

THE ANIMAL HEALTH STATUS OF TONGA

by

Peter Saville
Animal Health Adviser

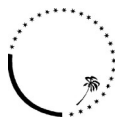


SOUTH PACIFIC COMMISSION

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ABSTRACT

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.

RÉSUMÉ

Des experts-conseils extérieurs et des vétérinaires locaux ont étudié à plusieurs reprises la situation zoonositaire des Tonga. Le présent document reprend essentiellement les résultats d'une enquête réalisée en septembre 1992 et en mars 1994. Les résultats d'enquêtes antérieures sont également inclus au besoin.

Bien que les Tonga soient indemnes de toutes les épizooties exotiques majeures, différentes pathologies importantes sur le plan économique et sur le plan de la santé publique sont présentes. La brucellose n'a pas été détectée chez les bovins dans le cadre de l'enquête (des études antérieures indiquaient que *Brucella sp.* était présente chez les bovins), bien qu'elle soit endémique chez les porcins. Plusieurs animaux ont réagi à l'intradermotuberculation. Cependant, le seul animal abattu et examiné ne comportait pas de lésions correspondant à la tuberculose. Le dépistage sérologique a montré que la rhinotrachéite infectieuse bovine/vulvovaginite pustulaire infectieuse et la diarrhée virale bovine/maladie des muqueuses sont répandues. Le nombre de cas positifs de leptospirose bovine constitue un problème de santé publique. L'absence de tiques du type *Boophilus* est à noter.

L'enquête a confirmé l'importance dans la population porcine de la maladie d'Aujeszky, de *Brucella suis* et de la leptospirose porcine. Le dépistage sérologique a révélé des cas de trichinose, mais les essais réalisés par la suite n'ont pas confirmé ces observations et d'autres investigations doivent être réalisées.

Bien que les échantillons de volailles examinés ne soient pas pleinement représentatifs, les résultats obtenus confirment que les pathologies aviaires répandues dans la région sont également présentes aux Tonga. Des cas de bursite infectieuse, de bronchite infectieuse, de maladie de Marek, de laryngo-trachéite infectieuse, d'encéphalomyélite aviaire, de *Mycoplasma gallisepticum* et de *Mycoplasma synoviae* ont été observés.

