine congenital arthrogryposis and hydranencephaly in south-eastern New South Wales, an Australia-wide serological survey (about 4,000 serums) was made to determine the ditribution of cattle possessing serum neutralising antibodies against Akabane virus. Eighty per cent of the serums from cattle in northern Australia (Western Australia, Northern Territory, and Queensland) were positive. A detailed study in the epizootic area in New South Wales (particularly around Bega) showed that 80 to 100% of serums from cows in herds in this area possessed neutralising antibodies. The animals possessing antibodies extended as far south as Genoa in north-eastern Victoria, and as far west as Darlington Point on the Murrumbidgee River. There were no positive herds along the Murray River, where an outbreak of the mosquito-borne disease Murray Valley encephalitis occurred in 1974. Serums tested from cows in the rest of Victoria, South Australia, south-western Western Australia, and Tasmania were negative. Arthrogrypotic calves born in Tasmania and south-western Western Australia were not associated with the presence of Akabane virus. In Papua New Guinea, serums collected from cattle at Boroka, Lae, and Goroka did not possess neutralising antibodies. The distribution of cattle possessing antibodies in Australia would fit a spread of the virus by Culicoides brevitarsis, a biting midge from which Akabane virus had been isolated on three occasions. The possibility of other vectors, as well as C. brevitarsis, was suggested by the presence of cows possessing antibodies at Alice Springs, where this biting midge has not been found. Possibly most cattle in northern Australia become infected early in life. The epizootics in New South Wales could occur when seasonal conditions allow a southerly extension of virus-infected C. brevitarsis

which feed on susceptible pregnant animals. C. brevitarsis also bites sheep, and both neutralising antibodies to Akabane virus and congenitally deformed lambs have been observed in the epizootic area. An understanding of the distribtuion of Akabane virus and C. brevitarsis, a possible Australian vector for bluetongue virus, may prove useful if bluetongue should enter Australia.

Jones, H. I. (1976). "The role of pigs in the dissemination of ascaris and hookworm infections in Papua New Guinea." P N G Med J 19(3): 153-155.

No abstract available

Spradbery, J. P., Sands, P. A., et al. (1976). "Evaluation of insecticide smears for the control of screw-worm fly, Chrysomya bezziana, in Papua New Guinea." Aust Vet J 52(6): 280-284.

Three new insecticide smear preparations for the control of Chrysomya bezziana larvae infesting wounds of cattle have been tested under field and laboratory conditions and compared with an established preparation EQ 335 which is based on 3% lindane. Two preparations based on 3% coumaphos proved comparable to EQ 335 in the field trials and exhibited more prolonged residual effectiveness in laboratory tests. A smear preparation based on 2.5% methoxychlor was only effective in controlling 1 and 2 day-old larvae in wounds and was generally inferior to other smears tested in the laboratory.

Zigas, V. (1976). "Prevalence of toxoplasma antibodies in New Britain, Papua New Guinea." P N G Med J 19(4): 225-230.

A seroepidemiological study of toxoplasmosis was conducted in four areas of New Britain (Papua New Guinea). The areas surveyed were of heterogeneous nature with regard to topography, soil, fauna, and the people's eating habits. The prevalence of human infection as measured by the presence of dye-test antibodies was high in Ewase area and Witu Island with no cats, but not on Lolobau and Kilengi, where cats were present. Observations obtained from the investigation led to speculation that consumption of raw meat or other factors, individually or in combination, may have played an essential role in the transmission of Toxoplasma in the Ewase and Witu areas.

George, T. D., Standfast, H. A., et al. (1977). "The epizootiology of bovine ephemeral fever in Australia and Papua-New Guinea." Aust Vet J 53(1): 17-28.

The epizootiology of ephemeral fever in Australia from its first recognition until 1968 was reviewed. Since 1968, ephemeral fever often in a silent form has been shown to be enzootic in northern Australia, by the use of sentinel cattle. The major epizootics which occured in 1970-1971, 1972-1974 and 1974-1975 are described. These epizootics were characterised by an apparently rapid movement of disease in a general north-south direction in summer months. Ephemeral fever antibody was detected in 11% of 1009 domesticated and feral water buffaloes.

Munday, B. L., Humphrey, J. D., et al. (1977). "Pathology produced by, prevalence, of, and probable life-cycle of a species of Sarcocystis in the domestic fowl." Avian Dis 21(4): 697-703.

Sarcosporidiosis was found to be the cause of a severe myositis in 3 fowls in Papua New Guinea and 2 in Australia. This represented 3.8% of a series of fowls examined in Papua New Guinea. The overall prevalence of infection in these birds was 45%. Both epidemiological and experimental evidence suggested that the dog was the definitive host for this particular type of sarcocyst.

Fabiyi, J. P. (1979). "Occurrence of Menacanthus pallidulus on domestic fowl in Papua New Guinea." Aust Vet J 55(10): 503.

No abstract available

Humphrey, J. D. (1979). "Helminths of the alimentary tract of the domestic fowl in Papua New Guinea." Aust Vet J 55(4): 205-207.

No abstract available

Van Kammen, A. and Kila, V. (1979). "A survey for rotavirus antibodies in Papua New Guinea cattle." Aust Vet J 55(2): 89.

No abstract available

Walton, E. A. and Humphrey, J. D. (1979). "Endemic goitre of sheep in the highlands of Papua New Guinea." Aust Vet J 55(1): 43-44.

No abstract available

Van Kammen, A. and Cybinski, D. H. (1981). "A serological survey for antibodies to bluetongue virus in Papua New Guinea." Aust Vet J 57(5): 253-255.

No abstract available

Van Kammen, A. (1982). "Survey of some poultry viruses in Papua New Guinea." Trop Anim Health Prod 14(2): 109-119.

During the years 1974 to 1979 a virological study on domestic poultry throughout Papua New Guinea was conducted involving clinical examination of diseased birds with subsequent attempted virus isolations and serological surveys of free village fowls and commercial poultry. Viruses isolated included those of Newcastle disease, infectious bronchitis, pox, avian encephalomyelitis and adenovirus. Clinical and pathological diagnoses of pox, avian encephalomyelitis, reticuloendotheliosis and Marek's disease were made. The serological survey included tests for Newcastle disease, influenza A, adenovirus, Marek's disease, pox, avian encephalomyelitis and infectious bursal disease virus. Antibody was demonstrated to all of these viruses except for bursal disease.

Della-Porta, A. J., Sellers, R. F., et al. (1983). "Serological studies of Australian and Papua New Guinean cattle and Australian sheep for the presence of antibodies against bluetongue group viruses." Veterinary microbiology 8(2): 147-162.

Following isolation of a virus (CSIRO19) from insects in Australia and its identification as bluetongue virus serotype 20 (BTV20), a nationwide survey of antibodies in cattle and sheep sera was undertaken. Initial studies using the serum neutralization (SN) test showed that the distribution of BTV20 antibodies in cattle was confined to the northern part of Australia. Group-reactive antibody tests (agar gel diffusion precipitin, AGDP, and complement-fixation, CF) showed group-reactive cattle sera south of the BTV20 zone (northern Australia), and southwards from Queensland to New South Wales. Very few group-reactive sheep sera (45 out of 16213) were found and these were of doubtful epidemiological significance. Some of these BTV group-reactive, BTV20-negative, sera were tested in SN tests against BTV1 to 17 and Ibaraki (IBA) virus. The results indicated that BTV1, or a closely related orbivirus, was active in cattle in Queensland, northern Western Australia, and New South Wales, and that antibody to BTV15 was present in some of the cattle sera in northern Western Australia and the Northern Territory. Antibody to IBA virus was present in some cattle sera in Queensland, northern Western Australia and New South Wales. SN

antibody titres greater than or equal to 60 were also found to a number of other BTV serotypes in cattle sera in northern Western Australia and Queensland (principally, BTV2 and BTV7). Low level reactions were commonly observed against these and a number of other BTV serotypes, often in the same serum samples. Further, 22% of the group-reactive cattle sera did not react with any of the viruses in the SN tests. Such results were difficult to interpret in terms of known Australian BTV or BTV-related isolates.

Owen, I. L. and Talbot, N. T. (1983). "Importance of gastro-intestinal helminths in calves in Papua New Guinea." Trop Anim Health Prod 15(2): 115-123.

Gastro-intestinal nematodes caused poor growth rates and high mortality in undrenched calves when weaning preceded the wet season. Cooperia punctata and Haemonchus placei were the dominant species throughout the year with worm burdens and pasture contamination being highest during the wet season and lowest in the dry season. Histotropic stages occurred throughout the year in weaner calves but with a clear peak during the wet season. The development of host resistance against the most important worm species generally followed the pattern described by others but a breakdown in resistance against Cooperia occurred amongst some calves during the wet season. The number of H. placei, together with Bunostomum phlebotomum, was sufficiently large in some calves to cause death. It is likely that the even larger burdens of C. punctata observed would have contributed to if not caused death.

Wernery, U. (1983). "Serological evidence of enzootic bovine leucosis in Papua New Guinea." Trop Anim Health Prod 15(3): 160.

No abstract available

Wernery, U. and Daivi, K. (1984). "The effect on egg production of layers after vaccination with an inactivated infectious bronchitis (IB) oil emulsion vaccine on a multi-age layer farm in Papua New Guinea." Dtsch Tierarztl Wochenschr 91(4): 158-159.

No abstract available

Jones, H. I. (1985). "Hematozoa from montane forest birds in Papua New Guinea." J Wildl Dis 21(1): 7-10.

Blood smears were examined from 141 montane forest birds of 45 species in southeastern Papua New Guinea. Haemoproteus spp. occurred in 46 (32.6%), Leucocytozoon fringillinarum Woodcock, 1910 in five, Trypanosoma sp. in one and Haemogregarina sp. in one. Intensity of infection by Haemoproteus was highest in those avian species and families with the highest prevalence; increasing altitude had no demonstrable effect on the prevalence of Haemoproteus spp.

