THE DISTRIBUTION OF INFECTIOUS AND PARASITIC DISEASES OF ANIMALS IN PAPUA AND NEW GUINEA

By

J. R. EGERTON AND T. L. W. ROTHWELL

RESEARCH BULLETIN No. 1 (now no. 2)
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J. R. EGERTON[1] AND T. L. W. ROTHWELL[2]

The distribution of animal diseases in the Territory of Papua and New Guinea has been described by the Report of I Australian Mobile Veterinary Survey Unit (1946), Dumbleton (1954) and Anderson (1960). The list of diseases presented in this publication is an attempt to bring up to date (31st July, 1964) the animal disease picture in Papua and New Guinea. The authors have included only those diseases for which confirmed diagnoses exist. In the main, diagnosis has been based on the identification in the laboratory of the agent responsible. If a diagnosis has been made on clinical or other grounds the fact is referred to. Where published authority exists for an identification, it is recorded. No references are given for those identifications taken only from Departmental records.

The present list is arranged as follows :

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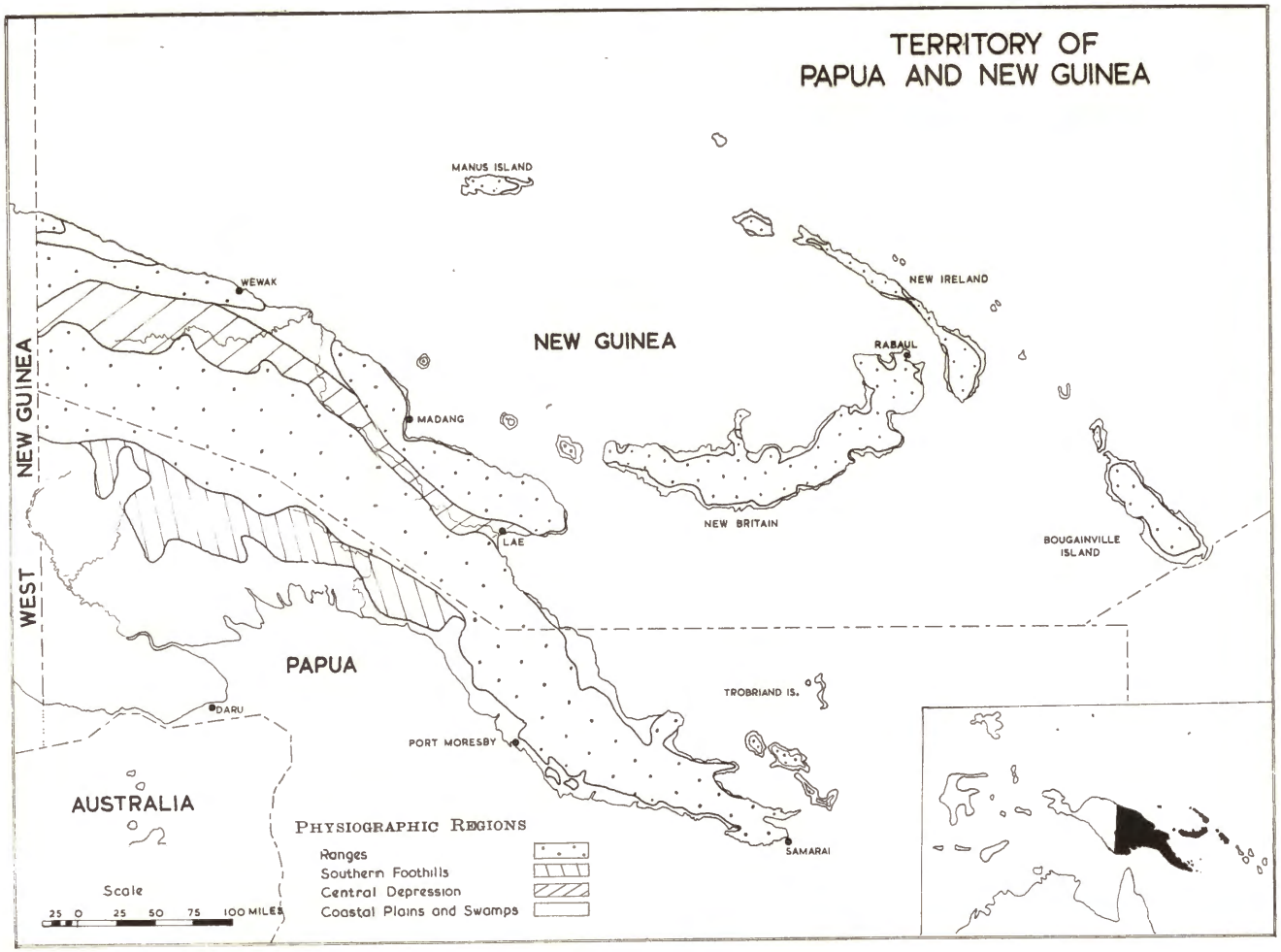
TERRITORY OF
PAPUA AND NEW GUINEA
MANUS ISLAND
WEWAK
NEW GUINEA
NEW IRELAND
RABAUL
MADANG
NEW BRITAIN
LAE
BOUGAINVILLE
ISLAND
WEST NEW GUINEA
PAPUA
TROBRIAND IS.
DARU
PORT MORESBY
AUSTRALIA
SAMARAI
PHYSIOGRAPHIC REGIONS
Ranges
Southern Foothills
Central Depression
Coastal Plains and Swamps
Scale
25 0 25 50 75 100 MILES

INTRODUCTION

The combined Territory of Papua and New Guinea comprises an area of 183,500 square miles and lies between latitudes 1° and 12° S. and longitudes 141° and 156° E. The main physiographic regions of the mainland are the Main Ranges (up to 15,000 feet), the Northern Mountains, the Central Depression, the Southern Foothills and the Coastal Plains and Swamps. The islands of New Britain, New Ireland and Bougainville (the latter in the Solomon Group) are mainly mountainous with coastal plains and swamps.

The largest rivers are the Fly, the Sepik, the Ramu, the Purari and the Markham. The Territory has a tropical monsoonal climate. Most areas have an average annual rainfall in excess of 80 inches, and several receive an average of at least 250 inches per annum. Mean maximum temperatures for coastal stations are about 90° F., and the minimum rarely falls below 70° F.; above 7,000 feet occasional frosts are experienced, increasing in severity and frequency as altitude rises.

The flora consists of Australian and Asiatic elements as well as a large endemic component. The fauna is closely related to that of Australia and is quite distinct from that of Asia. Most of the common domestic animals have been introduced. Pigs, dogs and poultry were introduced long before European settlement. Pigs have become feral throughout the country and deer introduced this century are spreading widely in the Papuan region.

The indigenous population, which is about two million, is mainly self-supporting for food, the main staples being sweet potato, taro, banana, sago and yam. Native-owned domestic pigs are at present regarded less as food animals than as tokens of wealth and prestige. Generally speaking, they are killed and eaten only at feasts or ceremonies. The contribution of game to the diet varies according to districts, but wild pigs, wallabies, birds and small game are locally important sources of food.

PART I

LIVESTOCK INDUSTRIES IN THE TERRITORY OF PAPUA AND NEW GUINEA

CATTLE

The development of a cattle industry in the Territory of Papua and New Guinea has been described by Anderson (1962). Prior to World War II cattle were run mainly on coastal coconut plantations, but the majority of these animals were killed during the War. Post-war development has mainly been on pastoral leases, although cattle continue to be run on coconut plantations and mixed farms. Commercial dairies supply milk to the main towns. At the 30th June, 1964, the cattle population of the Territory was about 34,000 head, 13,000 of which were situated in the Morobe District of New Guinea.

The Administration of the Territory has an active policy for encouragement of a cattle industry. The aim is an industry which will enable the Territory to be self-sufficient in beef. To this end, the Administration provides free veterinary and advisory services, operates a freight subsidy scheme for the importation of approved breeding cattle, and runs livestock stations where experiments in breeding, management and pasture improvement are carried out.

The introduction of cattle into the economy of the native people has received considerable attention from the Administration and religious Missions in recent years. At the 30th June, 1964, about 1,500 head were native-owned. It remains to be seen whether the native people utilize their cattle as a source of food and income or whether they become status symbols similar to the pig.

