

THE ANIMAL HEALTH STATUS OF KIRIBATI

by

Peter Saville
Animal Health Adviser

INTRODUCTION

The survey of the animal health status of the Republic of Kiribati was carried out between 1992 and 1994 by the SPC Animal Health Advisor and the Kiribati Government Veterinary Officer.

The objective of the survey was to confirm the presence or absence of livestock diseases considered to be of significant economic or public health importance. The information obtained during the survey will enable Kiribati to develop appropriate quarantine protocols to prevent the introduction of diseases not present on the island and to provide an indication of the distribution of diseases which are known to be present.

References are made to earlier surveys where appropriate,

Location and topography

The 33 islands of Kiribati, with the exception of Banaba are all low-lying coral atolls (no higher than 5 meters above sea level) with fringing reefs and central lagoons. Banaba is an elevated coral atoll reaching 81 metres above sea level.

The islands are divided into 6 groups namely the Gilbert group which is further subdivided into north, central and southern groups; Banaba to the far west; the Phoenix group of which only one island is inhabited by a small caretaker population; and the Line group which comprises 3 inhabited islands.

The territorial waters of Kiribati are approximately 3,000,000 sq. km.

Literature

There are no published records on the animal health status of Kiribati, however there are a number of unpublished reports by government veterinary officers.

Agriculture in Kiribati

Approximately 25cm of soil covers the sand which in turn covers the coral rock. Due to the porosity of this cover, drought potential is high. Vegetation is poor and insufficient to support large numbers of grazing or browsing animals.

Livestock development has been focused on pigs, poultry and more recently goats. Pigs and poultry are reared largely on scraps and by-products with a few semi-commercial producers utilising imported feeds. Ducks (Muscovy) have been introduced by individuals but numbers remain small. Goats have been distributed to a number of islands but have not proved to be very successful and the breeding programme is being discontinued.

There is no surface fresh water. Access to water is restricted to rainwater collection and the freshwater lens underlying the atolls.

The approximate distribution of livestock is as follows :

	Pigs	Goats	Chickens	Ducks
Gilbert Group	24,981	106	41,528	27
Line Group	2,629	-	3,475	1
Phoenix Group	12	-	53	-
Total	27,622	106	45,056	28

Selection of Diseases

Diseases to be investigated were selected on the basis of public health risk, economic significance and regional epidemiological importance, with particular reference to the diseases notifiable to the FAO and the Office International des Epizooties. These diseases are listed in three categories:

List A Diseases : Communicable diseases which have the potential for very serious and rapid spread, irrespective of national borders, which are of serious socio-economic or public health consequence and which are of major importance in the international trade of livestock and livestock products.

List B Diseases : Communicable diseases which are considered to be of socio-economic and/or public health importance within countries and which are significant in the international trade of livestock and livestock products.

List C Diseases : Communicable diseases with important socio-economic and/or sanitary influence at the local level.

The region is considered to be free of list A diseases and therefore, with the exception of Bluetongue, Newcastle disease and fowl plague, these conditions were not included in the survey. (It is assumed that if a list A disease was present in Kiribati for example Foot and Mouth disease, it would be recognised clinically).

Other diseases were investigated where appropriate.

Most diseases were surveyed through serological sampling of a statistically significant sample of the population. Where possible, diseases were also investigated clinically. Sample sizes were determined using the text "Livestock Disease Surveys: A Field Manual for Veterinarians" by Cannon and Roe. In some cases it was not practical to collect a statistically significant sample.

Where earlier investigations have confirmed the presence of a disease these are reported.

Materials and Methods

During the course of the surveys, samples were collected from one island in each of the 3 groups in the Gilberts - Makin in the Northern Group, Abemama in the Central Group and Beru in the Southern Group - and from the main population centre on South Tarawa, from Banaba and from Kiritimati, Fanning and Washington in the Line Islands.