Varghese, T. and Yayabu, R. (1985). "Ovine coccidia in Papua New Guinea." Vet Parasitol 17(3): 181-191.

Eimeria oocysts were found in 89% of fecal samples collected from the rectum of 75 sheep from 3 locations in Papua New Guinea. Eighty five percent of the hosts which were positive for coccidia had multiple infections with up to 6 different species of Eimeria. In order of decreasing predominance in the 67 Eimeria-positive samples the species were: E. ovina (72%); E. parva (58%); E. ovinoidalis (48%); E. ahsata (45%); E. crandallis (39%); E. faurei (28%); E. intricata (24%); E. granulosa (4%). Fecal oocyst counts showed the highest mean of 1252 oocysts per gram (o.p.g.) for E. parva and a maximum of 8000 for E. ovina.

Wernery, U. and Schmidt, F. W. (1985). "[Occurrence of enzootic bovine leukosis in Papua New Guinea]." Dtsch Tierarztl Wochenschr 92(5): 170-172.

No abstract available

Hamir, A. H. and Onaga, I. (1986). "Canine spirocercosis and dirofilariasis infection in Papua New Guinea." Aust Vet J 63(3): 98-99.

No abstract available

Hamir, A. N. (1986). "Neoplasms of dogs in Papua New Guinea." Aust Vet J 63(10): 342-343.

No abstract available

Lemerle, C. and Holmes, J. H. (1986). "Sodium deficiency of grazing cattle in Papua New Guinea." Tropical Animal Health and Production 18(3): 166-170.

Sodium deficiency was suspected from low saliva sodium concentrations in cattle at various sites in the lowlands of Papua New Guinea. In an experiment at Erap, Morobe Province crossbred and pedigree Brahman heifers supplemented with copper, cobalt and/or common salt showed no response to copper or cobalt supplementation. There was a significant growth response (P less than 0.01) to salt supplementation over a 16 week period confirming sodium deficiency in these animals. The response in the crossbreds was twice that in the purebreds. Supplemented crossbred animals grew 0.78 kg/day over the 16 week experimental period.

Varghese, T. (1986). "Porcine coccidia in Papua New Guinea." Vet Parasitol 21(1): 11-20.

Faecal samples from 232 domestic pigs raised on concrete, 98 free-ranging village pigs, and five wild boar showed 46.6 (108/232), 54 (53/98) and 80% (4/5) prevalence of coccidian oocysts, respectively. Eight species of Eimeria, and Isospora suis, were recovered. In their descending order of predominance in the pigs raised on concrete, the species of coccidia were E. debliecki (26.7%), E. scabra (22.4%), E. neodebliecki (19.8%), E. porci (15.5%), E. suis (11.6%), E. polita (8.6%), E. perminuta (7%), E. spinosa (5.6%) and I. suis (3.9%). The first five species listed above predominated in the village pigs as well. E. polita, E. spinosa and I. suis were not found in the wild boar. I. suis oocysts prevailed in 8.3% of the 36 sows on concrete, and in 11.1% (3/27) of those which were positive for coccidia. Isosporoid oocysts were absent in the village sows. Of the 125 less than 24-day-old piglets, 29.6% were diarrhoeic, and of these, 43.2% were positive for coccidia. Four of the 16 (25%) coccidia-positive, diarrhoeic piglets, and four of the 37 (10.8%) coccidia-positive non-diarrhoeic piglets shed I. suis oocysts, an observation which seems to weaken the present contention that I. suis is the primary causative agent of neonatal porcine coccidiosis. The highest mean number of oocysts per gram faeces (23,550) was recorded from the diarrhoeic farm piglets on concrete, and the lowest of 6,100 from the gestating farm sows. Mean opg data revealed very little significant quantitative variation between the corresponding age groups of the free-ranging village pigs and the commercially-farmed ones. One of the most interesting findings in the study was that the sows were more frequently infected than all other age groups.

Patten, B. E. (1987). "Antibodies to B. canis in dogs in Papua New Guinea." Aust Vet J 64(11): 355.

No abstract available

Varghese, T. (1987). "Endoparasites of birds of paradise in Papua New Guinea." Vet Parasitol 26(1-2): 131-144.

General endoparasitiasis in 16 species of captive birds of paradise (BOP) in Papua New Guinea ranged from 60.0 to 79.6% during 1977, 1978, 1981, 1983 and 1984. Percent prevalence of the three major groups of parasites during the five survey years was as follows: haematozoa, 36.7-53.0%; coccidia, 42.2-63.3% and helminths, 35.6-67.3%. Percent prevalence of blood parasites in the years 1977 and 1984 was: Haemoproteus 14.3, 20.0; Plasmodium 10.2, 4.5; Haemoproteus or Plasmodium 18.4, 8.9; Leucocytozoon 6.1, 6.7; Trypanosoma 8.2, 6.7; microfilaria 10.2, 4.5. Oocysts of Eimeria paradisaeai, Isospora raggianai and I. volki were common, as were oocysts morphologically distinct from these three species. The most frequently observed cestode eggs belonged to Raillietina and Biuterina species. Eggs of Strongyloides, Capillaria, Syngamus and Trichuris species of nematodes were also recovered. The Magnificent Bird of Paradise (Diphyllodes magnificus) had the highest mean eggs per gram (EPG) during the five survey years, except in 1978 when the highest mean was recorded from the Lesser Bird of Paradise (Paradisaea minor). Highest mean oocysts per gram (OPG) for the first 3 years were also recorded from D. magnificus, but Paradisaea raggiana had the highest mean OPG in 1983 and 1984. Possible causes for the greatest prevalence of endoparasites in the birds during 1977 and 1984, despite their having been regularly treated prophylactically, are considered.

Owen, I. L. (1988). "Field trials with closantel and Haemonchus contortus in sheep in Papua New Guinea." Aust Vet J 65(9): 267-270.

Sheep treated once with closantel at 7.5 or 15.0 mg/kg and grazing with untreated sheep remained free of Haemonchus contortus for at least 4 to 5 weeks and 6 to 7 weeks respectively after treatment. When the whole flock was treated with 15.0 mg/kg, H. contortus began to become re-established 7 to 8 weeks later. Maximum benefit of the residual anthelmintic effect of closantel against H.contortus was obtained only when all sheep in the flock were treated; it took 10 weeks longer for H.contortus to form 50% of larval cultures when the whole flock was treated than when only a part of the flock was treated.

Alto, W. A. and Nettleton, L. B. (1989). "Hydatid disease: the threat within Papua New Guinea." P N G Med J 32(2): 139-142.

Hydatid disease is a problem in those countries where man, grazing animals and dogs live in close association. The adult tapeworm of Echinococcus granulosus causes few, if any, symptoms in the dog and so its presence may be unsuspected. Transmission to man is by ingestion of eggs, which resist desiccation and may be viable for up to one year. Food or water may be directly contaminated or infection acquired by close contact with dogs carrying eggs in their saliva or hair. Though quarantine regulations exist, the introduction of the disease as the tapeworm in dogs or as the hydatid cyst in imported sheep from New Zealand has occurred and its spread is a possibility. The life cycle, clinical manifestations and significance if introduced to rural communities are discussed.

Owen, I. L. (1989). "The epidemiology of fasciolosis in Papua New Guinea." Aust Vet J 66(2): 58-60.

Fasciola hepatica metacercariae were present on pasture throughout the year at the trial site. The highest infection rate in trial sheep occurred in the first year after the beginning of the wet season, in December/January, when contamination of the pasture was maintained by other sheep. Variation in rates of infection in consecutive years was linked to differences in grazing pressure and to a change from sheep to cattle as accompanying grazing stock. A minimum precipitation of 125 mm over 4 consecutive weeks appears to be necessary for

infected snails to move from their normal habitats and to contaminate wet pasture with cercariae. Infection of sheep can occur during a dry season if pasture has permanent seepage sites or swampy areas where infected snails can remain active and continue to liberate cercariae.

Ladds, P. W. and Sims, L. D. (1990). "Diseases of young captive crocodiles in Papua New Guinea." Aust Vet J 67(9): 323-330.

To identify causes of mortality in young captive crocodiles, detailed necropsy and laboratory examination was done on 54 (30 Crocodylus porosus, 22 C. novaeguineae, 2 of unrecorded species). Although multiple infections often confounded interpretation it was concluded that the major infectious diseases, of approximately equal importance, were coccidiosis, bacterial septicaemia with Gram-negative organisms, and metazoan parasitism including ascariasis and pentastomiasis. A range of other lesions and agents was recognised, including keratitis, enteritis of unknown aetiology, non-suppurative encephalitis, traumatic peritonitis and trematodes located in renal tubules, gut and blood vessels. Some crocodiles in poor condition had only mild lesions associated with metazoan parasites and the cause of death or illness could not be clearly determined, although it was considered likely that adaptation failure was a contributing factor.

Alpers, D., Sanders, R. C., et al. (1991). "Rotavirus excretion by village pigs in Papua New Guinea." Aust Vet J 68(2): 65-67.

Cohort studies were conducted on 29 pigs from 3 villages in the Highlands of Papua New Guinea. Animals ranged in age from 9 d to 5 m old. Three hundred and twenty nine faecal samples were collected from individual pigs followed over 3 to 6 w periods, and were examined for group A rotavirus antigen by ELISA, and rotaviral genomic RNA by polyacrylamide gel electrophoresis (PAGE). Electron microscopy was also conducted on selected samples. Group A rotavirus was detected in the faeces of 16 pigs with infected individuals coming from all villages. Non-group A rotavirus resembling group C was found in faeces from pigs from 2 villages. All of the group A rotaviruses examined had the same electrophoretype and this was distinct from that of the common type infecting humans in the area at the time of the study. None of the group A positive samples reacted with monoclonal antisera specific for human group A rotaviruses of serotypes 1, 2, 3, 4, or 8. The non-group A rotaviruses also all had identical electrophoretypes. In contrast to previous findings in intensive piggeries, rotavirus infection did not occur in all young pigs and was not limited to young animals under 2 m of age. Infected pigs varied in age from 12 days to 20 weeks of age. This pattern of infection was attributed to the non-intensive husbandry situations in the villages, with less opportunity for transmission to occur than in intensive piggeries.