Representatives of most breeds of cattle may be found in the Territory. European breeds have not been satisfactory in the Lowlands, whereas Brahman and Brahman crossbreds perform well on natural pastures if managed properly. Africander crossbreds have been introduced, and although clearly superior to European breeds in the Lowlands, no statistics are available to compare them with Brahman crossbreds. Although European breeds of cattle perform fairly satisfactorily in the Highlands, Brahman and Africander crossbreds appear to have an advantage over the former in those areas of the Highlands where they have been introduced.

The majority of the Territory's cattle graze natural pastures which are dominated by kangaroo grass (*Themeda* sp.), kunai (*Imperata cylindrica*) and other tall grasses (*Phragmites* sp., *Saccharum* sp., *Miscanthus* sp., *Rottboellia* sp.) but include numerous other species of grasses, legumes and other plants.

PIGS

De Beaufort (1951) considered the so-called native pig to be of the European type, having been introduced by early European navigators. He named it *Sus papuensis*. Others consider it is of the Asiatic type, probably having arrived in the country with migrant people from the north. They are small, multi-coloured, and unimproved by European standards. The difference between " wild " and domestic pigs is slight (Brongersma, 1958). European breeds of pigs have been imported by the Administration, Missions and settlers for many years. Some of these have been purchased by the natives and in recent years the Administration has pursued a policy of distribution of European breeds, mainly Berkshires, in an attempt to grade up the native pigs. The impact of this process is noticeable in some areas.

The pig population of the Territory is unknown but has been estimated at one million on the basis of a sample count of pigs from 100 villages (Walters, 1963). Commercial piggeries are located mainly in the vicinity of towns, and run about 5,000 head, mostly derived from imported stock.

Nothing is known of the performance of native pigs. Being an integral part of the cultural system, the domestic pig makes an insignificant contribution to the diet of the native people. Native pig husbandry methods are primitive, whilst those of the commercial producers follow the European pattern. Producers utilize both imported and locally grown foodstuffs, the latter being favoured because of their lower cost. However, they have proved unsatisfactory for growing pigs, presumably because of their low protein content.

A ban on the importation of pigs and pig meats from Australia (lifted in August, 1964) because of the swine fever outbreak there, has had a stimulating effect on the local pig industry, and in 1963/64 about 2,500 pigs were slaughtered for urban consumption. Considerable numbers of live pigs are sold to the native people by the commercial producers.

POULTRY

The village poultry probably originated in Asia and were brought into the country by migrant peoples. They are unimproved, small, and of unknown productivity. Grading up to European types is being attempted by the sale of started improved types. Commercial producers generally operate on a battery cage system. Day-old chicks are often cold brooded, after which management tends to be orthodox. Imported foodstuffs are almost exclusively used owing to the general absence of grain production in the country. On slaughter, layers return their cost as chickens plus rearing costs, sales generally being made to urban natives.

The statistical position in regard to the poultry population is unsatisfactory. A sample survey (Walters, 1963) suggested the indigenous population had about three-quarters of a million head, although the Army Survey Unit estimated one million head between the Markham River and Mount Hagen in 1946. Over 150,000 day-old chickens are imported annually into the Territory, the majority going to commercial producers supplying the main towns. At the 30th June, 1964, these producers ran an estimated 50,000 birds.

OTHER ANIMALS

CATS

Cats have been introduced into main areas of the Territory, and the greatest concentration is in the urban areas. Some are kept as pets in the villages.

DOGS

As with pigs and poultry, dogs are believed to have accompanied migrants from the north into the country. Many have been introduced into the Territory by Europeans and there is consequently a substantial urban dog population. The influence of the imported breeds can now be seen in the village dogs of the more developed areas.

No reliable statistics are available, but censuses during 1962 and 1963 in thirty villages of the Western and Sepik Districts revealed about one dog per three head of population, or about 700,000 for the whole Territory.

Dogs are used extensively by the native people for hunting. The diet of these village dogs is almost exclusively of vegetable scraps, and whilst some carry good condition a great majority are poorly nourished even to the extent of emaciation (Report I Australian Mobile Veterinary Survey Unit, 1946). The effects of poor nutrition are enhanced by internal and external parasitism.

GOATS

There are an estimated 6,500 goats in the Territory, mostly in the Highlands.

HORSES

At the 30th June, 1964, there were approximately 1,500 horses in the Territory. The majority are used as stock horses on the pastoral leases, though race clubs have been established in Port Moresby and Rabaul. Polocrosse and pony clubs are established in other centres.

SHEEP

There are less than 500 sheep in the Territory, most of which are run in small herds in the Highlands.

WATER BUFFALO

Water buffalo or Caribou were introduced into the Territory of New Guinea during the German Administration (Commonwealth of Australia, 1954), and few of the estimated 1,000 head are under control.

NATIVE FAUNA

The fauna of the Territory of Papua and New Guinea is closely related to that of Australia. The long isolation of the New Guinea group of islands, however, has had a great influence, and some types and forms which succumbed on the mainland have survived in the islands (Commonwealth of Australia, 1964).

There are over 100 species of mammals, among which the marsupials predominate, the largest being the tree kangaroo. The Phalanger family is represented by several species, of which the Cus Cus and Red Bandicoot are members. There is only one carnivorous animal, the Dasyure, known in Australia as the native cat, but its occurrence is extremely rare. Non-marsupials include the Echidna or Spiny Anteater. Bats, rats and mice are common.

Birds of New Guinea include a number of handsome and brightly coloured forms, most of which are of Australian origin, but many come from the Malayan region. The Birds of Paradise have arisen locally. Migratory birds, travelling from Japan and South-East Asia, pass through New Guinea *en route* to Australia.

FERAL ANIMALS

Herds of feral *cattle* occur in all regions. They are derived from survivors of herds allowed to run wild during the war. Hunters are believed to be eliminating them, and total numbers are estimated at less than 1,000 head. Large herds of *deer* of the Sambar group (*Cervus timoriensis moluccensis*—Brongersma, 1958) are known to exist in the Western and Central Districts of Papua and in New Britain. There are an estimated 7,500 to 15,000 head in the Western District (Clissold, pers. comm.), derived from deer introduced into the Merauke area of West New Guinea. They appear to be increasing in numbers and migrating eastwards. No estimate of the number in the Central District is available. Fallow deer, *Dama* sp., were introduced into the Territory of New Guinea during the German administration. A herd of about 50 head is known to exist in the Madang District. Feral *dogs* are presumed to occur in all regions, but no estimate of their numbers is available. As described above, *pigs* were introduced either with the migration of people from the north in prehistoric times or by early European navigators. Feral pigs occur throughout the Territory and are extensively hunted by the indigenous people. *Water buffalo* or Caribou were introduced into the Territory of New Guinea during the German administration. They became feral during the war, and although a few have been domesticated, the majority remain feral. Most occur in the New Guinea islands region of New Guinea.

ENTRY OF ANIMALS AND ANIMAL PRODUCTS INTO THE TERRITORY OF PAPUA AND NEW GUINEA

The Animal Disease and Control Ordinance 1952–1958 and the Regulations and Proclamations made thereunder state, *inter alia*, that no animal or animal product, except animal products wholly originating in Australia or New Zealand and intended for human consumption, may be imported into the Territory of Papua and New Guinea without the prior consent in writing of the Chief Stock Inspector. The definition of "animal" under the Animal Disease and Control Ordinance 1952–1958 is "a member of the animal kingdom other than man, or a part or product of any such member". The prohibition on the importation of pigs, parts and products from Australia imposed in 1961 was lifted after the 28th August, 1964.