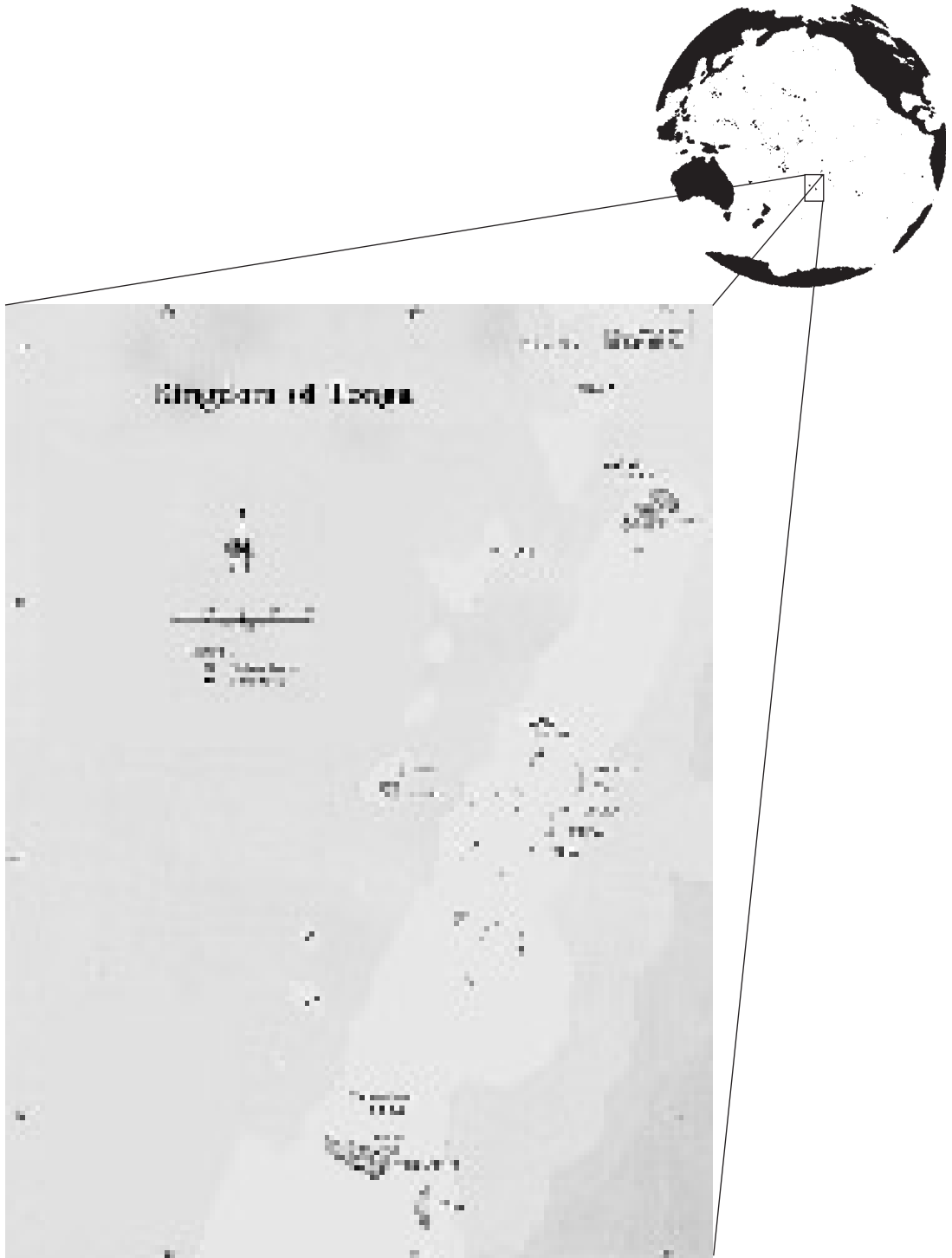
La prévalence élevée de la toxoplasmose dans la population caprine constitue un problème de santé publique. Les chats errants sont sans doute les hôtes réservoirs de cette maladie.

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INTRODUCTION

A survey to establish the animal health status of Tonga was carried out between 1992 and 1994 by the SPC Animal Health Adviser and the Tonga Government Veterinary Officer.

The objective of the survey was to confirm the presence or absence of livestock diseases considered to be of economic or public health importance. The information obtained during the survey will enable Tonga to develop appropriate quarantine protocols to prevent the introduction of diseases not present on the island, provide an indication of the distribution of diseases which are known to be present and facilitate the development of future policies for their control.

References are made to earlier surveys where appropriate,

LOCATION AND TOPOGRAPHY

Tonga lies to the south east of Fiji and to the south of Western Samoa just east of the International Dateline between latitudes 15°S and 23°S and between longitudes 173°W and 177°W. The Kingdom comprises 169 islands in three main groups, plus the northern Niua's; 36 islands are considered to be permanently inhabited. The three island groups are the Tongatapu Group, the Ha'apai Group and the Vava'u Group. The islands within the groups lie in two roughly parallel lines. The eastern islands are either atolls or of raised coral origin and are surrounded by coral reefs, with evidence of some volcanic activity overlaid by limestone. The higher western islands in the groups are of more recent volcanic origin; some are still active and eruptions do occur.

Apart from a few freshwater lakes, there is little available fresh water.

LITERATURE

There are no published records on the animal health status of Tonga, but there are a number of unpublished reports by consultants and government veterinary officers.

AGRICULTURE IN TONGA

Coconuts and bananas were once the principal export crops. However, these have been superseded by exports of squash for the Japanese market which tend to dominate all other agricultural activities.