Paterson, R. A., Robertson, I. D., et al. (1993). "The carriage of Streptococcus suis type 2 by pigs in Papua New Guinea." Epidemiol Infect 110(1): 71-78.

An indirect fluorescent antibody test was used to detect the presence of Streptococcus suis type 2 in nasal and pharyngeal swabs taken from pigs in Papua New Guinea. The rate of carriage for the two sites in domesticated indigenous village pigs was 0.5 and 2.5% respectively, compared to 39 and 43% for intensively reared pigs. These findings were supported by the results of a serological survey, using an enzyme linked immunosorbent assay, in which 87% of intensively reared pigs but only 8% of village pigs were seropositive to S. suis type 2. It is proposed that in intensive piggeries S. suis type 2 is continually cycled between pigs. In village pigs, the low population density and harsh environmental conditions prevents this cycle of infection.

Spradbery, J. P., Mahon, R. J., et al. (1995). "Dispersal of the Old World screw-worm fly Chrysomya bezziana." Med Vet Entomol 9(2): 161-168.

Dispersal of the Old World screw-worm fly, Chrysomya bezziana Villeneuve, was studied in Papua New Guinea by releasing radio-isotope labelled, laboratory-reared flies and collecting their labelled egg masses from sentinel cattle. A log-linear model was developed to describe recapture rate. Distance was found to dominate the model and was represented by a bilinear ('broken-stick') term as log-distance. Further terms in the model such as attractiveness of the site (estimated from the number of non-labelled egg masses), the season of the year and a time trend were statistically significant but of minor importance. From the model, the median distance females dispersed before depositing an egg mass was 10.8 km. The maximum distance from the release site that egg masses were recovered was 100 km. The dispersal ability of C. bezziana is discussed in terms of its impact on the prospects of eradicating this species using SIRM if an outbreak occurred in Australia.

Trott, D. J., Combs, B. G., et al. (1997). "The prevalence of Serpulina pilosicoli in humans and domestic animals in the Eastern Highlands of Papua New Guinea." Epidemiol Infect 119(3): 369-379.

In a survey of five villages in the Eastern Highlands of Papua New Guinea, Serpulina pilosicoli was isolated from rectal swabs from 113 of 496 individuals (22.8%). Colonization rates ranged from 22.6-30.1% in four of the villages but was only 8.6% in the other village. In comparison colonization was demonstrated in only 5 of 54 indigenous people (9.3%) and none of 76 non-indigenous people living in an urban environment in the same region. Colonization did not relate to reported occurrence of diarrhoea, age, sex, or length of time resident in a village. A second set of 94 faecal specimens was collected from 1 village 6 weeks after the first set. S. pilosicoli was isolated from 27 of 29 individuals (93.1%) who were positive on the first sampling and from 7 of 65 individuals (10.8%) who previously were negative. In this case, isolates were significantly more common in watery stools than in normal stools. The annual incidence of infection in the village was calculated as 93.6%, with an average duration of infection of 117 days. S. pilosicoli could not be isolated from any village pig (n = 126) despite its confirmed presence in 17 of 50 commercial pigs (34.0%) sampled at a local piggery. Four of 76 village dogs (5.3%) and 1 of 2 village ducks were colonized with S. pilosicoli, suggesting the possibility of cross transmission between humans and animals.

Moravec, F. and Spratt, D. M. (1998). "Crocodylocapillaria longiovata n. gen., n. sp. (Nematoda: Capillariidae) from the stomach of crocodiles in Australia and New Guinea." J Parasitol 84(2): 426-430.

A new nematode, Crocodylocapillaria longiovata n. gen. and n. sp., is described from the stomach of wild and farmed young crocodiles, Crocodylus johnstoni Krefft, and Crocodylus porosus Schneider, from northern Australia and Papua New Guinea; it is undoubtedly identical with the nematodes previously reported as Capillaria sp. from Crocodylus novaequineae Schmidt from Irian Jaya, Indonesia. This capillariid species represents a new genus, being characterized mainly by the presence of elongate eggs with unusually long protruding polar plugs, a well developed vulvar appendage, a weakly sclerotized spicule, proximal and distal parts of the spicular sheath with spines, and the male posterior end with 2 large lateral caudal lobes and a pair of papillae near the cloacal opening. The body length of C. longiovara males and females is 5,576-7,208 microm and 8,609-14,008 microm, respectively, the spicule is 276-369 microm long; the size of the egg proper is 48-60 x 15-21 microm, length of polar plugs 15-18 microm. Neocapillaria Yi and Guitang, 1994, a junior homonym of Neocapillaria Moravec, 1987, is re-named Sinocapillaria nom. n. and

placed as a synonym of Pseudocapillaria Freitas, 1959. Indocapillaria De and Maity, 1995 is retained as a subgenus of Pseudocapillaria because of the possession of a vulvar appendage in the type species. Neocapillaria Moravec, 1987 remains a subgenus of Capillaria Zeder, 1800. A key to genera of the Capillariidae from poikilotherm vertebrates is provided; C. longiovata is the first capillariid species described from the digestive tract of crocodiles.

Trott, D. J., Mikosza, A. S., et al. (1998). "Population genetic analysis of Serpulina pilosicoli and its molecular epidemiology in villages in the eastern Highlands of Papua New Guinea." Int J Syst Bacteriol 48 Pt 3: 659-668.

The population genetics of Serpulina pilosicoli and its molecular epidemiology in villages in the Eastern Highlands province of Papua New Guinea were investigated. Multilocus enzyme electrophoresis (MLEE) was used to analyse 164 isolates from humans and animals. These were divided into 33 electrophoretic types (ETs), four of which contained 65% of the isolates. The mean genetic diversity (n = number of ETs) for 145 human isolates was 0.18, and the mean number of alleles at five polymorphic loci was 2.6. The species appeared to be recombinant, as there was a lack of linkage disequilibrium, and 25% of all the possible combinations of alleles was present in the population. PFGE analysis using the enzymes M/ul and Sa/l divided 157 of the isolates into 99 PFGE types, demonstrating the existence of considerable strain diversity in a geographically restricted area. The two techniques were in excellent agreement; however, PFGE was more discriminatory for strain typing than was MLEE. Nine out of 19 (47.4%) culture-positive individuals were colonized by the same PFGE type of S. pilosicoli when retested after 6 weeks. For three individuals, the PFGE profiles of the second isolate differed from the first in only one or two DNA bands, while the other seven individuals were colonized with distinct PFGE types on each occasion. In two cases, strains with the same PFGE pattern were isolated from humans and dogs, suggesting that cross-species transmission of S. pilosicoli may occur naturally and that the infection can be zoonotic.

Halpin, K., Young, P. L., et al. (1999). "Newly discovered viruses of flying foxes." Veterinary Microbiology 68(1-2): 83-87.

Flying foxes have been the focus of research into three newly described viruses from the order Mononegavirales, namely Hendra virus (HeV), Menangle virus and Australian Bat Lyssavirus (ABL). Early investigations indicate that flying foxes are the reservoir host for these viruses. In 1994, two outbreaks of a new zoonotic disease affecting horses and humans occurred in Queensland. The virus which was found to be responsible was called equine morbillivirus (EMV) and has since been renamed HeV. Investigation into the reservoir of HeV has produced evidence that antibodies capable of neutralising HeV have only been detected in flying foxes. Over 20% of flying foxes in eastern Australia have been identified as being seropositive. Additionally six species of flying foxes in Papua New Guinea have tested positive for antibodies to HeV. In 1996 a virus from the family Paramyxoviridae was isolated from the uterine fluid of a female flying fox. Sequencing of 10 000 of the 18 000 base pairs (bp) has shown that the sequence is identical to the HeV sequence. As part of investigations into HeV, a virus was isolated from a juvenile flying fox which presented with neurological signs in 1996. This virus was characterised as belonging to the family Rhabdoviridae, and was named ABL. Since then four flying fox species and one insectivorous species have tested positive for ABL. The third virus to be detected in flying foxes is Menangle virus, belonging to the family Paramyxoviridae. This virus was responsible for a zoonotic disease affecting pigs and humans in New South Wales in 1997. Antibodies capable of neutralising Menangle virus were detected in flying foxes.

Pozio, E., Owen, I. L., et al. (1999). "Trichinella papuae n.sp. (Nematoda), a new non-encapsulated species from domestic and sylvatic swine of Papua New Guinea." Int J Parasitol 29(11): 1825-1839.

Encapsulated and non-encapsulated species of the genus Trichinella are widespread in sylvatic animals in almost all zoogeographical regions. In sylvatic animals from Tasmania (Australian region), only the non-encapsulated species Trichinella pseudospiralis has been reported. Between 1988 and 1998, non-encapsulated larvae of Trichinella were detected in five domestic pigs and six wild boars from a remote area of Papua New Guinea. Morphological, biological, and molecular studies carried out on one strain isolated from a wild boar in 1997 suggest that these parasites belong to a new species, which has been named Trichinella papuae n.sp. This species can be identified by the morphology of muscle larvae, which lack a nurse cell in host muscles, and whose total length is one-third greater than that of the other non-encapsulated species, T. pseudospiralis. Adults of T. papuae do not cross with adults of the other species and genotypes. Muscle larvae of T. papuae are unable to infect birds, whereas those of T. pseudospiralis do. The expansion segment V of the large subunit of the ribosomal DNA differs from that of the other species and genotypes. All of these features allow for the easy identification of T. papuae, even in poorly equipped laboratories. The discovery and identification of a second non-encapsulated species in the Australian region strongly supports the existence of two evolutionary lines in the genus Trichinella, which differ in terms of the capacity of larvae to induce a modification of the muscle cell into a nurse cell.