General conditions under which animals may be imported into the Territory of Papua and New Guinea include general certification of health by a Government Veterinary Officer of the exporting country, a certificate of treatment with approved insecticides, and a Statutory Declaration by the owner that they have not been in contact with diseased animals. Special certification is required for the following diseases:

Species	*Disease*	*Remarks*
Cattle	Tuberculosis	Negative intradermal test
	Contagious bovine pleuro-pneumonia	Negative complement fixation tests
	Brucellosis	Negative agglutination test
	Leptospirosis	Negative agglutination lysis tests for *L. pomona*. Positives accepted after streptomycin treatment provided less than 10% positive and suspicious reactors in group
	Johne's disease, Trichomoniasis, Vibriosis	No contact with affected animals and derived from properties free from these diseases

Species	*Disease*	*Remarks*
Pigs	Tuberculosis	Negative intradermal test
	Brucellosis	Negative agglutination test
	Leptospirosis	Negative agglutination lysis test
	Atrophic rhinitis	No contact with affected stock and derived from properties free from the disease
	Swine fever	Negative gel diffusion or tissue culture neutralization tests
Goats	Tuberculosis	Negative intradermal test
	Brucellosis	Negative agglutination test
	Melioidosis	No contact with affected stock and derived from properties free from this disease
Horses, Donkeys and Mules	Poll evil, fistulous withers and chronic bursitis	No symptoms displayed
	Equine infectious anaemia	No contact with affected stock and derived from properties free from this disease
Sheep	Foot rot	No contact with affected stock and derived from properties free from these diseases
	Melioidosis	
	Vibriosis	
	Liver fluke	
Poultry (day-olds and eggs only)	Pullorum	Requirements relate to freedom of parent birds and farm of origin
	Epidemic tremor	
Dogs	Distemper	Immunisation if under twelve months of age

Certificates of freedom of fodder, etc., from cattle tick (*Boophilus microplus*) are also required. Livestock may only be carried on ships which have plied for trade during the preceding twelve months between Australia, New Zealand and the Territory of Papua and New Guinea. Finally, a certificate from a Government Veterinary Officer is required, stating that the vessel during this period has carried only tick-free livestock or has been treated in such a manner as to render it free from ticks.

ANIMAL HEALTH IN THE TERRITORY OF PAPUA AND NEW GUINEA

The Animal Health Service of the Territory of Papua and New Guinea has been developed only in the post-World War II period (Anderson, 1960) and consequently, there are no comprehensive records of animal diseases prior to the war.

The I Australian Mobile Veterinary Survey Unit carried out the Territory's first animal disease survey. During World War II several species of domesticated animal (mainly equines and dogs) and at least one species of wild animal (monkey) were brought into the Territory from Asia by the Japanese army, from U.S.A. and Borneo by the U.S.A. army and from Borneo by the Australian army. In addition, there were extensive imports of foodstuffs, animal products and feed. As there are, in these countries, many serious animal diseases which had not been reported from Australia or the Territory of Papua and New Guinea prior to the war, the result of the survey was of particular importance.

The survey did reveal evidence that some diseases had been introduced by the invading armies. These diseases included equine infectious anaemia, surra, epizootic lymphangitis and infectious laryngo-tracheitis. However, slaughter of affected and "in-contact" animals was carried out and in the subsequent twenty years no evidence of them has ever been seen or suspected. They are thus considered to have been eradicated and have not been included in this disease distribution list, but are discussed in more detail below.

EQUINE DISEASES

Three serious equine diseases—equine infectious anaemia, surra and epizootic lymphangitis—were diagnosed in the New Guinea Islands region by Japanese Army veterinarians during World War II. Of these, equine infectious anaemia was confirmed by the I Australian Mobile Veterinary Survey Unit, and although resolving cases of epizootic lymphangitis were seen, the diagnosis could not be confirmed. There is no evidence to suggest that these diseases occurred other than in New Britain and Bougainville.

The Japanese introduced about 4,000 horses into New Britain during the war and about 3,000, or 75%, died from disease. Most deaths were attributed to equine infectious anaemia by the Japanese and to quote the survey report " there can be no hestitation in accepting the Japanese diagnosis of equine infectious anaemia ".

Four cases of surra were diagnosed by the Japanese in Bougainville and these, plus 50 " in-contact " horses, were slaughtered promptly. The 10 horses remaining at Bougainville at the end of the war were slaughtered and showed no evidence of surra on post-mortem examination.

In the areas where equine infectious anaemia, surra and epizootic lymphangitis were diagnosed all horses were slaughtered by the 30th April, 1946. Since then horses have been introduced into these areas, but no evidence of the diseases has been seen or suspected. Wild pigs are presumed to have been in the general area where surra was diagnosed but did not have any contact with the infected or " in-contact " horses, and no evidence of surra has been seen in other animals on Bougainville.

AVIAN DISEASE

It is recorded in the survey report that infectious laryngo-tracheitis was diagnosed by the Japanese Army veterinarians, but as all infected and " in-contact " birds were slaughtered it was probably eradicated. No evidence of its occurrence in the Territory of Papua and New Guinea was seen by the Survey Unit, or by Departmental officers in subsequent years.

NOTES ON THE TERRITORY'S MAJOR ANIMAL DISEASES

The freedom of the Territory's livestock from the serious epizootic diseases has been referred to by Anderson (1960 and 1962). The major livestock diseases and parasites of the Territory are briefly discussed below. They are anthrax, brucellosis, tuberculosis, internal parasites of pigs, *Boophilus microplus* infestation and *Chrysomya bezziana* infestation.

ANTHRAX

This disease is widespread in the Highlands Districts of the Territory of Papua and New Guinea and a further enzootic area of about 100 square miles exists in the Sepik District of the New Guinea mainland region. The predominant domestic animals in the areas involved are pigs, and as yet the disease has only been diagnosed in these animals in the field.

Epizootics of anthrax occur in native-owned grazing pigs each year, usually in the wet season. Mortality rates of up to 25% are common. The disease manifests itself as a local infection of the throat region, which causes a marked inter-mandibular swelling. Treatment with antibiotics is effective and spore vaccine has been shown to be effective in prevention if applied before an outbreak becomes established. Widespread vaccination has not been practised owing to the almost complete lack of animal husbandry in the enzootic areas and the suspicion with which most native owners regard any interference with their animals.

BRUCELLOSIS

The eradication programme for brucellosis in cattle in the Territory of Papua and New Guinea for the period 1956–1963 has been described by Egerton and Rothwell (1963). In this period the percentage of infected herds was reduced from 43·4 in 1956–57 to 1·8 in 1963–63 and the percentage reactors from 11·86 to 0·25. The eradication programme is based on the " Test and Slaughter " method. Strain 19 vaccine has not been used. Testing in 1963–64 revealed 0·054% reactors with 0·53% infected herds.

TUBERCULOSIS

A tuberculosis eradication programme is in progress in the Territory. The percentage of positive reactors has been reduced from 2·3 in 1954–55 to nil in 1963–64, and the percentage of infected herds from 24 to nil. The programme is based on the single intradermal test using the caudal fold.

INTERNAL PARASITES OF PIGS

Virtually all the Territory's pigs are grazed by their native owners on a free-range system. The diet is usually inadequate and the pigs are often heavily infested with internal parasites.

Of most importance are *Metastrongylus* spp., *Stephanurus dentatus*, *Macrocanthorhynchus hirudinaceus*, *Ascaris lumbricoides* and *Oesophagostomum* spp. *Gnathostoma hispidum* is common in some areas.

Little organized attempt is made at present to control internal parasites in pigs. The application of more intensive husbandry is prevented by the general shortage of a readily available economical supply of protein.

BOOPHILUS MICROPLUS INFESTATION

The occurrence and attempted eradication of *Boophilus microplus* in the Territory of Papua and New Guinea has been described by Anderson (1962–63). Eradication has been based on a three-monthly period of weekly spraying with approved tickicides, followed by fifteen months of fortnightly spraying. Approved tickicides at present include Asuntol, Diazinon and DDT. The organic phosphate insecticides are used for two monthly periods, alternated with two-monthly periods using DDT. At the present time most of the New Guinea Mainland and New Guinea Islands region are tick-free and most of Papua tick infested. Eradication in Papua has been complicated by the feral deer population described above.

CHRYSOMYA BEZZIANA INFESTATION

Myiasis due to *C. bezziana* (the screw worm fly) constitutes one of the Territory's major cattle health problems. Infestations have also been recorded in man, sheep, horses, pigs, dogs and cats. The screw worm problem has been reviewed by Norris and Murray (1964). Routine control is based on the regular inspection of stock and treatment of wounds and strikes with insecticidal preparations, of which EQ.335 (a lindane-pine oil smear) is the most popular.