On each of the selected islands, 2 or more villages were visited and blood samples collected from pigs and poultry. All pigs sampled were more than 6 months old. Pigs were mainly of the "local" breed but 11 "local" x Large White or Tamworth and 16 pure-bred Large White or Tamworth were included. The pure-breds were primarily from the government livestock units on South Tarawa and Kiritimati.

Sufficient blood samples were collected at random from the pig population to ensure a minimum level of confidence of 95% of detecting a diseased animal assuming that the disease would be present in 5% of the population.

Only sexually mature poultry were sampled. On South Tarawa, 30 parent stock from the government livestock unit were sampled (3 Cobb 500 and 27 Shaver 288 which had been imported as day-old chicks from New Zealand). 9 Shaver 288 commercial layers and 7 Black Australorp which had originated from the government livestock units and sold at 6 weeks plus 23 local-type birds were also sampled. All birds sampled elsewhere were of the "local-type", with the exception of 4 x "local" x Black Australorp.

Due to the relatively small number of goats which remain in the country, it was not possible to obtain a representative sample. It is anticipated that the existing goat population will continue to decline and there are no plans to introduce new stock.

Venous blood samples were obtained using vacutainers (Venoject 10ml draw) and allowed to stand overnight to enable the serum to separate. Where necessary, the samples were centrifuged for 10 minutes at 2,000 rpm. Serum samples were stored at -20°C after collection, prior to shipment to SPC, Suva.

Serum samples were stored at -20°C in Suva prior to shipment to the co-operating laboratories. 1ml aliquots of sera were shipped in duplicated microtitre tubes to the Central Animal Health Laboratory, Wallaceville, New Zealand and in eppendorfs to the Veterinary Pathology Laboratory, Koronivia, Fiji; and to the Laboratoire Territorial de Diagnostique Vétérinaire, Nouvelle-Caledonie.

Serum samples collected were as follows

	Avian	Porcine	Caprine
Tarawa	69	58	2
Abaiang	24	-	-
Abemama	-	25	-
Makin	17	20	-
Beru	14	20	-
Kiritimati	17	22	-
Fanning	18	20	-
Washington	17	20	-
Banaba	2	8	-
Total	178	193	2

Faecal samples were collected at random from all species and formalised to prevent larval development during transportation to the laboratory. This procedure limited identification.

Ectoparasites were collected and identified. Formalinised specimens were forwarded to SPC, Suva to confirm identification.

Diseases of Goats

As the goat population has continued to decline to a point where the population is no longer viable and as there are no immediate government plans to re-introduce goats, only 2 samples were obtained.

OIE List A Diseases

There is no clinical evidence to indicate that any exotic OIE List A diseases may be present in goats in Kiribati at this time, however as there has been serological evidence of the presence of certain bluetongue serotypes elsewhere in the region, samples were examined for bluetongue.

Bluetongue (LTDV) - Both samples were negative for *bluetongue* by AGDT. It was not possible to ascertain if potential vectors for this disease occur in Kiribati.

OIE List B Diseases

Leptospirosis (CAHL) - 51 sera were tested for *L.hardjo*, *L.pomona* and *L.copenhageni* in 1985. 2 sera were positive for *L.hardjo*, 5 sera were positive for *L.pomona* and 1 sera was positive for *L.copenhageni*.

'Q' fever (CAHL) - Testing by CFT was unable to demonstrate any serological evidence of *'Q' fever* in the 2 goats that were sampled.

Caprine arthritis/encephalitis (CAHL) - 2 samples subjected to the ELISA test failed to demonstrate any serological evidence of *caprine arthritis / encephalitis*.

Dermatophilus (KRS) - Samples were positive on culture for *D.congolensis*.

Echinococcus / hydatidosis - There are no reports which suggest that *Echinococcosis / hydatidosis* is present in Kiribati.

Tuberculosis - all goats were negative on two occasions (in 1983 and 1985) to the comparative intradermal tuberculin test.