Reid, S., Husein, A., et al. (1999). "A possible role for rusa deer (Cervus timorensis russa) and wild pigs in spread of Trypanosoma evansi from Indonesia to Papua New Guinea." Memorias do Instituto Oswaldo Cruz 94(2): 195-197.

Movement of transmigrants and livestock from western Indonesia to southeastern areas of Irian Jaya near the border with Papua New Guinea may pose a risk of introducing Trypanosoma evansi into Papua New Guinea via feral Rusa deer (Cervus timorensis russa) and wild pigs which inhabit these areas in large numbers. Pilot experimental studies were conducted to observe infection in pigs and Rusa deer with a strain of T. evansi isolated in Indonesia. Parasitaemia and signs of clinical disease were monitored each second day for 120 days. Trypanosomes were observed in haematocrit tubes at the plasma-buffy coat interface of jugular blood of deer and pigs on 86% and 37% of sampling occasions respectively. Parasitaemia was at a high level in deer for 35% of the time but for only 11.5% of the time in pigs. Results indicate that both Rusa deer and pigs have a high tolerance for infection with T. evansi. The deer suffered mild anaemia evidenced by a 25% reduction in packed cell volume (PCV) 14 days after infection which coincided with the initial peak in parasitaemia. However, PCV had returned to pre infection values by the end of the experiment. The pigs showed no change in PCV. There were no visual indications of disease in either species and appetite was not noticeably affected. It was concluded that both Rusa deer and pigs were capable reservoir hosts for T. evansi but that Rusa deer, with their more persistent higher levels of parasitaemia, have more potential to spread T. evansi into Papua New Guinea from West Irian than pigs.

Owen, I. L., Sims, L. D., et al. (2000). "Trichinellosis in Papua New Guinea." Aust Vet J 78(10): 698-701.

OBJECTIVES: To describe the discovery in a domestic pig of the first case of trichinellosis in Papua New Guinea, caused by a new taxon within the genus Trichinella (T papuae). Also, to establish if the disease occurred in the local wild pig population and in domestic pigs elsewhere in the country, and to test if the worm was infective to some other

animals. PROCEDURE: Fresh and fixed tissue samples were examined by the digestion method and histologically, respectively, for the non-encapsulated larvae of T papuae. Feeding trials were conducted, using infected tissues and infective larvae, on animals under laboratory conditions. RESULTS: About 8.8% of a wild pig population in Western Province, adjacent to Irian Jaya, Indonesia, was found to be infected. Infection was not found in other local and feral animals or in domestic pigs from other parts of the country. Infection was experimentally established in cats, pigs and laboratory bred mice and rats. CONCLUSION: Trichinellosis is confined to one remote locality in PNG. Domestic pigs in the initial case became infected, probably, by eating infected wild pig meat.

Reid, S. A. and Copeman, D. B. (2000). "Surveys in Papua New Guinea to detect the presence of Trypanosoma evansi infection." Aust Vet J 78(12): 843-845.

OBJECTIVE: To confirm serological evidence that Trypanosoma evansi is present in Papua New Guinea. DESIGN: Three surveys were undertaken in PNG during 1997/1998. Animals were selected for sampling on the basis of convenience. Samples of blood were examined for the presence of T evansi by the haematocrit centrifugation technique (HCT) and mouse inoculation test (MI). Sera were tested in the field using the card agglutination test for trypanosomiasis/T evansi (CATT). Bovine sera were tested at James Cook University using an antibody-detection ELISA (Ab-ELISA). Results from testing bovine sera with the Ab-ELISA and sera from wallabies with the CATT were analysed using FreeCalc to determine the probability that animals in these populations were infected with T evansi. RESULTS: A total of 545 serum samples were collected, during the three surveys of which 39 cattle, two pig and three agile wallaby samples were positive with the CATT. All bovine sera collected were negative when tested with an Ab-ELISA. T evansi was not isolated using the HCT or the MI from any of these animals. CONCLUSION: Based on the Ab-ELISA results it was concluded that T evansi infection was not present in cattle in villages around Balimo at a minimum expected prevalence of 10% ($P < 0.05$) and, based on the CATT results, that infection was not present in wallabies on the Bula plain at a minimum expected prevalence of 10% ($P < 0.1$). These results indicate that it is unlikely that T evansi is endemic in PNG.

Harley, D., Sleigh, A., et al. (2001). "Ross River virus transmission, infection, and disease: a cross-disciplinary review." Clin Microbiol Rev 14(4): 909-932, table of contents.

Ross River virus (RRV) is a fascinating, important arbovirus that is endemic and enzootic in Australia and Papua New Guinea and was epidemic in the South Pacific in 1979 and 1980. Infection with RRV may cause disease in humans, typically presenting as peripheral polyarthralgia or arthritis, sometimes with fever and rash. RRV disease notifications in Australia average 5,000 per year. The first well-described outbreak occurred in 1928. During World War II there were more outbreaks, and the name epidemic polyarthritis was applied. During a 1956 outbreak, epidemic polyarthritis was linked serologically to a group A arbovirus (Alphavirus). The virus was subsequently isolated from Aedes vigilax mosquitoes in 1963 and then from epidemic polyarthritis patients. We review the literature on the evolutionary biology of RRV, immune response to infection, pathogenesis, serologic diagnosis, disease manifestations, the extraordinary variety of vertebrate hosts, mosquito vectors, and transmission cycles, antibody prevalence, epidemiology of asymptomatic and symptomatic human infection, infection risks, and public health impact. RRV arthritis is due to joint infection, and treatment is currently based on empirical anti-inflammatory regimens. Further research on pathogenesis may improve understanding of the natural history of this disease and lead to new treatment strategies. The burden of morbidity is considerable, and the virus could spread to other countries. To justify

and design preventive programs, we need accurate data on economic costs and better understanding of transmission and behavioral and environmental risks.

Hide, R. (2003). "Pig Husbandry in New Guinea - A Literature Review and Bibliography." Australian Centre for International Agricultural Research 307.

No abstract available

Reid, S. A. and Copeman, D. B. (2003). "The development and validation of an antibody-ELISA to detect Trypanosoma evansi infection in cattle in Australia and Papua New Guinea." Prev Vet Med 61(3): 195-208.

Trypanosoma evansi is exotic to Australia and Papua New Guinea (PNG). However, it might have been introduced to Papua (Indonesia); thus, there is a risk of it entering PNG and thence Australia. Because of logistical difficulties in PNG and northern Australia, surveillance for T. evansi must rely on serological tests. The accuracy of an Ab-ELISA using a detergent extract of T. evansi and three antigen fractions purified from the detergent extract using stepwise precipitation with saturated ammonium sulphate (AS) were compared. The ELISA using the AS 40-50% fraction had greater discriminatory power compared to the ELISA using the other antigen fractions. This ELISA then was compared with two commercial tests: the Card Agglutination Test for trypanosomiasis/T. evansi (CATT) and Suratex. CATT/T. evansi at 1/4 serum dilution has higher sensitivity and the ELISA has higher specificity. There is no likely benefit in combining antibody detection tests to improve the accuracy of diagnosis. Furthermore, the combination of Suratex (which was independent of the antibody tests) with the CATT or the ELISA did not improve the sensitivity. None of the tests was sufficiently sensitive to be used confidently to determine freedom from infection in animals imported into Australia from countries where T. evansi infection is endemic.

Van Den Hurk, A. F., Johansen, C. A., et al. (2003). "Mosquito host-feeding patterns and implications for Japanese encephalitis virus transmission in northern Australia and Papua New Guinea." Med Vet Entomol 17(4): 403-411.

Japanese encephalitis (JE) virus spread to northern Australia during the 1990s, transmitted by Culex annulirostris Skuse and other mosquitoes (Diptera: Culicidae). To determine the relative importance of various hosts for potential vectors of JE virus, we investigated the host-feeding patterns of mosquitoes in northern Australia and Western Province of Papua New Guinea, with particular attention to pigs, Sus scrofa L. - the main amplifying host of JE virus in South-east Asia. Mosquitoes were collected by CDC light traps baited with dry ice and 1-octen-3-ol, run 16.00-08.00 hours, mostly set away from human habitations, if possible in places frequented by feral pigs. Bloodmeals of 2569 mosquitoes, representing 15 species, were identified by gel diffusion assay. All species had fed mostly on mammals: only <10% of bloodmeals were from birds. The predominant species was Cx. annulirostris (88%), with relatively few (4.4%) bloodmeals obtained from humans. From all 12 locations sampled, the mean proportion of Cx. annulirostris fed on pigs (9.1%) was considerably lower than fed on other animals (90.9%). Highest rates of pig-fed mosquitoes (>30%) were trapped where domestic pigs were kept close to human habitation. From seven of eight locations on the Australian mainland, the majority of Cx. annulirostris had obtained their bloodmeals from marsupials, probably the Agile wallaby Macropus agilis (Gould). Overall proportions of mosquito bloodmeals identified as marsupial were 60% from the Gulf Plains region of Australia, 78% from the Cape York Peninsula and 64% from the Daru area of Papua New Guinea. Thus, despite the abundance of feral pigs in northern Australia, our findings suggest that marsupials divert host-seeking Cx. annulirostris away from pigs. As marsupials are poor JE virus hosts, the prevalence of marsupials may impede the

establishment of JE virus in Australia.

Beadell, J. S., Gering, E., et al. (2004). "Prevalence and differential host-specificity of two avian blood parasite genera in the Australo-Papuan region." Mol Ecol 13(12): 3829-3844.