OTHER DISEASES

Of secondary importance at present but of possible future significance are the following :

Mucosal disease of cattle has been diagnosed in one Papuan herd on clinical and serological grounds (French and Snowdon, 1964). It was believed to be responsible for the death of 21 of 54 head in one herd on a property running 300 head of cattle. *Pseudomonas pseudomallei*, the causative organism of melioidosis, was recovered from a tree kangaroo by Egerton (1963). As tree kangaroos are eaten by the indigenous people, the isolation was considered to have some public health significance. Since then the disease has been recorded in cattle (Egerton, 1964), a pig (Rampling, 1964) and a man. Mycotic dermatitis is widely distributed in the Territory of Papua and New Guinea (Egerton, 1964) and is responsible for losses in cattle.

Infestations of dogs with *Dirofilaria immitis* constitutes the Territory's major canine health problem. Transmissible venereal tumours have been frequently recorded in dogs in all regions.

PART II

HOST CHECK LIST

HORSE

Virus disease ..	Papillomatosis*	
Bacterial pathogens ..	*Brucella* sp.†	
	Clostridium tetani (Flugge, 1886) Holland, 1920‡	
	Salmonella paratyphi C (Kayser, 1902) Castellani and Chalmers, 1919	
	Dermatophilus congolensis Van Saceghem, 1915	
Fungal pathogens	——	
Protozoa ..	——	
Trematoda ..	——	
Cestoda	*Anoplocephala perfoliata* (Goeze, 1782)	
Nematoda ..	*Dictyocaulus arnfeldi* (Cobbold, 1884)	AMVSU Report (1946)
	Draschia megastoma (Rudolphi, 1819)	
	Gyalocephalus sp.	
	Habronema microstoma (Schneider, 1866)	AMVSU Report (1946)
	Habronema muscae (Carter, 1861)	
	Oxyurus equi (Schrank, 1788)	
	Parascaris equorum (Goeze, 1782) Yorke and Maplestone, 1926	AMVSU Report (1946)
	Strongyloides westeri Ihle, 1917	AMVSU Report (1946)
	Strongylus edentatus (Looss, 1900)	AMVSU Report (1946)
	Strongylus equinus Mueller, 1780	AMVSU Report (1946)
	Strongylus vulgaris (Looss, 1900)	AMVSU Report (1946)
	Trichonema sp.	
	Triodontophorus sp.	
	Triodontophorus serratus (Looss, 1900)	AMVSU Report (1946)
Acarina	*Ambylomma triguttatum* Koch, 1884	
	Boophilus microplus (Canestrini, 1887)	AMVSU Report (1946)
	Haemaphysalis novae-guineae Hirst, 1914	
	Sarcoptes scabiei (Linnaeus, 1758)	AMVSU Report (1946)
	Trombicula sp.	
Siphonaptera ..	*Tyroglyphus* sp.	AMVSU Report (1946)
Anoplura ..	——	
Diptera	*Chrysomya bezziana* Villeneuve	Norris, K. R., and Murray, M.D. (1964)
	Chrysomya megacephala Fabricius	AMVSU Report (1946)
	Chrysomya micropogon Bigot	AMVSU Report (1946)
	Gastrophilus intestinalis (de Geer, 1776)	
	Gastrophilus nasalis (Linnaeus, 1761)	
	Musca vetustissima Walker	AMVSU Report (1946)
	Siphona exigua (de Meijere, 1903)	AMVSU Report (1946)
	Stomoxys calcitrans Geoffroy, 1764	

* Histological diagnosis.
† Serological diagnosis.
‡ Clinical diagnosis.

OX

Virus disease ..	Ephemeral fever*	
	Mucosal disease†	French, E. L., and Snowdon, W. A. (1964)
	Papillomatosis‡	
Bacterial pathogens ..	*Actinobacillus lignierisi* Brumpt, 1910	
	Actinomyces sp.	
	Brucella abortus (Schmidt and Weiss, 1901) Meyer and Shaw, 1920	Egerton, J. R., and Rothwell, T. L. W. (1963)
	Corynebacterium pyogenes (Glage, 1903) Eberson, 1918	
	Dermatophilus congolensis Van Saceghem, 1915	
	Escherichia coli (Migula, 1895) Castellani and Chalmers, 1919	
	Leptospira sp.†	Wannan, J. S. (1955, 1961) Forbes, B. R. V., and Wannan, J. S. (1958)
	Listeria monocytogenes (Murray *et al.*, 1926) Pirie, 1940	
	Mycobacterium tuberculosis (Zopf, 1883) Lehmann and Neumann, 1896	AMVSU Report (1946)
	Nocardia sp.	
	Pasteurella multocida (Lehmann and Neumann, 1899) Rosenbusch and Merchant, 1939	
	Pseudomonas pseudomallei (Whitmore, 1913)	Egerton, J. R. (1964*a*)
	Pseudomonas aeruginosa (Schroeter, 1872) Migula, 1900	
	Salmonella spp.	
	Sphaerophorus necrophorus (Flugge, 1886) Prevot, 1938	
	Staphylococcus aureus Rosenbach, 1884	
	Streptococcus zooepidemicus Frost and Engelbrecht, 1936	
	Streptococcus sp.	
	Vibrio fetus Smith and Taylor, 1919	Egerton, J. R. (1963*a*)
Fungal pathogens	*Rhinosporidium seeberi** (Wernicke) Seeber, 1912	
Protozoa ..	*Anaplasma marginale* Theiler, 1910	
	Babesia argentina Lignieres, 1901	
	Babesia bigemina (Smith and Kilborne, 1893)	
	Eimeria auburnensis Christesen and Porter, 1939	
	Eimeria bovis (Zublin, 1908)	
	Eimeria zurnii (Rivolta, 1878)	
	Theileria sp.	Legg, J. (1961)
Trematoda ..	*Calicophoron calicophorum* (Fischoeder, 1901 ; Nasmark, 1937)	
	Fasciola hepatica Linnaeus, 1758	
	Paramphistomum sp.	
Cestoda	*Echinococcus granulosus* (cyst) (Batsch, 1786)	AMVSU Report (1946)
	Moniezia expansa (Rudolphi, 1810)	
Nematoda ..	*Bunostomum phlebotomum* (Railliet, 1900)	
	Cooperia sp.	
	Cooperia punctata (v. Linstow, 1907)	
	Dictyocaulus viviparus (Bloch, 1782)	
	Haemonchus contortus (Rudolphi, 1803)	AMVSU Report (1946)
	Mecistocirrus digitatus (v. Linstow, 1906)	AMVSU Report (1946)
	Nematodirus sp.	
	Neoascaris vitulorum (Goeze, 1782) Travassos, 1927	Rothwell, T. L. W. (1962–63)
	Oesophagostomum radiatum (Rudolphi, 1803)	
	Onchocerca gibsoni Cleland and Johnston, 1910	
	Ostertagia sp.	

* Clinical diagnosis.
† Serological diagnosis.
‡ Histological diagnosis

	Strongyloides papillosus (Wedl, 1856)	
	Trichostrongylus axei (Cobbold, 1879)	
	Trichurus globulosa (v. Linstow, 1901)	
Acarina	*Amblyomma cyprium cyprium* Neumann	Roberts, F. H. S., pers. comm.
	Amblyomma triguttatum Koch, 1884	Roberts, F. H. S., pers. comm.
	Aponomma sp.	
	Boophilus microplus (Canestrini, 1887)	AMVSU Report (1946) Anderson, J. L. (1962–63)
	Haemaphysalis spp.	
	Haemaphysalis novae-guineae Hirst, 1914	Roberts, F. H. S., pers. comm.
	Ixodes sp.	
	Ixodes confusus Roberts, 1960	Roberts, F. H. S., pers. comm.
	Rhipicephalus sanguineus (Latreille, 1804)	AMVSU Report (1946)
Anoplura . .	*Haematopinus eurysternus* (Nitzsch, 1818)	AMVSU Report (1946)
	Haematopinus quadripertussis (Fahrenholz, 1916)	Roberts, F. H. S. (1950)
Diptera	*Chrysomya bezziana* Villeneuve	Anderson, J. L., and Catley, A. (1961) Legg, J. (1961) Norris, K. R., and Murray, M. D. (1964)
	Chrysomya megacephala Fabricius	AMVSU Report (1946)
	Chrysomya micropogon Bigot	AMVSU Report (1946)
	Chrysomya rufifacies Macq.	
	Musca vetustissima Walker	AMVSU Report (1946)
	Siphona exigua (de Meijere, 1903)	AMVSU Report (1946)
	Stomoxys calcitrans Geoffroy, 1764	AMVSU Report (1946)
	Tabanus sp.	AMVSU Report (1946)
	Tabanus ceylonicus Schiner	