Cattle production was encouraged by Government as a means of reducing imports of meat and dairy products. Most cattle are kept in 'closed' herds with little movement or contact between holdings. This has been the major factor in the limitation of spread of bovine diseases recognised previously. Future imports of cattle are understood to be under Government consideration.

National livestock numbers at the time of the survey were estimated to be as follows:

	Tongatapu	Vava'u	Ha'apai	'Eua	Niua's	Total
Horses	5,148	2,567	1,387	986	467	10,555
Cattle	6,083	1,533	374	1,274	54	9,318
Pigs	49,387	13,715	8,341	4,994	4,416	80,853
Poultry	168,452	41,963	31,308	10,445	11,150	263,318
Goats	7,061	2,942	2,421	900	615	13,939

There has also been some Government and overseas aid assistance to establish the pig industry, although most pigs continue to be kept under 'free-range' conditions. Such practices are the primary contribution to the continued spread of disease.

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 FAO and OIE.

Most diseases were investigated through serological sampling of a statistically significant sample of the population. In the case of bovine tuberculosis and brucellosis, an attempt was made to test the entire eligible bovine 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 & Roe. In some cases it was not practical to collect a statistically significant sample.

Where earlier investigations (Bowskill, 1992-4; Cargill 1984; Daft, 1976; Hopkirk, 1981, 1982; Barger et al., 1994) have confirmed the presence of a disease, these are reported.

MATERIALS AND METHODS

Blood samples were collected by vacutainer from all species included in the survey. After being allowed to clot overnight, the serum was separated and stored at -20°C. If necessary, the serum was centrifuged at 2000 rpm for 10 minutes.

Samples for brucellosis testing were collected from all female cattle over the age of 12 months and all males capable of or being retained for breeding. Sufficient samples were selected at random for diseases under investigation and submitted for laboratory analysis to ensure a minimum level of confidence of 95 per cent of detecting a diseased animal, assuming that the disease would be present in 5 per cent of the population.

All cattle are being subjected to the intra-dermal caudal fold tuberculin test, using 0.1 ml Bovine PPD 2 mg (100,000 units) per ml. Reaction is evaluated by palpation of the injection site at 72 hours. Due to difficulties associated with the handling of some cattle, it was not possible to test all eligible cattle in Tonga in the anticipated time.

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

Similarly, sufficient blood samples were also collected at random from the goat population to ensure a minimum level of confidence of 95 per cent of detecting a diseased animal, assuming that the disease would be present in 5 per cent of the population.

Samples from domestic poultry were mainly limited to Tongatapu. The number of samples collected are not statistically significant. However, they do serve to confirm the presence of certain diseases.

Serum samples were stored at -20°C in Suva prior to shipment to the co-operating laboratories. 1 ml 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; Laboratoire Territorial de Diagnostique Vétérinaire, New Caledonia and the Elizabeth Macarthur Agricultural Institute, New South Wales, Australia

RESULTS

Diseases of equines

180 equine samples were collected from the three main groups (Tongatapu—60 samples, Ha'apai—60 samples and Vava'u—60 samples). Samples were submitted to LTDV and PIF.

OIE List B diseases

Equine infectious anaemia (LTDV): All samples were examined by AGIT for equine infectious anaemia and all were negative. Tonga is probably free of equine infectious anaemia.

Equine rhinopneumonitis (PIF): 176 samples were tested for equine rhinopneumonitis and two animals were positive (one each from Tongatapu and Vava'u). A further 11 samples displayed significant titres. Equine rhinopneumonitis is present in Tonga at a low level.

Equine influenza A (LTDV): 176 samples were tested by HIT and were negative. Equine influenza has not been recorded elsewhere in the region and is probably not present in Tonga.