The degree to which widespread avian blood parasites in the genera Plasmodium and Haemoproteus pose a threat to novel hosts depends in part on the degree to which they are constrained to a particular host or host family. We examined the host distribution and host-specificity of these parasites in birds from two relatively understudied and isolated locations: Australia and Papua New Guinea. Using polymerase chain reaction (PCR), we detected infection in 69 of 105 species, representing 44% of individuals surveyed (n = 428). Across host families, prevalence of Haemoproteus ranged from 13% (Acanthizidae) to 56% (Petroicidae) while prevalence of Plasmodium ranged from 3% (Petroicidae) to 47% (Ptilonorhynchidae). We recovered 78 unique mitochondrial lineages from 155 sequences. Related lineages of Haemoproteus were more likely to derive from the same host family than predicted by chance at shallow (average LogDet genetic distance = 0, n = 12, P = 0.001) and greater depths (average distance = 0.014, n = 11, P < 0.001) within the parasite phylogeny. Within two major Haemoproteus subclades identified in a maximum likelihood phylogeny, host-specificity was evident up to parasite genetic distances of 0.029 and 0.007 based on logistic regression. We found no significant host relationship among lineages of Plasmodium by any method of analysis. These results support previous evidence of strong host-family specificity in Haemoproteus and suggest that lineages of Plasmodium are more likely to form evolutionarily-stable associations with novel hosts.

Pozio, E., Owen, I. L., et al. (2004). "Trichinella papuae in saltwater crocodiles (Crocodylus porosus) of Papua New Guinea." Emerging Infectious Diseases 10(8): 1507-1509.

No abstract available

Owen, I. L. (2005). "Parasitic zoonoses in Papua New Guinea." J Helminthol 79(1): 1-14.

Relatively few species of zoonotic parasites have been recorded in humans in Papua New Guinea. A greater number of potentially zoonotic species, mostly nematodes, occur in animals but are yet to be reported from humans. Protozoa is the best represented group of those infecting man, with Giardia duodenalis, Cryptosporidium parvum, Cyclospora cayetanesis, Toxoplasma gondii, Sarcocystis spp., Entamoeba polecki, Balantidium coli and, possibly, Blastocystis hominis. The only zoonotic helminths infecting humans include the trematode Paragonimus westermani, the cestodes Hymenolepis nana, H. diminuta and the sparganum larva of Spirometra erinacea, and the nematodes Trichinella papuae and Angiostrongylus cantonensis and, possibly, Ascaris suum. Other groups represented are Acanthocephala (Macracanthorhynchus hirudinaceus)), insects (Chrysomya bezziana, Cimex sp., Ctenocephalides spp.), and mites (Leptotrombidium spp. and, possibly Sarcoptes scabiei, and Demodex sp.). One leech (Phytobdella lineata) may also be considered as being zoonotic. The paucity of zoonotic parasite species can be attributed to long historical isolation of the island of New Guinea and its people, and the absence until recent times of large placental mammals other than pig and dog. Some zoonotic helminths have entered the country with recent importation of domestic animals, in spite of quarantine regulations, and a few more (two cestodes, one nematode and one tick) are poised to enter from neighbouring countries, given the opportunity. Improvement in water supplies, human hygiene and sanitation would reduce the prevalence of many of these parasites, and thorough cooking of meat would lessen

the risk of infection by some others.

Pozio, E., Owen, I. L., et al. (2005). "Inappropriate feeding practice favors the transmission of Trichinella papuae from wild pigs to saltwater crocodiles in Papua New Guinea." Vet Parasitol 127(3-4): 245-251.

The recent discovery of Trichinella zimbabwensis in farmed crocodiles (Crocodilus niloticus) of Zimbabwe and its ability to infect mammals, and the development of both T. zimbabwensis and Trichinella papuae in experimentally infected reptiles led to an investigation of Trichinella infection in saltwater crocodiles (Crocodylus porosus) and in wild pigs (Sus scrofa) of Papua New Guinea, to see if T. papuae also, is present in both cold- and warm-blooded animals. Of 222 crocodiles examined, 47 animals (21.2%), all from Kikori, Gulf Province, were positive for non-encapsulated larvae in the muscles. The greatest number of larvae was found usually in the biceps, with an average of 7 larvae/g. One isolate from a crocodile infected successfully both laboratory rats and mice. Of 81 wild pigs examined, 9 from Bensbach river area (Western Province) and 1 from Kikori area (Gulf Province) were positive for non-encapsulated larvae in the muscles. Trichinella larvae from both saltwater crocodiles and wild pigs have been identified by multiplex-PCR analysis as T. papuae. The sequence analysis of the region within the large subunit ribosomal DNA, known as the expansion segment V, has shown the presence of a molecular marker distinguishing T. papuae isolates of Bensbach river area from those of Kikori area. This marker could be useful to trace back the geographical origin of the infected animal. The epidemiological investigation carried out in the Kikori area has shown that local people catch young crocodiles in the wild and keep them in holding pens for several months, before sending them to the crocodile farm in Lae (Morobe Province). They feed the crocodiles primarily with wild pig meat bought at the local market and also with fish. These results stress the importance of using artificial digestion for routinely screening of swine and crocodiles, and of adopting measures for preventing the spread of infection, such as the proper disposal of carcasses and the adequate freezing of meat.

Dwyer, P. D. (2006). "People, pigs and parasites in New Guinea: relational contexts and epidemiological possibilities." Parasitology international 55 Suppl: S167-173.

Within Papua New Guinea the relationship people have with their pigs varies between societies. These differences arise in the earliest phase of rearing piglets and result in domestic animals whose primary attachments are to other pigs, to places or to people. For Papua New Guineans, different pig management regimes fulfill ecological and social needs. In addition, however, the ways in which pigs are raised and managed, and the presence or absence of a local population of wild pigs, have consequences for the exposure of both domestic pigs and people to parasites that they may host. Effective control of disease-inducing parasites should be attentive to society-specific relationships between people and their pigs.

Owen, I. L. (2006). "Current status of Taenia solium and cysticercosis in Papua New Guinea." Parasitology international 55 Suppl: S149-153.

There is no evidence that taeniasis due to Taenia solium is present in Papua New Guinea (PNG), but there is some serological evidence that human cysticercosis exists at particular locations near the border with West Papua (Indonesia), where refugees from across the border have been settled. Only a few surveys have been conducted; the first was in 1986, when one refugee who originated from an infected locality in West Papua was found to be serologically positive, but asymptomatic. Subsequently, there have been unpublished reports of more positive but asymptomatic cases amongst refugees and, it is claimed, amongst local inhabitants that live near the border. A serological survey conducted in PNG in 1999 at the

southern end of the border revealed no positive cases of cysticercosis. There are no reports of pigs or dogs affected with cysticercosis in PNG.

Owen, I. L. and Reid, S. A. (2007). "Survival of Trichinella papuae muscle larvae in a pig carcass maintained under simulated natural conditions in Papua New Guinea." Journal of Helminthology 81(4): 429-432.

In Papua New Guinea, Trichinella papuae, a non-encapsulated species, is circulating among wild and domestic pigs and saltwater crocodiles. Since an important phase of the life cycle of nematodes of the genus Trichinella is the time of survival of infective larvae in decaying muscle tissues of the hosts, the carcass of a pig, experimentally infected with larvae of T. papuae, was exposed to the environmental conditions of Papua New Guinea to establish how long these larvae would survive and remain infective to a new host. Larvae retained their infectivity in the pig carcass up to 9 days after slaughtering, during which time the temperature within the carcass reached 35.0 degrees C on 2 days; the average relative humidity was 79.0%. A low number of larvae survived up to day 14 after the pig was killed, when the carcass temperature reached 38.0 degrees C, but they lost their infectivity to laboratory mice. This result suggests that the larvae of T. papuae can survive in a tropical environment for a time, favouring their transmission to a new host in spite of the lack of a collagen capsule.

Wai'in, P. M. (2007). "Epidemiology of infection with Leptospira species in Livestock in Papua New Guinea." School of Biomedical and Veterinary Sciences Perth, Murdoch University PhD: 214.

The role of infection with Leptospira as a cause of infertility in Papua New Guinea (PNG) has not been confirmed, mainly because of the lack of robust and simple diagnostic tests in PNG. The aims of this study were to determine the seroprevalence and distribution of infection in livestock in PNG and to develop and validate a diagnostic test for use in PNG that was sufficiently accurate and reliable for confident interpretation of the results. The nested and real-time PCRs were assessed for use as diagnostic tools. The first survey was conducted on 3 commercial, 3 smallholder cattle farms and 4 abattoirs in March 2004 in PNG. Each herd was stratified into 3 age groups (< 2, 2-5 and >5 years), and sera from 1379 animals were sampled in Lae and Kimbe. In addition, 73 kidneys were collected from cattle at the abattoir and aseptically processed for culture. Two hundred and eighty three sera were collected from pigs killed at the abattoirs and 79 pig kidneys were collected and cultured. All sera were tested using the microscopic agglutination test (MAT). The dominant serovar infecting the cattle in PNG was Hardjo with a seroprevalence of 53.7%. The prevalence of serovar Hardjo in the six farms and the abattoir was significantly higher than serovars Tarassovi and Pomona ($P < 0.05$). All pig sera were negative for Leptospira. Leptospires were isolated by culture and the isolates were typed and identified as L. borgpetersenii serovar Hardjo. Cattle are a recognized reservoir for serovar Hardjo and may have a role in transmission to humans. The second survey was conducted in June 2006 to determine if cattle from smallholder farmers, village pigs and dogs in the Markham Valley in Lae, PNG were infected with Leptospira. In addition, pigs from a commercial piggery and horses from commercial and smallholder farms were also sampled. A total of 69 pig sera, 22 dog sera, 15 horse sera and 111 cattle sera were collected. The results showed that 1 dog and 1 pig were seropositive with serovar Canicola. Of the 111 cattle sampled, 21 were seropositive for Hardjo. It was concluded that the seroprevalence with serovar Hardjo in these cattle was significantly lower than cattle from commercial properties. Smallholder cattle may therefore not be a major source of Hardjo infection for animals on commercial farms and pigs do not appear to be infected with Leptospira. The Ab-ELISAs were constructed using one crude