PIG

Virus diseases . .	Papillomatosis	
Bacterial pathogens . .	*Actinobacillus lignierisi* Brumpt, 1872, 1910	
	Bacillus anthracis Cohn, 1872	AMVSU Report (1946)
	Clostridium perfringens (Veillon and Zuber, 1898) Holland, 1920	
	Corynebacterium equi Magnusson, 1923	
	Corynebacterium pyogenes (Glage, 1903) Eberson, 1918	
	Erysipelothrix insidiosa (Trevisan, 1885) Langford and Hansen, 1953	
	Escherichia coli (Migula, 1895) Castellani and Chalmers, 1919	
	Klebsiella pneumoniae (Schroeter, 1886) Trevisan, 1887	
	Leptospira spp.*	Emmanuel, Marie L. (1959)
	Pasteurella multocida (Lehmann and Neumann, 1899) Rosenbusch and Merchant, 1939	
	Pseudomonas pseudomallei (Whitmore, 1913)	Rampling, A. M. (1964)
	Pseudomonas aeruginosa (Schroeter, 1872) Migula, 1900	
	Salmonella sp.	
	Salmonella anatum Rettger and Scoville, 1919, 1920	
	Salmonella bareilly Bridges and Scott, 1931	
	Salmonella cholerae-suis (Smith, 1894) Weldin, 1927	
	Salmonella infantis Wheeler and Borman, 1943	
	Salmonella london White, 1926	
	Staphylococcus aureus Rosenbach, 1884	
	Streptococcus sp.	

* Serological diagnosis.

Fungal pathogens	——	
Protozoa ..	*Eimeria debliecki* Douwes, 1921	
	Eimeria scabra Henry, 1931	
	Isospora suis Biester, 1934	AMVSU Report (1946)
Trematoda ..	——	
Cestoda	——	
Nematoda ..	*Ascarops dentata* (v. Linstow, 1904)	AMVSU Report (1946)
	Ascarops strongylina (Rudolphi, 1819)	AMVSU Report (1946)
	Ascaris lumbricoides Linnaeus, 1758	AMVSU Report (1946)
	Bourgelatia diducta Railliet, Henry and Bauche, 1919	AMVSU Report (1946)
	Globocephalus spp.	AMVSU Report (1946)
	Gnathostoma hispidum Fedschenko, 1872	AMVSU Report (1946)
	Hyostrongylus rubidus (Hassal and Stiles, 1892)	
	Metastrongylus apri (Gmelin, 1790)	AMVSU Report (1946)
	Metastrongylus pudendotectus (Wostokow, 1905)	AMVSU Report (1946)
	Metastrongylus salmi Gedoelst, 1923	
	Necator sp.	
	Oesophagostomum dentatum (Rudolphi, 1803)	
	Oesophagostomum quadrispinulatum (Marone, 1901)	AMVSU Report (1946)
	Physocephalus sexalatus (Molin, 1860)	AMVSU Report (1946)
	Setaria congolensis Railliet and Henry, 1911	
	Simondsia paradoxa Cobbold, 1864	
	Stephanurus dentatus Diesing, 1839	AMVSU Report (1946)
	Strongyloides spp.	
	Trichuris trichiura (Linnaeus, 1771)	AMVSU Report (1946)
Acanthocephala	*Macrocanthorhynchus hirudinaceus* (Pallas, 1871)	AMVSU Report (1946)
Acarina	*Ambylomma* spp.	AMVSU Report (1946)
	Haemaphysalis novae-guineae Hirst, 1914	
	Sarcoptes scabiei (Linnaeus, 1758)	AMVSU Report (1946)
Siphonaptera ..	*Ctenocephalides felis* (Bouché, 1835)	
Anoplura ..	*Haematopinus suis* (Linnaeus, 1758)	AMVSU Report (1946)
Diptera	*Chrysomya bezziana* Villeneuve	Norris, K. D., and Murray, M. D. (1964)
	Tabanus ceylonicus Schiner	

SHEEP

Virus diseases ..	——	
Bacterial pathogens ..	*Corynebacterium pseudo-tuberculosis* (Buchanan, 1911) Eberson, 1918	
	Pseudomonas aeruginosa (Schroeter, 1872) Migula, 1900	
Fungal pathogens	——	
Protozoa ..	——	
Trematoda ..	*Fasciola hepatica* Linnaeus, 1758	
Cestoda	*Cysticercus tenuicollis* Rudolphi, 1810	
	Moniezia expansa (Rudolphi, 1810)	
Nematoda ..	*Bunostomum trigonocephalum* (Rudolphi, 1808)	
	Cooperia sp.	
	Haemonchus contortus (Rudolphi, 1803)	AMVSU Report (1946)
	Nematodirus sp.	
	Oesophagostomum columbianum (Curtice, 1890)	
	Strongyloides papillosus (Wedl, 1856)	
	Trichostrongylus colubriformis (Giles, 1892)	
	Trichuris globulosa (v. Linstow, 1901)	

Acarina	*Trombicula* spp.	AMVSU Report (1946)
Siphonaptera ..	——	
Anoplura ..	*Damalinia ovis* (Linnaeus, 1758)	
Diptera	*Chrysomya bezziana* Villeneuve	Norris, K. R., and Murray, M. D. (1964)
	Chrysomya rufifacies Macq.	
	*Oestrus ovis** Linnaeus, 1761	
	Stomoxys calcitrans Geoffroy, 1764	

GOAT

Virus diseases ..	——	
Bacterial pathogens ..	*Corynebacterium pyogenes* (Glage, 1903) Eberson, 1918	
	Dermatophilus congolensis Van Saceghem, 1915	
	Leptospira sp.†	Emmanuel, Marie L. (1959)
	Mycoplasma sp.	
Fungal pathogens		
Protozoa ..	*Eimeria arloingi* Marotel, 1905	
	Eimeria faurei Moussu and Marotel, 1901	
	Eimeria intricata Speigl, 1925	
	Eimeria parva Kotlan, Mocsya and Vajda, 1929	
Trematoda ..	*Fasciola hepatica* Linnaeus, 1758	
Cestoda	*Moniezia expansa* (Rudolphi, 1810)	
Nematoda ..	*Bunostomum trigonocephalum* (Rudolphi, 1808)	
	Cooperia sp.	
	Haemonchus contortus (Rudolphi, 1803)	AMVSU Report (1946)
	Nematodirus sp.	
	Nematodirus spathiger (Railliet, 1896)	
	Oesophagostomum asperum Railliet and Henry, 1913	
	Oesophagostomum columbianum (Curtice, 1890)	
	Oesophagostomum venulosum (Rudolphi, 1809)	
	Strongyloides papillosus (Wedl, 1856)	
	Trichostrongylus colubriformis (Giles, 1892)	
	Trichuris globulosa (v. Linstow, 1901)	
	Trichuris ovis (Abildgaard, 1795)	
Acarina	*Boophilus microplus* (Canestrini, 1887)	
Siphonaptera ..	——	
Anoplura ..	*Damalinia caprae* (Gurlt, 1843)	AMVSU Report (1946)
	Linognathus stenopsis (Burmeister, 1838)	
Diptera	*Chrysomya bezziana* Villeneuve	

* Seen in one imported sheep; not believed to be established.
† Serological diagnosis.