OIE List C and other diseases

Ectoparasites : *Haemaphysalis longicornis*

Endoparasites : *Angiostrongylus cantonensis*
Habronema spp.
Oxyuris equi
Parascaris equorum

Diseases of cattle

All bovine samples were submitted to KRS for testing for bovine brucellosis. 171 samples were selected at random from the sera collected for *Brucella* testing (Tongatapu—60 samples, 'Eua—51 samples and Vava'u—60 samples) and submitted to CAHL, EMAI and LTDV.

OIE List A diseases

Bluetongue (EMAI): 2 samples from Vava'u were reported to be weakly positive in the AGIT test for bluetongue. It is unlikely that pathogenic forms of bluetongue are present in Tonga. Subsequent tests performed on the same samples failed to confirm the presence of bluetongue. An earlier survey by Cargill on 'Eua had also failed to demonstrate antibody to bluetongue.

OIE List B diseases

Anaplasmosis (LTDV): All samples tested negative with the card test for anaplasmosis. Tonga is probably free of anaplasmosis.

Babesiosis (LTDV): All samples were tested for *Babesia bovis* by IFAT. 49 samples gave a doubtful reaction and one sample was considered positive (Vava'u). There has been no clinical evidence of babesiosis. The presence of babesiosis in Tonga requires further investigation.

Paratuberculosis (CAHL): All samples were tested for paratuberculosis by CFT. 21 samples gave a significant reaction; of these 5 animals were considered positive and one animal was suspicious. Paratuberculosis (Johne's Disease) is present in Tonga.

Leptospirosis (LTDV): All samples were tested by the Leptospiral MAT for the following serogroups represented by the named serotypes:

<i>Serogroup</i>	<i>Serotype</i>	<i>Vava'u</i>	<i>'Eua</i>	<i>Tongatapu</i>
Australis	<i>L. australis</i>	-	-	-
Autumnalis	<i>L. autumnalis</i>	3	1	7
Ballum	<i>L. castellanis</i>	-	-	-
Canicola	<i>L. canicola</i>	-	-	-
Hebdomadis	<i>L. hebdomadis</i>	1	-	1
Icterohaemorrhagiae	<i>L. copenhageni</i>	-	-	-
Pomona	<i>L. pomona</i>	11	9	7
Sejroe	<i>L. sejroe</i>	1	-	8
Sejroe	<i>L. hardjo</i>	-	-	-
Tarassovi	<i>L. tarassovi</i>	-	-	4
Total positives		16 (26%)	10 (19%)	27(45%)

Cargill (1984), using a screening ELISA, found 23 out of 39 bovines of mixed ages to be positive for *L. pomona* on 'Eua but stated that the test did not distinguish between serovars. An earlier report by Hopkirk (1981) recorded that *L. pomona* and *L. hardjo* were endemic in cattle on Tongatapu. Leptospirosis continues to be a significant problem in cattle in Tonga.

Bovine brucellosis (KRS & CAHL): 652 samples were tested by RBCT at the Veterinary Pathology Laboratory, Koronivia. Eight samples were positive and one sample was anti-complimentary. Subsequent testing by CFT has failed to confirm the presence of *Brucella* in Tonga. The investigation is continuing.

Enzootic bovine leukosis (LTDV): All 171 samples were subjected to the ELISA for enzootic bovine leukosis and 2 samples were positive (both animals from Vava'u). The presence of enzootic bovine leukosis in Tonga should be investigated further.

Infectious bovine rhinotracheitis/infectious pustular vulvovaginitis (CAHL): From the submission of 171 sera, 31 samples were positive and 2 were suspicious by ELISA for infectious bovine rhinotracheitis. The distribution of positive cases was Tongatapu—18/60 (30%), 'Eua—11/51 (21.5%), Vava'u—2/60 (3%). Infectious bovine rhinotracheitis can be considered to be endemic in Tonga. During his investigations on 'Eua in 1984, Cargill found that 26 out of 39 animals tested (66%) had antibody to infectious bovine rhinotracheitis

Theileriasis (LTDV): 171 samples were tested for *Theileria buffeli* by IFAT. 51 samples were positive and 13 were considered doubtful. *T. buffeli* can be considered to be endemic in Tonga.