preparations of L. interrogans serovar Pomona and 2 different crude preparation of L. biflexa serovar Patoc. The three antigen preparations were evaluated using 21 MAT-positive and 96 MAT-negative pig sera to determine which antigen preparation was suitable for use in an Ab–ELISA. The selected antigen preparation (L1) was validated in the test using serum from 2 cattle and 1 pig population that were seropositive for Leptospira. A sub-population of seronegative cattle and pigs were also used. The Ab-ELISA was used to test 1,465 bovine sera from 8 cattle populations and the results were compared with the MAT using a Bayesian framework, to obtain an unbiased estimate of the accuracy of the tests. The ELISA had high sensitivity and specificity. Results from the Bayesian analysis showed that the sensitivity and specificity estimates for the Ab-ELISA were high compared to the MAT. Based on the test accuracy and its performance the Ab-ELISA using the L1 antigen described in this study is suitable for use in countries like PNG where the MAT is difficult to perform. Samples of kidneys from livestock in PNG were tested using culture and a PCR-based assay to detect Leptospira species. A total of 72 samples of kidney were collected from cattle and a total of 74 samples were collected from pigs slaughtered in Lae and Port Moresby. A second study was designed to assess the use of a real-time PCR for detecting leptospiral DNA in urine from cattle. One hundred and ninety-three urine samples were collected from a beef cattle farm in WA. Whole genomic DNA from kidney samples was extracted from each kidney using the QIAamp DNA Mini kit (Qiagen). Heat lysis was used to extract genomic DNA from clear urine samples and the QIAamp Mini Kit was used for urine that was contaminated with faeces. The PCR-based test was able to detect a higher number of Leptospira-positive kidneys compared to culture in EMJH medium. Results of testing DNA extracted from urine using the realtime PCR showed that this test is sensitive and able to detect cattle infected with pathogenic leptospires.

Huchzermeyer, F. W., Langelet, E., et al. (2008). "An outbreak of chlamydiosis in farmed Indopacific crocodiles (Crocodylus porosus)." Journal of the South African Veterinary Association 79(2): 99-100.

An outbreak of chlamydiosis was diagnosed in hatchling and juvenile Indopacific crocodiles (Crocodylus porosus) on a crocodile farm in Papua New Guinea. The outbreak was characterised by high mortality with hepatitis and exudative conjunctivitis. The agent appears to have been introduced with live wild-caught crocodiles, which are purchased routinely by the farm. Improved quarantine procedures and treatment with tetracycline led to a rapid reduction of losses on the farm.

Breed, A. C., Yu, M., et al. (2010). "Prevalence of henipavirus and rubulavirus antibodies in pteropid bats, Papua New Guinea." Emerg Infect Dis 16(12): 1997-1999.

To determine seroprevalence of viruses in bats in Papua New Guinea, we sampled 66 bats at 3 locations. We found a seroprevalence of 55% for henipavirus (Hendra or Nipah virus) and 56% for rubulavirus (Tioman or Menangle virus). Notably, 36% of bats surveyed contained antibodies to both types of viruses, indicating concurrent or consecutive infection.

Owen, I. L. (2011). "Parasites of animals in Papua New Guinea recorded at the National Veterinary Laboratory: a catalogue, historical review and zoogeographical affiliations." Zootaxa(3143): 1-163.

The catalogue includes more than 700 parasites of domestic and wild animals recorded at the National Veterinary Laboratory, Papua New Guinea, since data began to be gathered at the end of World War 2. It incorporates some information already published and data on parasites, particularly of indigenous fauna, not recorded previously in the country. Wildlife host species include wild pig, deer, bats, murine rodents, marsupials, monotremes,

birds, reptiles, amphibians, fishes and invertebrates. The range of parasites in domestic and many wild animals shows great affinity with that found in Australia. Some notable exceptions amongst domestic animal parasites are the endoparasites Trichinella papuae, Capillaria papuensis and Mammomonogamus laryngeus and the economically significant ectoparasites Chrysomya bezziana, Tropilaelaps mercedesae and Varroa jacobsoni that are not recorded in Australia. Unusual host-parasite associations include the larvae of the insects Chrysomya spp. and Lucilia sp., parasites of warm-blooded animals, infesting, respectively, cold-blooded crocodiles and cane toads, and the mammalian mite, Sarcoptes scabiei, on an avian host, cassowaries. No host switching of helminths was seen between domestic and wild animals, or between populations of deer, wild pigs and wallabies when grazing together. The economic importance of certain parasites for domestic animals, the potential threats from introduced or newly-discovered parasites, and the relationship between some parasites and their wildlife hosts, are discussed. Information is presented in two tables: a parasite-host list that includes the location of a parasite in or on a host as well as a list of references of relevance to the country, and a host-parasite list that contains the distribution of the parasites according to province or locality.

Schuster, G., Ebert, E. E., et al. (2011). "Application of satellite precipitation data to analyse and model arbovirus activity in the tropics." International journal of health geographics 10: 8.

BACKGROUND: Murray Valley encephalitis virus (MVEV) is a mosquito-borne Flavivirus (Flaviviridae: Flavivirus) which is closely related to Japanese encephalitis virus, West Nile virus and St. Louis encephalitis virus. MVEV is enzootic in northern Australia and Papua New Guinea and epizootic in other parts of Australia. Activity of MVEV in Western Australia (WA) is monitored by detection of seroconversions in flocks of sentinel chickens at selected sample sites throughout WA. Rainfall is a major environmental factor influencing MVEV activity. Utilising data on rainfall and seroconversions, statistical relationships between MVEV occurrence and rainfall can be determined. These relationships can be used to predict MVEV activity which, in turn, provides the general public with important information about disease transmission risk. Since ground measurements of rainfall are sparse and irregularly distributed, especially in north WA where rainfall is spatially and temporally highly variable, alternative data sources such as remote sensing (RS) data represent an attractive alternative to ground measurements. However, a number of competing alternatives are available and careful evaluation is essential to determine the most appropriate product for a given problem. RESULTS: The Tropical Rainfall Measurement Mission (TRMM) Multi-satellite Precipitation Analysis (TMPA) 3B42 product was chosen from a range of RS rainfall products to develop rainfall-based predictor variables and build logistic regression models for the prediction of MVEV activity in the Kimberley and Pilbara regions of WA. Two models employing monthly time-lagged rainfall variables showed the strongest discriminatory ability of 0.74 and 0.80 as measured by the Receiver Operating Characteristics area under the curve (ROC AUC). CONCLUSIONS: TMPA data provide a state-of-the-art data source for the development of rainfall-based predictive models for Flavivirus activity in tropical WA. Compared to ground measurements these data have the advantage of being collected spatially regularly, irrespective of remoteness. We found that increases in monthly rainfall and monthly number of days above average rainfall increased the risk of MVEV activity in the Pilbara at a time-lag of two months. Increases in monthly rainfall and monthly number of days above average rainfall increased the risk of MVEV activity in the Kimberley at a lag of three months.

Koinari, M., Karl, S., et al. (2012). "Infection levels of gastrointestinal parasites in sheep and goats in Papua New Guinea." Journal of Helminthology: 1-7.

Gastrointestinal parasites of livestock cause diseases of important socio-economic concern worldwide. The present study investigated the prevalence of gastrointestinal parasites in sheep and goats in lowland and highland regions of Papua New Guinea (PNG). Faecal samples were collected from a total of 165 small ruminants (110 sheep and 55 goats) from February to April 2011. Analysis by a modified McMaster technique revealed that 128 animals (72% of sheep and 89% of goats) were infected with one or more species of gastrointestinal parasites. The gastrointestinal parasites found and their prevalences in sheep (S) and in goats (G) were as follows: strongyle 67.3% (S), 85.5% (G); Eimeria 17.3% (S), 16.4% (G); Strongyloides, 8.2% (S), 23.6% (G); Fasciola, 5.5% (S), 18.2% (G); Trichuris, 1.8% (S), 3.6% (G); and Nematodirus, 1.8% (S), 3.6% (G). Two additional genera were found in goats: Moniezia (9.1%) and Dictocaulus (3.6%). This is the first study to quantitatively examine the prevalence of gastrointestinal parasites in goats in PNG. The high rates of parasitism observed in the present study are likely to be associated with poor farming management practices, including lack of pasture recovery time, lack of parasite control measures and poor-quality feed.

Samoa

Martin, T. (1999). "The Animal Health Status of Samoa." Secretariat of the Pacific Community: 42.

A serological survey for diseases of livestock was conducted in Samoa in 1997, with the objective of determining the current animal health status of the country for selected diseases. The results are presented along with those of previous surveillance activities, notably in the 1970s. Both village livestock (pigs, poultry, horses) and commercial livestock (cattle, pigs, poultry) were covered in the survey. Samoa is free of the contagious livestock diseases of serious socio-economic or public health significance (OIE list A diseases). It is also free of rabies. Appropriate importation and quarantine procedures must be maintained to retain this disease-free status. Other important livestock diseases which are not present in Samoa include porcine brucellosis, transmissible gastroenteritis of pigs, porcine reproductive and respiratory syndrome, bovine anaplasmosis and enzootic bovine leukosis. The serological evidence also points to freedom from bovine Johne's disease. There are several diseases of animals present in Samoa that are transmissible to humans: bovine brucellosis and tuberculosis (both the subject of renewed control programmes), leptospirosis and trichinosis. The human viral infection Japanese B encephalitis is not present in Samoa. There is serological evidence for the presence of infectious bovine rhinotracheitis, pestivirus, theileriosis and babesiosis in cattle; Aujeszky's disease in pigs; and infectious bronchitis, infectious bursal disease, infectious laryngotracheitis, avian encephalomyelitis and Marek's disease in poultry.