DOG

Virus diseases ..	Canine distemper†	
	Infectious canine hepatitis‡	
	Papillomatosis†	
Bacterial pathogens ..	*Clostridium tetani*† (Flugge, 1886) Holland, 1920	
	Leptospira sp.*	Emmanuel, Marie L. (1959)
	Nocardia sp.	
	Pasteurella multocida (Lehmann and Neumann, 1899), Rosenbusch and Merchant, 1939)	
	Pseudomonas aeruginosa (Schroeter, 1872) Migula, 1900	
	Staphylococcus aureus Rosenbuch, 1884	
	Streptococcus sp.	
Fungal pathogens	*Microsporum canis* (Bodin, 1902)	
Protozoa ..	——	
Trematoda ..	——	
Cestoda	*Dipylidium caninum* (Linnaeus, 1758)	AMVSU Report (1946)
Nematoda ..	*Ancylostoma caninum* (Ercolani, 1859)	AMVSU Report (1946)
	Dirofilaria immitis (Leidy, 1856)	AMVSU Report (1946) Abbott, P. K. (1961)
	Spirocerca lupi (Rudolphi, 1809)	Egerton, J. R., and Rothwell, T. L. W. (1959)
	Toxascaris leonina (v. Linstow, 1902) Leiper, 1907	
	Toxocara canis (Werner, 1782)	AMVSU Report (1946)
	Trichuris vulpis (Frohlich, 1789)	
Acarina	*Boophilus microplus* (Canestrini, 1887)	
	Demodex canis Leydig, 1859	AMVSU Report (1946)
	Ixodes sp.	
	Otodectes cynotis (Hering, 1838)	
	Rhipicephalus sanguineus (Latreille, 1804)	AMVSU Report (1946)
	Sarcoptes scabiei (Linnaeus, 1758)	AMVSU Report (1946)
	Tyroglyphus spp.	AMVSU Report (1946)
Siphonaptera ..	*Ctenocephalides canis* (Curtis, 1826)	
	Ctenocephalides felis (Bouché, 1835)	
Anoplura ..	*Heterodoxus longitarsus* (Piaget, 1880)	AMVSU Report (1946)
	Trichodectes canis (de Geer, 1778)	
Diptera	*Chrysomya bezziana*, Villeneuve	
	Siphona exigua (de Meijere, 1903)	AMVSU Report (1946)

CAT

Virus diseases ..	Panleucopenia†	
	Pneumonitis†	
Bacterial pathogens ..	*Klebsiella pneumoniae* (Schroeter, 1886) Trevisan, 1887	
	Salmonella san diego Kauffmann, 1940	
	Streptococcus sp.	
Fungal pathogens	*Microsporum canis* (Bodin, 1902)	
Protozoa ..	——	
Trematoda ..	*Platynosum concinnum* (Braun, 1901)	

† Clinical diagnosis.
‡ Histological diagnosis.
* Serological diagnosis

Cestoda	*Diphyllobothrium erinacei* (Rudolphi, 1819) *Dipylidium caninum* (Linnaeus, 1758) *Taenia taeniaformis* (Batsch, 1786)	
Nematoda ..	*Ancylostoma braziliense* Gomez de Faria, 1910 *Ancylostoma caninum* (Ercolani, 1859) *Dirofilaria immitis* (Leidy, 1856) *Toxocara* sp.	
Acarina	*Notoedres cati* (Hering, 1838) *Otodectes cynotis* (Hering, 1838)	Rothwell, T. L. W. (1961)
Siphonaptera ..	*Ctenocephalides felis* (Bouché, 1835)	
Anoplura ..	*Felicola subrostrata* (Nitzsch, 1838)	
Diptera	*Chrysomya bezziana* Villeneuve	

FOWL

Virus diseases ..	Avian leucosis Encephalomyelitis Fowl pox	Rothwell, T. L. W. (1962–63)
Bacterial pathogens ..	*Clostridium botulinum** (van Ermengem, 1896) Holland, 1920 *Escherichia coli* (Migula, 1895) Castellani and Chalmers, 1919 *Mycoplasma gallinarum* Freundt, 1955 *Salmonella* sp. *Salmonella pullorum* *Staphylococcus aureus* Rosenbach, 1884 *Streptococcus* sp.	
Fungal pathogens	*Aspergillus fumigatus* Fresenius, 1850–53 *Candida albicans* (Robin) Berkhaut, 1923	Rothwell, T. L. W. (1962–63)
Protozoa ..	*Eimeria acervulina* Tyzzer, 1929 *Eimeria maxima* Tyzzer, 1929 *Eimeria mitis* Tyzzer, 1929 *Eimeria necatrix* Johnson, 1930 *Eimeria tenella* Railliet and Lucet, 1891	
Trematoda ..	——	
Cestoda	*Davainea proglottina* (Davaine, 1860) *Raillietina cesticillus* (Molin, 1858) *Raillietina tetragona* (Molin, 1858) *Raillietina echinobothrida* (Megnin, 1880)	
Nematoda ..	*Acuaria hamulosa* (Deising, 1851) *Acuaria spiralis* (Molin, 1858) *Ascaridia galli* (Schrank, 1788) *Capillaria* sp. *Capillaria columbae* (Rudolphi, 1819) *Gongylonema ingluvicola* Ransom, 1904 *Heterakis gallinae* (Gmelin, 1790) *Oxyspirura mansoni* (Cobbold, 1879) *Tetrameres* sp. *Trichostrongylus tenuis* (Mehlis, 1846)	AMVSU Report (1946) Rothwell, T. L. W. (1961) AMVSU Report (1946) AMVSU Report (1946)
Acarina	*Cnemidocoptes mutans* (Robin, 1860) *Cytoleichus nudus* (Vizioli, 1868) *Liponyssus bursa* (Berlese, 1888) *Megninia cubitalis* (Megnin, 1877)	AMVSU Report (1946)
Siphonaptera ..	——	

* Clinical diagnosis.

Anoplura ..	*Goniocotes gallinae* (de Geer, 1776)	
	Gonioides dissimilis Nitzsch, 1842	AMVSU Report (1946)
	Lipeurus caponis (Linnaeus, 1758)	AMVSU Report (1946)
	Menopon gallinae (Linnaeus, 1758)	AMVSU Report (1946)

DUCK

Virus diseases ..	——	
Bacterial pathogens ..	*Clostridium botulinum** (van Ermengem, 1896) Holland, 1920	
	Listeria monocytogenes (Murray *et al.*, 1926) Pirie, 1940	
	Pasteurella multocida (Lehmann and Neumann, 1899) Rosenbusch and Merchant, 1939	
Fungal pathogens	——	
Protozoa ..	——	
Trematoda ..	*Cotylurus cornutus* (Rud, 1809)	
	Echinostoma revolutum (Frohlich, 1802)	
	Echinoparyphium paraulum (Dietz, 1909)	
	Echinoparyphium recurvatum (v. Linstow, 1873)	
	Hypoderaeum conoideum (Bloch, 1872)	
	Notocotylus attenuatus (Rudolphi, 1809)	

TURKEY

Virus diseases ..	Fowl pox	
Bacterial pathogens ..	*Mycoplasma gallinarum** Freundt, 1955	
Protozoa ..	*Histomonas meleagridis* (Smith, 1895)	

GUINEA-PIG

Bacterial pathogens ..	*Salmonella weltevreden* Erber, 1941	Egerton, J. R., and Rampling, A. M. (1963)

WALLABY

Bacterial pathogens ..	*Actinobacillus* sp.	
	Nocardia asteroides (Eppinger, 1891) Blanchard, 1895	Egerton, J. R., and Larcher, A. M. (1963)
Nematoda ..	*Breinlia* sp.	
Anoplura ..	*Heterodoxus longitarsus* (Piaget, 1880)	AMVSU Report (1946)
	Lignognathus stenopsis (Burmeister, 1838)	
Acarina	*Haemaphysalis novae-guineae* Hirst, 1914	
	Ixodes sp.	
	Ixodes cordifer Neumann, 1908	

TREE-CLIMBING KANGAROO

Bacterial pathogens ..	*Pseudomonas pseudomallei* (Whitmore, 1913)	Egerton, J. R. (1963*b*)
Nematoda ..	*Breinlia dendrolagi*, Solomon, 1933	Solomon, S. G. (1933)

* Clinical diagnosis.

PART III

REGIONAL DISTRIBUTION OF INFECTIOUS DISEASES AND PARASITES

The Territory of Papua and New Guinea has been divided into three regions, as follows :

Papua (PAP)—The Territory of Papua.

New Guinea Mainland (NGM)—The north-eastern portion of the mainland of New Guinea.