Brucellosis (KRS) - all samples were negative on RBPT on two occasions for brucellosis. There is no evidence to indicate that caprine brucellosis is present in Kiribati.

List C and other diseases

Toxoplasmosis (CAHL) - Both samples exhibited serological evidence of toxoplasmosis on LAT. Toxoplasmosis should be considered to be present in Kiribati.

Clostridial infections - cases of tetanus have been reported.

Coccidiosis - coccidial oocysts (*Eimeria sp.*) have been identified on faecal examination. Caprine coccidiosis is not recognised as a disease problem.

Pig diseases

Samples were collected from 8 islands distributed throughout the Republic. It was intended to collect

60 stratified random samples from Tarawa (58 submitted), plus an additional 60 samples were to be collected from other islands in the Gilberts Group and Banaba (73 submitted). A further 60 samples were also to be collected from the Line and Phoenix Islands (primarily Christmas Island) - 62 samples submitted.

List B

Aujeszky's (CAHL) - All samples were negative to the ELISA test for *Aujeszky's* disease. This confirms earlier findings by Brown (1) where 22 sera were tested for *Aujeszky's* disease and were negative. *Aujeszky's* disease is probably not present in Kiribati.

Leptospirosis (CAHL) - 193 samples were tested by the Leptospiral MAT for the following serogroups represented by the named serotypes.

SEROGROUPSEROVAR

Grippotyphosa	<i>L. grippotyphosa</i>	All negative
Pomona	<i>L. pomona</i>	All negative
Icterohaemorrhagiae	<i>L. copenhageni</i>	2 inconclusive (Beru x 1 & Kiritimati x 1)
Sejroe	<i>L. hardjo</i>	All negative
Australis	<i>L. australis</i>	All negative
Tarassovi	<i>L. tarasovi</i>	All negative
Australis	<i>L. bratislava</i>	4 inconclusive (Fanning x2, Kiritimati x1, Banaba x1)
Canicola	<i>L. canicola</i>	All negative
Ballum	<i>L. ballum</i>	All negative
Autumnalis	<i>L. autumnalis</i>	All negative

172 samples by SAT had been tested for leptospirosis between 1975 and 1980, (serovars not reported) and all were negative (1). Leptospirosis does not appear to be a significant problem in pigs in Kiribati.

Porcine brucellosis (CAHL) - One sample was weakly positive on RBCT but all samples were considered negative for *porcine brucellosis* on CFT. 215 samples tested between 1975 and 1980 (1) by RBCT were also negative. There is no evidence that *porcine brucellosis* is present in Kiribati.

Trichinellosis (LTDV) - 161 samples were tested by ELISA for *Trichinellosis* and 72 were found to be positive. Although trichinellosis has been recorded elsewhere in the region, there had been no evidence to indicate that *Trichinella* was present in Kiribati. There is a need for further investigation of the *trichinellosis* status of Kiribati.

Atrophic rhinitis of sows - There is no clinical evidence of the presence of *atrophic rhinitis*.

Cysticercosis (C. cellulosae) - There are no reports to indicate that cysticercosis occurs in Kiribati.

Echinococcus / hydatidosis - There are no reports which suggest that *Echinococcus / hydatidosis* is present in Kiribati.

List C and other diseases

Swine erysipelas - there are no reports that indicate that swine erysipelas is present in Kiribati. If the disease is present it occurs very rarely.

Salmonellosis - in an earlier survey, *Salmonella sp.* were isolated from 9 out of 98 faecal samples (1). The species identified were reported as *S. bovis morbificans*, *S. panama*, *S. ovion*, *S. enteritidis* and *S. websteunridon*. Difficulties associated with the handling and testing of samples limited this survey and although it should be recorded that there is no evidence to indicate that salmonellosis is a significant problem, the incidence of intestinal salmonellosis at the present time requires further investigation.