OIE List B—Clinical/abattoir investigations

Bovine malignant catarrh: There are no clinical reports of bovine malignant catarrh having occurred in Tonga. None of the natural hosts for this disease are present in Tonga. (It is accepted that outbreaks can occur in the absence of natural hosts.)

Echinococcosis/hydatidosis: There are no reports which suggest that echinococcosis / hydatidosis is present in Tonga.

Bovine tuberculosis: All bovines in the island are being subjected to the intradermal caudal fold tuberculin test using PPD (Bovine) 2 mg (100,000 units) per ml. Over 2,500 animals have been tested and 6 reactors have been identified. One animal has been slaughtered. However on post-mortem it was not possible to demonstrate visible lesions. The surveillance programme is continuing.

Cysticercosis: There are no reports to indicate that cysticercosis occurs in Tonga.

Dermatophilus: Clinical dermatophilus has not been reported in Tonga.

OIE List C and other diseases

Bovine ephemeral fever (EMAI): All samples were negative to the virus neutralisation test for bovine ephemeral fever. There is no evidence to indicate that bovine ephemeral fever is present in Tonga. The vector status for bovine ephemeral fever in Tonga is unknown.

Akabane virus (EMAI): All samples were negative to the virus neutralisation test for Akabane virus. Akabane virus is probably not present in Tonga.

Simbu serogroup (EMAI): There is no serological evidence (using the ELISA) to indicate that viruses of the Simbu serogroup may be present in Tonga.

Mucosal disease/bovine virus diarrhoea (CAHL): 171 samples were negative for mucosal disease/bovine virus diarrhoea by ELISA. 14 samples were positive, with a 5 further samples showing a weak positive reaction. In 1984 Cargill reported that 27 out of 39 animals had serological evidence of exposure to mucosal disease/bovine virus diarrhoea. Mucosal disease/bovine virus diarrhoea appears to be endemic in Tonga.

Parainfluenza 3: In 1984 Cargill reported that 30 out of 39 animals on 'Eua were serologically positive on HIT for PI3. Parainfluenza 3 is probably endemic in cattle in Tonga.

Ectoparasites : *Damalinia bovis*
Haemaphysalis longicornis
Haematopinus eurysternus
Linognathus vituli

Endoparasites : *Bunostomum phlebotomum*
Capillaria spp.
Cooperia oncophora
Dictyocaulus viviparus
Haemonchus placei
Nematodirus spp.
Ostertagia ostertagia
Setaria labiopapillosa
Strongyloides papillosis
Trichostrongylus axei
Trichostrongylus colubriformis
Trichuris spp.

Diseases of goats

177 samples were collected from the three main groups (Tongatapu—60 samples, Ha'apai—57 samples and Vava'u—60 samples).

OIE List A diseases

There is no clinical evidence to indicate that any exotic OIE List A diseases are present in goats in Tonga 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): 177 samples were negative for bluetongue by AGDT. Cargill (1984) had also failed to demonstrate the presence of bluetongue in goats on 'Eua. It was not possible to ascertain if potential vectors for this disease are present in Tonga. Tonga is probably free from bluetongue.

OIE List B diseases

Caprine brucellosis (KRS): All samples were negative for caprine brucellosis by RBPT. There is no evidence to suggest that caprine brucellosis is present in Tonga.

'Q' fever (*LTDV*): Testing by CFT was unable to demonstrate any serological evidence of 'Q' fever in the 177 goats that were sampled. Cargill (1984) was also unable to detect any serological evidence to indicate the presence of *Coxiella burnetti* on 'Eua.

Caprine arthritis/encephalitis (CAHL): 171 samples subjected to the ELISA test failed to demonstrate any serological evidence of caprine arthritis / encephalitis in Tonga. In 1984 Cargill also reported that there was no serological evidence of CAEV in goats on 'Eua.