New Guinea Islands (NGI)—Manus Island, New Island, New Britain, Bougainville and other lesser islands.

The New Guinea Mainland and the New Guinea Islands together constitute the Trust Territory of New Guinea.

P = Present.

PR = Present but rare.

GP = Genus identified.

— = Not recorded.

VIRUS DISEASES

Disease	Host	PAP	NGM	NGI
Distemper	Dog	P	P	P
Encephalomyelitis	Fowl	P	P	—
Ephemeral fever	Cattle	P	—	—
Fowl pox	Fowl	P	P	P
	Turkey	—	P	—
Infectious hepatitis	Dog	P	P	P
Leucosis complex	Fowl	P	P	P
Mucosal disease	Cattle	P	—	—
Panleucopenia	Cat	P	P	P
Papillomatosis	Cattle	P	P	P
	Dog	P	P	P
	Pig	—	P	—
	Horse	—	P	—
Pneumonitis	Cat	P	P	P

BACTERIAL PATHOGENS

Organism	Host	PAP	NGM	NGI
Actinobacillus	Wallaby	GP	—	—
A. lignierisi	Cattle	P	—	—
	Pig	P	—	—
Actinomyces	Cattle	GP	—	—
Bacillus				
B. anthracis	Pig	P	P	—
Brucella				
B. abortus	Cattle	PR	PR	PR
	Horse	PR	—	PR
Clostridium				
C. botulinum	Fowl	—	P	—
	Duck	P	P	—
C. perfringens	Pig	—	P	—
C. tetani	Horse	P	P	—
	Dog	P	P	—
Corynebacterium				
C. equi	Pig	P	—	—
C. pseudotuberculosis	Sheep	PR	PR	—
C. pyogenes	Cattle	P	P	—
	Goat	P	—	—
	Pig	P	—	—
Dermatophilus congolensis	Cattle	P	P	P
	Goat	P	—	—
	Horse	P	—	—
Erysipelothrix				
E. insidiosa	Pig	P	—	—
Escherichia				
E. coli	Cattle	P	P	P
	Fowl	P	P	P
	Pig	P	P	P
Klebsiella				
K. pneumoniae	Pig	P	P	—
	Cat	P	—	—
Leptospira	Cattle	GP	GP	—
	Dog	GP	GP	—
	Goat	GP	—	—
	Pig	GP	GP	GP
Listeria				
L. monocytogenes	Cattle	P	—	—
	Duck	P	—	—
Mycobacterium				
M. tuberculosis	Cattle	PR	PR	PR

BACTERIAL PATHOGENS—Continued

Organism	Host	PAP	NGM	NGI
Mycoplasma	Goat	GP	—	—
M. gallinarum	Fowl	—	P	—
	Turkey	—	P	—
Nocardia	Cattle	GP	—	—
	Dog	GP	—	—
N. asteroides	Wallaby	P	—	—
Pasteurella				
M. multocida	Cattle	P	—	—
	Dog	P	—	—
	Duck	—	P	—
	Pig	P	—	—
Pseudomonas				
P. pseudomallei	Cattle	PR	—	—
	Pig	P	—	—
	Tree - climbing kangaroo	P	—	—
P. aeruginosa	Cattle	—	P	—
	Dog	P	P	—
	Pig	P	—	—
	Sheep	—	P	—
Salmonella	Cattle	GP	GP	GP
	Fowl	GP	—	—
	Pig	GP	GP	GP
S. anatum	Pig	P	P	—
S. bareilly	Pig	P	—	—
S. cholerae-suis	Pig	P	—	—
S. infantis	Pig	P	—	—
S. london	Pig	—	P	—
S. paratyphi C	Horse	—	—	P
S. pullorum	Fowl	P	P	—
S. san diego	Cat	P	—	—
S. weltevreden	Guinea-pig	P	—	—
Spherophorus				
S. necrophorus	Cattle	P	P	—
Staphylococcus				
S. aureus	Cattle	P	P	P
	Dog	P	P	P
	Fowl	P	P	—
	Pig	P	P	P
Streptococcus	Cat	GP	—	—
	Cattle	GP	GP	—
	Dog	GP	GP	—
	Fowl	GP	—	—
	Pig	GP	GP	—
S. zooepidemicus	Cattle	P	P	—
Vibrio				
V. fetus	Cattle	P	—	—

FUNGAL PATHOGENS

Organism	Host	PAP	NGM	NGI
Aspergillus				
A. fumigatus	Fowl	P	P	—
Candida				
C. albicans	Fowl	P	P	—
Microsporum				
M. canis	Dog	P	P	P
	Cat	P	P	P
Rhinosporidium				
R. seeberi	Cattle	—	P	—

PROTOZOA

Organism	Host	PAP	NGM	NGI
Anaplasma				
A. marginale	Cattle	P	—	—
Babesia	Cattle	GP	GP	GP
B. argentina	Cattle	—	P	—
B. bigemina	Cattle	P	P	—
Eimeria				
E. acervulina	Fowl	P	P	P
E. arloingi	Goat	P	—	—
E. auburnensis	Cattle	—	—	P
E. bovis	Cattle	P	—	—
E. debliecki	Pig	P	—	—
E. faurei	Goat	P	—	—
E. intricata	Goat	P	—	—
E. maxima	Fowl	P	P	P
E. mitis	Fowl	P	—	—
E. necatrix	Fowl	P	P	P
E. parva	Goat	P	—	—
E. scabra	Pig	—	P	—
E. tenella	Fowl	P	P	P
E. zurnii	Cattle	—	—	P
Histomonas				
H. meleagridris	Turkey	P	—	—
Isospora				
I. suis	Pig	P	—	—
Theileria	Cattle	GP	—	—

TREMATODA

Organism	Host	PAP	NGM	NGI
Calicophoron				
C. calicophorum	Cattle	P	P	—
Cotylurus				
C. cornutus	Wild duck	P	—	—
Echinoparyphium				
E. paraulum	Wild duck	P	—	—
E. recurvatum	Wild duck	P	—	—
Echinostoma				
E. revolutum	Wild duck	P	—	—
Fasciola				
F. hepatica	Cattle	PR	P	—
	Sheep	—	P	—
	Goat	—	P	—
Hypoderaeum				
H. conoideum	Wild duck	P	—	—
Notocotylus				
N. attenuatus	Wild duck	P	—	—
Paramphistomum	Cattle	GP	GP	GP
Platynosum				
P. concinnum	Cat	PR	—	—

CESTODA

Organism	Host	PAP	NGM	NGI
Anoplocephala				
A. perfoliata	Horse	—	PR	—
Cysticercus				
C. fasciolaris	Rat	P	—	—
C. tenuicollis	Sheep	—	PR	—
Davainea				
D. proglottina	Fowl	—	P	—
Diphyllobothrium				
D. erinacei	Cat	P	P	—
Dipylidium				
D. caninum	Cat	P	—	—
	Dog	P	P	P
Echinococcus				
E. granulosus (hydatid) ..	Cattle	PR	—	—
Moniezia				
M. expansa	Cattle	P	P	—
	Sheep	P	P	—
	Goat	P	P	—
Raillietina				
R. cesticillus	Fowl	P	P	—
R. echinobothrida	Fowl	P	P	—
R. tetragona	Fowl	P	P	—
Taenia				
T. taeniaeformis	Cat	PR	PR	—

NEMATODA

Organism	Host	PAP	NGM	NGI
Acuaria				
A. hamulosa	Fowl	—	P	—
A. spiralis	Fowl	P	P	—
Ancylostoma ..				
A. braziliense	Cat	P	—	—
A. caninum	Cat	P	—	—
	Dog	P	P	P
Ascarops	Pig	—	—	GP
A. dentata	Pig	P	P	P
A. strongylina	Pig	P	P	—
Ascaris				
A. lumbricoides	Pig	P	P	P
Ascaridia				
A. columbae	Pigeon	P	—	—
A. galli	Fowl	P	P	P
Bourgelatia				
B. diducta	Pig	—	P	—
Breinlia	Wallaby	GP	—	—
B. dendrolagi	Tree - climbing kangaroo	—	P	—
Bunostomum				
B. phlebotomum	Cattle	P	P	P
B. trigonocephalum	Goat	—	P	—
	Sheep	—	P	—
Capillaria	Fowl	—	GP	—
C. columbae	Fowl	P	P	—
	Pigeon	P	—	—
C. longicollis	Pigeon	P	—	—