Porcine parvovirus - 3 samples out of a total of 30 (10%) were positive by ELISA for porcine parvovirus. PPV may be assumed to be present in Kiribati however due to the lack of contact between pigs the incidence is low.

Ectoparasites (1,2,3,4,5,6) - *Sarcoptes scabiei*
Demodex spp.

Endoparasites (1,2,3,4,5,6) - *Metastrongylus apri*
Ascaris suum
Trichuris suis
Balantidium coli
Eimeria sp.
Stephanurus dentatus

Poultry

The survey required the collection of 30 samples from government or commercial poultry flocks which comprise birds imported as day-old chicks or fertile eggs plus 30 samples from village chickens from Tarawa.

An additional 60 samples were to be collected from Makin, Tabiteue and Banaba. A further 60 samples were to be collected from the Line and Phoenix Islands (primarily Christmas Island).

OIE List A Diseases

Newcastle Disease (CAHL) - 100 samples (56%) were positive by HIT for *Newcastle Disease*. *Newcastle disease* has not been recognised clinically and it would appear that a lentogenic strain is present on Kiribati. This is consistent with the importation of day-old chicks from countries where lentogenic strains are known to be present. In a previous survey, 212 samples tested by HIT at the Central Veterinary Laboratory in UK between 1975 and 1980 were also negative. There is no evidence to suggest that virulent Newcastle Disease is present on Kiribati.

Fowl Plague (CAHL) - All samples (178) were negative for *avian influenza* by AGPT. Fowl plague is not reported elsewhere in the region and in the absence of clinical signs, it is considered unlikely to be present in Kiribati.

OIE List B Diseases

Avian infectious bronchitis (CAHL) - 56 samples were positive for IB on ELISA (31%). 12 samples were also positive out of 35 in 1980 on HIT (34%) and 11 out of 21 samples were positive (52%) in 1990 (3). The nephritic form of IB had been suspected earlier (1) and was diagnosed histopathologically in 1993. It can be assumed that IB is endemic in Kiribati.

Avian infectious laryngotracheitis (CAHL) - 69 samples (39%) were positive by the ELISA test for ILT. The disease may now be considered to be endemic throughout the group although 21 samples taken in 1990 had failed to demonstrate the presence of ILT.

Avian tuberculosis - 121 chickens tested in 1980 (1) showed no evidence of avian tuberculosis. There are no reports to suggest that avian tuberculosis is present on Kiribati.

Fowl pox - fowl pox is widespread in Kiribati and has been confirmed histologically.

Fowl cholera (CAHL) - The presence of *P.multocida* has been confirmed histologically (1).

Pullorum-Typhoid disease (CAHL) - 123 samples were positive (70%) by the Agglutination test for *Salmonella pullorum* and *Salmonella gallinarum*. Results from the slide agglutination test on stored sera are questionable, particularly as the serum quality in this case was reported to be poor. Further sampling is required.

Infectious bursal disease (CAHL) - 120 samples were positive (67%) by ELISA for IBD. Positive cases were distributed widely throughout the country, although 21 sera tested previously in 1990

were negative. A strain of IBD with low pathogenicity is known to be present in most countries in the region and it would appear that this strain of IBD is also endemic in Kiribati.

Mareks disease (CAHL) - 7 sample were positive (4%) to the AGPT for Mareks disease. Mareks disease is present in Kiribati however with the exception of one positive sera from Kiritimati, all positive cases occurred in Tarawa. Earlier surveys have also reported the presence of Mareks disease (1, 2, 3).

Mycoplasma synoviae and *Mycoplasma gallisepticum (CAHL)* - 113 samples were positive by the agglutination test for *M. gallisepticum* and 143 samples were positive for *M. synoviae*. Results from the slide agglutination test on stored sera are questionable, particularly as the serum quality in this case was reported to be poor however earlier surveys (1), which used HIT to confirm the results of the rapid slide agglutination test, have indicated that *Mycoplasma synoviae* (64% positive) and *Mycoplasma gallisepticum* (38% positive) are widespread.