OIE List C and other diseases

Toxoplasmosis (LTDV): 92 samples (52%) had serological evidence of toxoplasmosis. Toxoplasmosis may be considered to be endemic in Tonga.

Ectoparasites : *Damalinia caprae*
Haemaphysalis longicornis

Endoparasites : *Haemonchus contortus*
Oesophagostomum columbianum
Ostertagia ostertagia
Trichostrongylus axei
Trichostrongylus colubriformis
Eimeria spp.

Diseases of pigs

Due to the economic and cultural importance of pigs in Tonga and the threat to public health which arises from their close association with human habitation, a total of 244 samples was collected from the three main groups (Tongatapu and 'Eua—60 and 65 samples respectively, Ha'apai—59 samples and Vava'u—60 samples).

OIE List B diseases

Aujeszky's disease (CAHL): 244 samples were subjected to the ELISA test for Aujeszky's disease. 122 samples (50%) were considered positive and 5 were suspicious. Positive samples were distributed as follows: Tongatapu—29/60 (48%), 'Eua—28/65 (43%), Vava'u—33/60 (55%), Ha'apai—32/59 (54%). Cargill had earlier found that 10 out of 18 pigs sampled (55%) on 'Eua had antibody to Aujeszky's disease in 1984. Aujeszky's disease may be considered to have a high occurrence in Tonga. However, further investigations are required to establish the pathogenicity.

Porcine brucellosis (CAHL): 55 samples were considered positive for porcine brucellosis on both the CFT and RBCT. 63 samples were positive by RBCT only. 63 samples were positive on CFT, with 5 additional samples being anti-complimentary. Positive samples were found to be distributed evenly throughout the country. Porcine brucellosis is endemic in Tonga.

Leptospirosis (CAHL): 244 samples were tested by the leptospiral MAT for the following serogroups, represented by the named serotypes:

<i>Serogroup</i>	<i>Serotype</i>	<i>Vava'u</i>	<i>'Eua</i>	<i>Tongatapu</i>	<i>Ha'apai</i>
Australis	<i>L. bratislava</i>	2	1	1	3
Ballum	<i>L. ballum</i>	-	-	-	-
Canicola	<i>L. canicola</i>	-	-	-	-
Grippotyphosa	<i>L. grippotyphosa</i>	-	-	-	-
Icterohaemorrhagiae	<i>L. copenhageni</i>	2	-	-	-
Pomona	<i>L. pomona</i>	6	4	2	2
Sejroe	<i>L. hardjo</i>	-	-	-	-
Tarassovi	<i>L. tarassovi</i>	-	-	-	-
Total positives		10 (16%)	5 (8%)	3 (5%)	5 (8%)

A total of 92 samples (41.6%) were also considered to be inconclusive reactors to the MAT.

<i>Serogroup</i>	<i>Serotype</i>	<i>Vava'u</i>	<i>'Eua</i>	<i>Tongatapu</i>	<i>Ha'apai</i>
Australis	<i>L. bratislava</i>	5	5	16	3
Ballum	<i>L. ballum</i>	-	-	-	-
Canicola	<i>L. canicola</i>	-	-	-	-
Grippotyphosa	<i>L. grippotyphosa</i>	-	-	-	-
Icterohaemorrhagiae	<i>L. copenhageni</i>	12	9	5	5
Pomona	<i>L. pomona</i>	7	13	6	13
Sejroe	<i>L. hardjo</i>	-	-	-	-
Tarassovi	<i>L. tarassovi</i>	-	-	-	-
Total inconclusive		25 (41%)	28 (23%)	28 (46%)	21 (28%)

From the positive and inconclusive results, it would appear that leptospirosis caused by the serogroups Australis, Pomona and Icterohaemorrhagiae is of particular concern. This is unlike the situation of bovines, where Pomona, Autumnalis and Sejroe are primarily involved. Cargill (1984) reported that of 12 adult pigs and 8 piglets sampled, 100 per cent and 25 per cent respectively had antibody to leptospirosis on 'Eua, but did not identify the serogroup. Porcine leptospirosis represents a significant public health and economic problem in pigs in Tonga.