NEMATODA—Continued

Organism	Host	PAP	NGM	NGI
Cooperia	Cattle	GP	GP	—
	Goat	GP	—	—
	Sheep	—	GP	—
C. punctata	Cattle	P	P	—
Dictyocaulus				
D. arnfeldi	Horse	—	P	—
D. viviparus	Cattle	P	P	—
Dirofilaria				
D. immitis	Dog	P	P	P
	Cat	P	—	—
Draschia				
D. megastoma	Horse	P	—	—
Globocephalus	Pig	—	GP	GP
Gongylonema				
G. ingluvicola	Fowl	—	PR	—
Gnathostoma				
G. hispidum	Pig	P	P	P
Gyalocephalus	Horse	GP	—	—
Habronema				
H. muscae	Horse	P	P	—
H. microstoma	Horse	P	—	P
Haemonchus				
H. contortus	Buffalo	—	P	—
	Cattle	P	P	P
	Goat	P	P	—
	Sheep	—	P	—
Heterakis				
H. gallinae	Fowl	P	P	P
Hyostrongylus				
H. rubidus	Pig	—	P	—
Mecistocirrus				
M. digitatus	Cattle	—	P	—
Metastrongylus				
M. apri	Pig	P	P	P
M. pudendotectus	Pig	P	P	P
M. salmi	Pig	P	P	—
Necator	Pig	—	GP	—
Nematodirus	Cattle	GP	GP	—
	Goat	GP	—	—
	Sheep	GP	GP	—
N. spathiger	Goat	P	—	—
Neoascaris				
N. vitulorum	Cattle	—	P	—
Oesophagostomum				
O. asperum	Goat	—	P	—
O. columbianum	Goat	P	P	—
	Sheep	P	P	—
O. dentatum	Pig	P	P	—
O. quadrispinulatum	Pig	P	P	P
O. radiatum	Cattle	P	P	P
O. venulosum	Goat	P	P	—
Onchocerca				
O. gibsoni	Cattle	P	P	P
Ornithostrongylus				
O. quadriradiatus	Pigeon	P	—	—
Ostertagia	Cattle	GP	—	—
Oxyspirura				
O. mansoni	Fowl	P	P	—
Oxyuris				
O. equi	Horse	P	P	P
Parascaris				
P. equorum	Horse	—	P	—
Physocephalus				
P. sexalatus	Pig	P	P	P
Setaria				
S. congolensis	Pig	P	P	P

NEMATODA—Continued

Organism	Host	PAP	NGM	NGI
Simondsia				
S. paradoxa	Pig	P	P	—
Spirocerca				
S. lupi	Dog	P	—	P
Stephanurus				
S. dentatus	Pig	P	P	P
Strongyloides	Cattle	GP	GP	—
	Pig	GP	GP	—
S. papillosus	Cattle	P	P	P
	Goat	P	P	—
	Sheep	P	—	—
S. westeri	Horse	—	P	—
Strongylus				
S. equinus	Horse	P	P	P
S. edentatus	Horse	P	P	P
S. vulgaris	Horse	P	P	P
Tetrameres	Fowl	GP	GP	—
Toxascaris				
T. leonina	Dog	—	P	—
Toxocara	Cat	GP	—	—
T. canis	Dog	P	P	P
Trichonema	Horse	GP	—	—
Trichostrongylus				
T. axei	Cattle	P	P	—
T. colubriformis	Goat	—	P	—
	Sheep	—	P	—
T. tenuis	Fowl	P	—	—
	Pigeon	P	—	—
Trichuris				
T. globulosa	Cattle	P	P	—
	Goat	P	P	—
	Sheep	—	P	—
T. ovis	Goat	—	P	—
T. trichiura	Pig	P	P	P
T. vulpis	Dog	P	P	—
Triodontophorus	Horse	GP	GP	—
T. serratus	Horse	—	—	P

ACANTHOCEPHALA

Organism	Host	PAP	NGM	NGI
Macrocanthorynchus				
M. hirudinaceus	Pig	P	P	P

ACARINA

Organism	Host	PAP	NGM	NGI
Ambylomma	Pig	GP	—	GP
A. cyprium cyprium ..	Cattle	P	P	P
	Deer	P	—	—
A. triguttatum	Cattle	P	—	—
	Horse	—	P	—
Aponomma	Cattle	GP	—	—

ACARINA—Continued

Organism	Host	PAP	NGM	NGI
Boophilus				
B. microplus	Cattle	P	P	P
	Deer	P	—	P
	Dog	P	—	—
	Goat	P	P	P
	Horse	—	P	—
Cnemidocoptes				
C. mutans	Canary	P	—	—
	Fowl	P	P	—
Cytoleichus				
C. nudus	Fowl	—	P	—
Demodex				
D. canis	Dog	P	P	P
Haemaphysalis	Cattle	GP	GP	—
H. novae-guineae	Cattle	P	P	—
	Horse	P	P	—
	Pig	—	P	—
	Wallaby	P	P	P
Ixodes	Cattle	GP	GP	GP
	Dog	GP	GP	GP
	Wallaby	GP	GP	GP
I. confusus	Cattle	P	—	—
I. cordifer	Wallaby	P	P	—
Liponyssus				
L. bursa	Fowl	P	P	P
Megninia				
M. cubitalis	Fowl	P	—	—
Notoedres				
N. cati	Cat	P	P	—
Otodectes				
O. cynotis	Cat	P	—	—
	Dog	P	P	P
Rhipicephalus				
R. sanguineus	Cattle	P	P	—
	Dog	P	P	P
Sarcoptes				
S. scabiei	Dog	P	P	P
	Horse	—	—	P
	Pig	P	P	P
Trombicula	Horse	—	GP	—
	Sheep	—	GP	—
Tyroglyphus	Horse	—	—	GP
	Dog	—	—	GP

SIPHONAPTERA

Organism	Host	PAP	NGM	NGI
Ctenocephalides				
C. canis	Dog	P	P	P
C. felis	Cat	P	P	—
	Dog	P	—	—
	Pig	P	P	—

ANOPLURA

Organism	Host	PAP	NGM	NGI
Damalinia				
D. caprae	Goat	P	P	P
D. ovis	Sheep	—	P	—
Felicola				
F. subrostrata	Cat	P	—	—
Goniocotes				
G. gallinae	Fowl	P	—	—
Gonioides				
G. dissimilis	Fowl	P	P	P
Haematopinus				
H. eurysternus	Cattle	P	—	—
H. quadripertussis	Cattle	—	—	P
H. suis	Pig	P	P	P
Heterodoxus				
H. longitarsus	Dog	P	—	—
	Wallaby	P	—	—
Linognathus				
L. stenopsis	Goat	P	P	—
	Wallaby	P	—	—
Lipeurus				
L. caponis	Fowl	P	P	P
Menopon				
M. gallinae	Fowl	P	P	—
Trichodectes				
T. canis	Dog	P	—	—

DIPTERA

Organism	Host	PAP	NGM	NGI
Chrysomya				
C. bezziana	Cat	P	P	P
	Cattle	P	P	P
	Dog	P	P	P
	Goat	P	P	—
	Horse	P	P	P
	Pig	P	P	P
	Sheep	P	P	—
C. megacephala	Cattle	P	P	—
	Horse	P	—	—
C. micropogon	Cattle	P	P	—
	Horse	P	—	—
C. rufifacies	Cattle	P	—	—
	Sheep	P	—	—
Gastrophilus				
G. intestinalis	Horse	P	P	—
G. nasalis	Horse	P	P	—
Musca				
M. vetustissima	Cattle	P	P	—
	Horse	P	P	—
Oestrus				
O. ovis	Sheep	—	PR	—
Siphona				
S. exigua	Cattle	P	P	P
	Dog	—	P	—
	Horse	—	P	—
Stomoxys				
S. calcitrans	Cattle	—	P	—
	Horse	—	P	—
	Sheep	—	P	—
Tabanus	Cattle	GP	—	—
T. ceylonicus	Cattle	P	P	—
	Pig	P	—	—

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