Secretariat of the Pacific Community (2004). "Apiculture in Samoa, Country report and future strategy." Secretariat of the Pacific Community: 13.

No abstract available

Carslake, R. J., Hill, K. E., et al. (2012). "Prevalence of selected infectious diseases in the Samoan dogs." Journal of Veterinary Internal Medicine 26(3): 788-788.

Samoa has a tropical island climate ideally suited to many infectious diseases, and vectors for some infectious diseases are known to be present. Dogs are very common pets in

Samoa with 88% of households owning an average of two dogs, which live in direct contact with their owners and the wider village community. These dogs also come into close proximity to a substantial tourist population visiting this holiday destination. Many canine infectious diseases are zoonotic and there is limited preventative medicine available for dogs in Samoa. There are very few studies into the presence of zoonotic pathogens in Samoa or other South Pacific islands, and the role of dogs as a reservoir for zoonotic diseases is unknown. The prevalence of selected infectious diseases was evaluated in 242 dogs undergoing surgical sterilisation in Samoa in July 2010 and August 2011. Dogs were selected from both main Samoan islands, in rural and urban areas. Data were obtained from dogs' owners by interview, including age, environment and any previous preventative medication. Serum and fecal samples were collected, and the skin examined for external parasites. Seroprevalence of five vector-borne diseases were assessed in 237 dogs using point of care qualitative ELISA assays (SNAP Leishmania and SNAP 4Dx, IDEXX, Westbrook, ME) to detect antibodies against Leishmania infantum, Anaplasma phagocytophilum, Ehrlichia canis and Borrelia burgdorferi, and Dirofilaria immitis antigens. Fecal analysis was performed by flotation testing on fresh fecal samples from 204 dogs to screen for intestinal parasites. Forty-eight fecal samples were tested for Giardia and Cryptosporidium spp. The median age of dogs enrolled was one year, with a range of four months to eight years and 73.3% (176/240) were male. The vast majority of dogs, 95% (230/242), were owned, the remaining were stray animals. The seroprevalence of D. immitis was 46.8% (111/237) and A. phagocytophilum prevalence was 8.4% (20/327). All serum samples tested negative for E. canis, B. burgdorferi and L. infantum. Prevalence of hookworm was 92.6% (185/204), Trichuris vulpis 6.9% (14/204), Dipylidium caninum 4.4% (9/204), Toxocara canis 3.4% (7/204) and Capillaria spp. 2.0% (4/204). Prevalence of Giardia spp. was 14.6% (7/48) while no Cryptosporidium was detected. Examination for external parasites was completed in 221 dogs. Fleas were found on 83.7% of the dogs (185/221), ticks on 42.1% (93/221) and lice on 8.1% (18/221). Identified ticks were Rhipicephalus sanguineus, with no Ixodes spp. found. The results indicate a very high prevalence of hookworm, D. immitis, and external parasites in dogs in Samoa. This study provides valuable information on canine health and suggests dogs could play a role in the spread of some zoonoses in Samoa. Further studies are required to review the public health implications of this study.

Solomon Islands

De Fredrick, D. F. (1977). "Pig production in the Solomon Islands. II. Diseases and parasites." Trop Anim Health Prod 9(3): 135-139.

A study of diseases and parasites of pigs in the Solomon Islands during 1967 to 1969 indicated that infectious diseases were of little consequence. Four arthropod parrasite species were found: one tick, one louse and two tabanids. The tick (Amblyomma cyprium cyprium) was extremely rare. Fifteen species of helminth parasites were recorded and of these Stephanurus dentatus was the most prevalent. All species were identified except a filariid, of which only the microfilariae were seen.

De Fredrick, D. F. and Osborne, H. G. (1977). "Pig production in the Solomon Islands. III. The influence of breed, diet and housing on reproduction and growth." Trop Anim Health Prod 9(4): 203-210.

In the Solomon Islands pigs grow slowly and sows have small litters. An experiment using 124 pigs in 16 litters from eight sows compared the effect of village breed, village diet and village husbandry which encouraged infection of pigs with Stephanurus dentatus, with

the effect of European breed, commercial rations and a system of management which ensured freedom from S. dentatus infection on the productivity of pigs. It was shown that the village diet was markedly inferior to the commercial rations and had by far the greatest influence of any of the three factors studied on the parameters measured. The village breed was not inferior in litter size or growth rate when fed on the village diet, but was inferior in growth on the commercial diet. No harmful effects of the village husbandry system were detected on either type of pig but this may have been due to the lightness of S. dentatus infections.

De Fredrick, D. F. and Reece, R. L. (1980). "Diseases of cattle in the Solomon Islands." Aust Vet J 56(11): 522-525.

Between 1967 and 1977 a study was made of diseases of cattle in the Solomon Islands. Tuberculosis was found in only 3 herds and was eradicated by 1975. Brucellosis serology revealed very few reactors and by 1977 the herds involved were considered free of the disease. Significant serological reactions were found to Leptospira interrogans serovars pomona, hardjo, autumnalis and jez-bratislava. There was evidence that infectious bovine rhinotracheitis and mucosal disease were present. Seventeen parasites were identified of which Haematobia irritans exigua, Haemonchus placei, Oesophagostomum radiatum and Ceylonocotyle streptocoelium were widely distributed. Nutritional stress occurred under some forms of husbandry but environmental stress was minimal. The Solomon Islands are therefore in a most favourable situation with regard to diseases of cattle.

Hellyar, A. G. (1985). "The introduction of brucellosis into the Solomon Islands." Trans R Soc Trop Med Hyg 79(4): 567-568.

No abstract available

Reid, G. M. and Van Eaton, C. (1993). "A survey of honey bee pests and diseases in the Solomon Islands." Wellington, Ministry of External Relations and Trade.

A pest and disease survey was carried out on the honey bee population of the Solomon Islands during January and February 1993. Just under 70% of the hives registered with the Ministry of Agriculture and Lands were inspected and a sample of bees was taken from each colony for subsequent laboratory analysis. Hives were examined in the major beekeeping and quarantine risk areas on Guadalcanal, Malaita and in Western Province. Broods combs were examined clinically for the presence of American foulbrood (*Bacillus larvae),* European foulbrood (*Melissococcus pluton),* sacbrood virus, and chalkbrood fungus (*Ascosphaera apis).* Drone pupae were also inspected for the external parasitic mite *Varroa jacobsoni* and the Asian mite (*Tropilaelaps clareae).* Adult bees were examined for chronic bee paralysis virus, which causes paralysis in bees, and evidence of predation by other insects or animals. Samples of adult bees were tested for the protozoan *Nosema apis*, the internal tracheal mite (*Acarapis woodi*), *Varroa* and *Tropilaelaps* mites, and adults bee viruses. Sticky traps on the floorboards of hives were used in conjunction with miticides to sample colonies for external mites. The only diseases found during the survey were sacbrood virus, chronic bee paralysis virus, Kashmir bee virus, black queen cell virus, and nosema. None of these are considered to be serious diseases of the honey bee. Eight hives showed symptoms of a condition known as halfmoon disorder. This is not considered to be a disease and can be dealt with effectively by requeening. Cane toads (*Bufo marinus*) were found to be a serious predator of adult bees. Wax moths(*Galleria mellonella* and *Achroia grisella*) were also present and severely damaged combs in some dead hives. Larvae of a species of blister beetle (sub-family Nemognathinae) were found on sticky boards and on two samples of adult bees. The effects of these insects on the hives, if any, are not known. Recommendations are made regarding training and extension in bee disease recognition and surveillance systems for

exotic diseases. The bee gene pool in the Solomon Islands is relatively small, with only a few importations of queen bees having been made since 1962. Evidence of inbreeding was found in bee colonies in a number of apiaries. This was traced to the used of only one breeder queen over several years by the beekeeper who produced the queens heading up these colonies. There is an acute shortage of quality queen bees for either increase or replacement and this is limiting expansion of the beekeeping industry in the country. The temperament of the general bee population was found to be marginal and has the potential to limit beekeeping development in the country. A program is urgently needed to locate local breeding stock, or import selected breeders, and use these to rear large numbers of quality queens for sale. Quarantine facilities should be established to facilitate importation of disease-free stock. An intensive extension program in queen bee selection, breeding and production is required for both extension workers and farmers.

Martin, T. and Epstein, V. (1999). "The animal health status of the Solomon Islands." Secretariat of the Pacific Community: 44.

A serological survey for diseases of livestock was conducted in the Solomon Islands in 1998, with the objective of determining the current animal health status of the country for selected diseases. The results are presented along with those of previous surveillance activities, notably in the 1960s and 1970s. Both village livestock (pigs and poultry) and commercial livestock (cattle, pigs, poultry) were covered in the survey, along with horses and goats. The Solomon Islands are free of the contagious livestock diseases of serious socio-economic or public health significance (OIE List A diseases), although there is serological evidence for the presence of bluetongue virus. The country is also free of rabies. Appropriate importation and quarantine procedures must be maintained to retain this disease-free status. Other important livestock diseases which are not present in the Solomon Islands include brucellosis (cattle, pigs and goats), bovine tuberculosis, Aujeszky's disease, transmissible gastroenteritis of pigs, porcine respiratory and reproductive syndrome, bovine anaplasmosis, and bovine pestivirus infection. The serological evidence also points to freedom from Johne's disease, and there are very few, if any, cattle ticks. Diseases of animals present in the Solomon Islands that are transmissible to humans include trichinosis and leptospirosis. There is serological evidence for the presence of infectious bovine rhinotracheitis, theileriasis and babesiasis in cattle; and infectious bronchitis, infectious laryngotracheitis, avian encephalomyelitis and Marek's disease in poultry. Ongoing surveillance and import controls are necessary to maintain or improve the country's animal health status.