List C Diseases

Botulism (CAHL) - botulism caused by *Clostridium botulinum* type C. has been reported to be a cause of deaths on previous occasions.

Coccidiosis - coccidiosis due to *Eimerai tenella* and *Eimeria necatrix* is endemic in Kiribati.

Avian encephalomyelitis (CAHL) - 33 samples (18%) were positive for *avian encephalomyelitis*. All positive cases were located on Tarawa, 30 of which were collected from the government station with only 3 positive cases identified among local birds. This would indicate that the virus has become established among the breeding stock at the station where vaccination affords protection from clinical disease. Previous reports confirm that a disease outbreak in 1980 was caused by AE.

Avian malaria (KRS) - 28 smears examined for avian malaria were negative.

Avian salmonellosis - early reports (1) confirm that *Salmonella* sp. (*Salmonella bovis morbificans*) was isolated in 1980. Subsequent investigations have failed to demonstrate the presence of Salmonollosis in poultry.

Avian leucosis - avian leucosis has been confirmed on post mortem and histologically.

Ectoparasites (1,2,3,4,5,6) - *Menopon* sp.
Lipeurus sp.
Goniodes / Goniocotes sp.
Pterolichus sp.
Cnemidocoptes sp.
Trombiculidae mites

Endoparasites (1,2,3,4,5,6) - *Oxyspirura mansonii*
Ascaridia galli
Tetrameres sp.
Capillaria sp.
Strongyloides sp.

DISEASES OF CANINES & FELINES

Dogs and cats were not included in the serological survey, however where it has been possible to establish that a disease is present in Kiribati, that disease is reported.

Dogs

Canine parvovirus - clinical cases of parvovirus in dogs are reported to be widespread.

Ectoparasites : *Ctenocephalides canis*.
 Pulex irritans
 Heterodoxus longitarsus
 Sarcoptes scabiei
 Otodectes cynotis
 Haemaphysalis longicornis

Endoparasites : *Taenia hydatigena*
 Ancylostoma caninum
 Dirofilaria immitis
 Toxacara canis
 Eimeria spp.

Cats

Ectoparasites : *Ctenocephalides sp.*
 Otodectes cynotis

Endoparasites : *Dipylidium caninum*
 Taenia taeniaformis

CONCLUSIONS

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, Marek's 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 thought 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.

REFERENCES

1. Brown, L. (1980) A survey of infections and diseases of pigs, chickens, goats and dogs in the Republic of Kiribati (formerly the Gilbert Islands) Central Pacific. Unpublished report.
2. Angus, S.D. (1985) Animal Disease Survey Phase III. End of Project Report. Unpublished report.
3. Nanjiani, I.A. (1991) Animal Health section Annual Report 1991. Unpublished.
4. Nanjiani, I.A. (1992) Animal Health section Annual Report 1992. Unpublished.
5. Jones, B.A. (1993) Animal Health section Annual Report 1993. Unpublished.
6. Jones, B.A. (1994) Animal Health section Annual Report 1994. Unpublished.

ACRONYMS

AGPT	-	Agar Gel Precipitation Test
CAHL	-	Central Animal Health Laboratory, Wallaceville, New Zealand
CFT	-	Complement Fixation Test
ELISA	-	Enzyme Linked Immuno-sorbent Assay
FAO	-	Food and Agriculture Organisation of the United Nations
GDT	-	Gel Diffusion Test
HIT	-	Haemagglutination Inhibition Test
KRS	-	Koronivia Research Station, Fiji
LAT	-	Latex Agglutination Test
LTDV	-	Laboratoire Territorial de Diagnostique Vétérinaire, Nouvelle-Caledonie
MAT		Microscopic Agglutination Test
OIE	-	Office International des Epizooties
RBCT	-	Rose Bengal Card Test
RBPT	-	Rose Bengal Plate Test
SAT	-	Serum Agglutination Test