Trichinellosis (LTDV): 245 samples were tested by ELISA for trichinellosis and 71 (28%) were found to be positive. 154 samples were subsequently tested by ELISA at the USDA Parasite Biology and Epidemiology Laboratory at Beltsville, Maryland and all samples were negative. In addition over 50 muscle samples were examined, using the acid trypsin digestion technique, in an attempt to demonstrate cysts. All samples were negative. There is no evidence to confirm that trichinellosis is present in Tonga.

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 Tonga.

Echinococcus / hydatidosis: There are no reports which suggest that echinococcosis / hydatidosis is present in Tonga.

Ectoparasites : *Haematopinus suis*
Sarcoptes scabiei
Demodex phylloides

Endoparasites : *Cysticercus tenuicollis (Taenia hydatigena)*
Ascaris suum

Hyostrongylus rubidus
Metastrongylus apri
Stephanurus dentatus
Strongyloides ransomi
Eimeria spp.

Diseases of poultry

77 samples were collected, from Ha'apai (6 samples), Tongatapu (41 samples) and Vava'u (30 samples). The samples from Tongatapu were obtained from commercial layers, whereas the samples from Ha'apai and Vava'u were obtained from backyard chickens.

OIE List A Diseases

Newcastle disease (CAHL): 32 samples (41%) 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 Tonga.

This is consistent with the findings elsewhere in the region and the importation of day-old chicks from countries where lentogenic strains are known to be present.

Fowl plague (CAHL): All samples (77) 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 unlikely to be present in Tonga.

OIE List B diseases

Avian infectious laryngotracheitis (CAHL): 1 sample (1.3%) from Ha'apai and 2 samples from Vava'u were positive by the ELISA test for infectious laryngotracheitis. Although present in the group, the incidence of infectious laryngotracheitis appears to be very low.

Pullorum-Typhoid disease (CAHL): 31 samples (40%) were positive 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 investigations are required.

Avian infectious bronchitis (CAHL): 6 samples were positive for infectious bronchitis on ELISA (7.7%). 4 of the positive sera were from commercial flocks on Tongatapu, with 2 positives from backyard chickens on Ha'apai. No positive animals were identified on Vava'u. Infectious bronchitis can be assumed to be endemic in Tonga, but at a low incidence, and may be restricted to certain islands.

Infectious bursal disease (CAHL): 35 samples were positive (45%) by ELISA for infectious bursal disease. Positive cases were distributed widely throughout the country. However, the majority of positive cases originated from the commercial flocks. A strain of infectious bursal disease with low pathogenicity is known to be present in most countries in the region and, in the absence of clinical signs, it would appear that the same strain of infectious bursal disease is endemic in Tonga.

Marek's disease (CAHL): 28 samples were positive (36%) to the AGIDT for Marek's disease. Marek's disease is present in Tonga. However, all positive cases occurred in Tongatapu in the commercial layer flocks.

Mycoplasma gallisepticum (CAHL): 64 samples were positive by the agglutination test for *M. gallisepticum*. Results from the slide agglutination test on stored sera are questionable, particularly as the serum quality in this case was reported to be poor.

Mycoplasma synoviae (CAHL): 70 samples were positive by the agglutination test for *M. synoviae*. As with *M. gallisepticum*, results from the slide agglutination test on stored sera are questionable, particularly as the serum quality in this case was reported to be poor. Arrangements have been made to repeat the tests in Tonga.

Fowl pox: Fowl pox is reported to be widespread in Tonga.

OIE List C and other diseases

Avian encephalomyelitis (CAHL): 33 samples (42.8%) showed serological evidence of exposure to avian encephalomyelitis. Most positive cases were located on Tongatapu. Avian encephalomyelitis is established in Tonga but appears to be restricted to certain areas.