Tokelau

Martin, T. (1999). "The Animal Health Status of Tokelau." Secretariat of the Pacific Community: 23.

A cross-sectional serological survey for diseases of pigs and poultry in Tokelau was conducted in 1998. This was the first investigation into the animal health status of the Tokelau Islands. Clinical observations were also recorded, and some parasites identified. This document presents the findings of the survey. Tokelau is free of the contagious livestock diseases of serious socio-economic or public health significance (OIE List A diseases). The pig population is also free of the viral diseases transmissible gastroenteritis and porcine reproductive and respiratory syndrome, and the serological findings suggest it is free of brucellosis and trichinosis. The prevalence of leptospirosis is very low. Aujeszky's disease and porcine parvovirus are present on all three atolls at high prevalence. Viral infections present in the free range poultry population include infectious bronchitis, infectious bursal

disease, infectious laryngotracheitis and Marek's disease.

Tonga

Barger, I. A., Siale, K., et al. (1994). "Rotational grazing for control of gastrointestinal nematodes of goats in a wet tropical environment." Veterinary parasitology 53(1-2): 109-116.

A preliminary experiment involving contamination of pasture plots with eggs of Haemonchus contortus, Trichostronglyus colubriformis and Oesophagostomum columbianum every month for a year established that in the tropical environment of the Pacific island of Tongatapu, hatching and development of all species was rapid and continuous, with a short survival on pasture (3-7 weeks) of the resulting infective larvae. These results indicated that a rotational grazing system consisting of ten paddocks grazed in sequence for 3.5 days at a time may permit a reduction in the frequency of anthelmintic treatment of goats. In comparison with an adjacent set-stocked flock which required treatment on three occasions during the year when mean flock egg counts exceeded 2000 eggs per gram (EPG), rotationally grazed goats generally maintained mean egg counts of less than 1000 EPG. Anthelmintic treatment was only given to rotationally grazed goats individually as they kidded, and there were indications that even this precaution was unnecessary. Because of the expense of frequent anthelmintic treatment and the resulting selection of strains of anthelmintic-resistant nematodes, rotational grazing of small ruminants through fencing, tethering or herding deserves further investigation as a nematode control option in wet tropical environments.

Saville, P. (1996). "The Animal Health Status of Tonga." Secretariat of the Pacific Community: 20.

Aspects of the animal health status of Tonga have been investigated on a number of occasions by visiting consultants and resident veterinarians. This paper seeks primarily to record the findings from a survey which took place between September 1992 and March 1994. The results of earlier surveys are also included as appropriate. The findings indicate that although Tonga is free from all major exotic diseases, there are a number of diseases of economic and public health concern. In cattle, bovine brucellosis has not been detected so far in the survey (previous reports had suggested that Brucella sp. in cattle was present), although the disease is endemic in pigs. A number of reactors to the tuberculin test have been identified. However the single case that was slaughtered and examined post-mortem failed to demonstrate lesions consistent with infection. Serological evidence indicates that infectious bovine rhinotracheitis/infectious pustular vulvovaginitis and bovine viral diarrhoea/mucosal disease are widespread. The number of positive cases of bovine leptospirosis is of public health concern. The absence of Boophilus ticks is a major benefit. The survey has confirmed the widespread distribution in the pig population of Aujeszky's disease, Brucella suis and porcine leptospirosis. A number of samples were serologically positive for trichinellosis. Subsequent tests have failed to confirm these findings and further investigations are required. Although the number of poultry samples examined was not fully representative, results served to confirm that poultry diseases which are known to be widespread elsewhere in the region are also present in Tonga. These include infectious bursal disease, infectious bronchitis, Marek's disease, infectious laryngotracheitis, avian encephalomyelitis, Mycoplasma gallisepticum and Mycoplasma synoviae. The high incidence of toxoplasmosis in the caprine population is of public health concern. The feral cat population is thought to constitute the reservoir for this disease.

Secretariat of the Pacific Community (2004). "Apiculture in Tonga, Country report and future strategy." Secretariat of the Pacific Community: 11.

No abstract available

Tuvalu

Secretariat of the Pacific Community (2004). "Apiculture in Tuvalu, Country report and future strategy." Secretariat of the Pacific Community: 8.

No abstract available

Vanuatu

Bouree, P. and Leon, J. J. (1976). "[Human and animal parasitic diseases in the New Hebrides]." Bulletin de la Societe de pathologie exotique et de ses filiales 69(2): 186-189.

New-Hebrides Condominium, an archipelago in the South Pacific, is a country with a special socio-political environment, due to the duality of its French-British regime. This state of affairs is felt in all areas including Public Health, where we find French, British and Condominial personnel. The pathology of parasitic diseases is essentially tropical with a strong predominance of paludism, at times fatal, and intestinal nematodes; however we rarely find amibiasis or human hydatid disease. Strongyloidiasis as well as specific ascaris of each species are very frequent in animals. In general cattle is relatively healthy, which is fortunate for a country whose economy is turning more and more to breeding.

Schandevyl, P. and Deleu, D. (1985). "Diseases and parasites of cattle in Vanuatu." Aust Vet J 62(9): 297-300.

A study of cattle diseases was carried out in Vanuatu from 1971 to 1981. Tuberculosis was discovered in 4 herds and eradication was completed by 1981. The number of farms with brucellosis reactors increased from 2 in 1976 to 7 in 1978 despite eradication measures. Antibodies to serovars Leptospira icterohaemorrhagiae, australis, sejroe and canicola were demonstrated by the microscopic agglutination test. Antibodies were demonstrated against infectious bovine rhinotracheitis/infectious pustular vulvovaginitis and bovine virus diarrhoea/mucosal disease complexes. Of the 18 parasites identified, Haemaphysalis longicornis, Haemonchus, sp, Oesophagostomum phlebotomum and Neoascaris vitulorum were the most prevalent. As brucelossis is the only serious disease present, Vanuatu is in a favourable situation with regard to cattle diseases.

Wallis & Futuna

Giraud P., Toutain, B. et al. (1987). "Présentation de l'élevage aux iles Wallis et Futuna. [An overview of livestock farming in the islands of Wallis and Futuna]. " Revue d'élevage et de médecine vétérinaire des pays tropicaux : 40(2):173-179.

This French Overseas Territory consists of three islands with a total area of about 200 km, over 12000 inhabitants, 20000 pigs, 22000 poultry and five small herds of beef cattle. Salmonella choleraesuis and Staphylococcus aureus have been isolated from diseased pigs, and there is serological evidence of brucellosis, leptospirosis, Aujeszky's disease and

parvovirus infection in the pig population. Sporadic cases of sea-slug (Aplysia) poisoning occur among free-ranging pigs. Multiple parasitoses are common, and Stephanurus dentatus infection causes losses. Helminth and arthropod parasites of pigs and other animals, that have been identified, are listed.

Martin, T. (1999). "The Animal Health Status of Wallis & Futuna." Secretariat of the Pacific Community: 29.

Various aspects of animal health in Wallis & Futuna have been studied and recorded by resident and visiting veterinarians over many years. In 1997 and 1998 a serological survey of livestock diseases was conducted in Wallis & Futuna, and this report combines the findings both of this survey and previous reports. Wallis & Futuna is free of the contagious livestock diseases of serious socio-economic or public health significance (OIE List A diseases). The pig population is also free of the important viral diseases transmissible gastroenteritis and porcine respiratory and reproductive syndrome. Brucellosis and Aujeszky's disease are two infections that appear to have been greatly diminished by the introduction in the late 1980s of compulsory penning of pigs. Leptospirosis is prevalent among pigs in Wallis & Futuna, and there is some serological evidence of trichinosis on Wallis, so the territory has at least two important livestock diseases of public health concern. Tuberculosis has never been identified in livestock. Both village and commercial poultry have serological evidence of infectious bronchitis, infectious bursal disease, infectious laryngotracheitis and avian encephalomyelitis, and it is likely that Marek's disease is also present. Tropical canine pancytopaenia and its tick vector have both been identified in the territory.

Secretariat of the Pacific Community (2004). "Brucella suis brucellosis outbreak in Wallis and Futuna." Inform'Action 18.

No abstract available

Antras, V. and Garin-Bastuji, B. (2011). "La brucellose porcine à Wallis et Futuna [Swine brucellosis in Wallis and Futuna]. " Bulletin épidémiologique, santé animale et alimentation : 43:31-34.

Wallis and Futuna is a French overseas community (160 km2; 15,000 inhabitants) located between Fiji, Samoa and Tonga islands, includes two main islands which are 250 km apart and is divided into three traditional chiefdoms:Uvea(Wallis), Sigave and Alo(Futuna). The territory's economy is limited to traditional subsistence agriculture, with livestock including mostly pigs – 19,000 heads in 1,800 flocks in 2001). Due to an increasing number of human cases of brucellosis due to Brucella suis biovar 1, serological surveys were carried out in order to evaluate the prevalence of the disease in pigs and in exposed human populations.The study included 208 pig flocks and 1,213 animals tested in RBT and iELISA, the specificity of which had been previously evaluated on Metropolitan pigs. For the whole population, the seroprevalence of infected flocks was estimated at 22% and the mean intra-flock prevalence at 34%. Despite the fact that the human seroprevalence appeared finally very low, the incidence of clinical cases (0-4 annual cases per 15,000 inhabitants) and the enzootic situation inpig farms requiredthe implementation of control measures. Therefore, the sanitary authorities decided the establishment of a brucellosis-free piglet-producing farm with the objective of selling young 20-30 kg females for domestic consumption and castrated males for fattening for customary offerings.This experiment is planned to be repeated in order to restrict breeding towell-controlled free farms and to reduce the sources of human infection.

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