Infectious coryza: Clinical cases of infectious coryza (*Haemophilus gallinarum*) are reported to be common (Bowskill, 1992-94). The disease may be regarded as endemic in Tonga.

Ectoparasites : *Menacanthus stramineus*
Menopon gallinae

Endoparasites : *Acuarias sp.*
Ascaridia galli
Capillaria sp.
Heterakis gallinae
Syngamus trachea
Eimeria spp.

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 Tonga, that disease is reported.

OIE List B diseases

Aujeszky's disease. Clinical cases of Aujeszky's disease in dogs have been observed. Diagnosis was confirmed histopathologically.

Other diseases - Canines

Canine parvovirus: Clinical cases of parvovirus in dogs are reported to be widespread.

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

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

Other diseases - Felines

Ectoparasites : *Ctenocephalides sp.*
Otodectes cynotis

Endoparasites : *Dipylidium caninum*
Taenia taeniaformis



CONCLUSIONS

Tonga 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 bovine brucellosis and bovine tuberculosis, are either absent or exist at a very low level. Surveillance for these diseases should be maintained until it can be confirmed that the diseases have been eliminated.

A number of diseases of economic or public health importance are widespread and consideration should be given to instituting control measures. Of particular concern from the public health viewpoint is the high incidence of leptospirosis and porcine brucellosis.

Economically, in addition to losses due to leptospirosis and brucellosis in pigs, the presence of Aujeszky's disease is likely to result frequently in reproductive failure. Such losses are difficult to quantify. However as 50 per cent of the pigs tested were serologically positive and clinical cases are seen in canines, it must be assumed that the impact of the disease is significant.



REFERENCES

- Barger, I.A., K. Siale, D.J.D Banks & L.F. Le Jambre. (1994). Rotational grazing for the control of gastrointestinal nematodes of goats in a wet tropical environment. *Veterinary Parasitology* 53, 109-116.
- Bowskill, J. (1992-94). Records of disease investigation by MAF Animal Health. Unpublished data.
- Cannon, R.M. & Roe, R.T. (1982). *Livestock disease surveys: a field manual for veterinarians*. Australian Bureau of Animal Health, Canberra.
- Cargill, C. (1984). Disease survey of cattle, pigs and goats in 'Eua, Tonga. Unpublished report.
- Daft, B. (1976). Preliminary information on the intestinal parasites of livestock in Tongatapu, Tonga. SPC Information Circular No. 71.
- FAO-WHO-OIE. (1993). *Animal Health Yearbook 1993*.
- Hopkirk, R. (1981). Interim report on the animal health consultancy to the Kingdom of Tonga. Unpublished report to MAFF.
- Hopkirk, R. (1982). Report on the follow-up animal health consultancy to the Kingdom of Tonga. Unpublished report to MAFF.



ACRONYMS

AGDT	-	Agar gel diffusion test
AGIDT	-	Agar gel immuno-diffusion test
AGIT	-	Agar gel immunofluorescence test
CAHL	-	Central Animal Health Laboratory, Wallaceville, New Zealand
CFT	-	Complement fixation test
ELISA	-	Enzyme-linked immuno-sorbent assay
EMAI	-	Elizabeth Macarthur Agricultural Institute, New South Wales
FAO	-	Food and Agriculture Organization of the United Nations
GDT	-	Gel diffusion test
HIT	-	Haemagglutination inhibition test
IFAT	-	Indirect fluorescent antibody test
KRS	-	Koronivia Research Station, Fiji
LAT	-	Latex agglutination test
LTDV	-	Laboratoire Territorial de Diagnostique Vétérinaire, New Caledonia
MAT	-	Microscopic agglutination test
OIE	-	Office International des Épizooties
PIF	-	Pasteur Institute, France
RBCT	-	Rose Bengal card test
RBTP	-	Rose Bengal plate test
SAT	-	Serum agglutination test

