History of veterinary public health in Australasia

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Summary: The geographic isolation of Australasia has played a significant role in preventing the introduction of exotic diseases or in limiting the spread of many diseases which entered after settlement. Some infections such as psoroptic mange, tuberculosis and brucellosis became widely dispersed and some were ultimately to require novel methods to curtail them, e.g. greater use of rail and road transportation to convey stock, improved methods to locate and muster livestock in bush terrain (helicopters), improved diagnostic tests and the introduction of effective methods for tracing diseases found at abattoirs to the farms of origin.

From the 1860s to the 1880s, there were such high mortalities from anthrax in Australia that a business syndicate associated with the Pasteur Institute established a laboratory in Sydney to produce anthrax vaccine from 1890 to 1898. The two-dose vaccine developed by Pasteur was unable to compete with a single dose spore vaccine later pioneered locally by Gunn and McGarvie-Smith. The most important achievements in veterinary public health in Australasia have been the successful eradication of brucellosis, the virtual eradication of hydatid disease in New Zealand and Tasmania, the substantial progress made in the eradication of tuberculosis from all but small regions of Australasia, and the development of a commercial vaccine to prevent Q fever in humans.

KEYWORDS: Anthrax - Brucellosis - Control - Eradication - Hydatidosis - Pasteur - Tuberculosis.

INTRODUCTION

Important factors which limited the introduction of diseases of livestock into Australia and New Zealand were the small number of animal sources (both herds and geographical locations) from which foundation stock were drawn, the selection of sound stock themselves, and the long voyages from Europe and Africa to the then British antipodean colonies. Stock incubating serious diseases or showing signs of disease either died or were killed en route. It is easy to over-emphasise the importance of those diseases which became established, thereby ignoring the many diseases which did not persist and/or were eradicated. It is also understandable that some diseases, once introduced, did not spread rapidly because of the relatively low density of stock. Moreover, the favourable climate, free-ranging conditions and abundant pasture did not mimic the stressful ecosystem from which they came, allowing latent infections

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to remain dormant. Counterbalancing this was the fact that many cattle and pigs escaped their herdsmen or in some cases were deliberately released to breed in the wild, and fencing to prevent intermingling of stock was non-existent.

EARLY DEVELOPMENTS IN AUSTRALIA

As the population of livestock in Australia increased, their value decreased and owners became less discerning in their selection and mating of breeding animals. Concomitantly, the voyage time from Europe to Australia shortened, and less wisdom was exercised in the selection of imported stock. Gradually, fencing of farms occurred and grazing density increased, while drought and parasitic disease took their toll. Scab (1788), anthrax (1847), bovine pleuropneumonia (1858), tuberculosis, brucellosis, caseous lymphadenitis and swine fever were some of the important diseases introduced. The importance of scab to students of veterinary public health is that the New South Wales Scab Act 1832 was the forerunner to a series of successful laws to combat infectious disease of animals, to arrange for compulsory inspection of stock, to quarantine affected farms and districts and restrict the movement of apparently healthy in-contact stock, to kill or treat those affected, and to lay the basis for national eradication, which was completed by 1896.

Apart from two minor incidents, Australasia has been free of rabies and glanders. Rabies was recognised in Tasmania in 1867 after a case in a boy who had been bitten by a dog. The dog died and the municipality killed all stray dogs. No subsequent cases occurred. Glanders occurred in a shipment of horses and their contacts in quarantine in Sydney, in 1891. All stock were either killed or re-exported (those in isolation) to the United States of America (49).

Some of the introduced diseases — notably anthrax, pleuropneumonia and tuberculosis — were spread along defined stock routes where stock were driven to market or in search of better pasture. Bullock teams were also important in spreading pleuropneumonia and tuberculosis. Contact with stock along fenced routes, as well as with straggler animals abandoned because of disease, provided a continuing nidus for spread of infection. Despite the absence of health certificates and any record of pre-embarkation inspection in Britain for disease in exported animals, the knowledge used in framing early quarantine regulations came from investigations abroad. Veterinary skill, luck and ignorance of landowners all played their part in determining whether infection persisted, with good fortune conferring a false sense of security.

The positions of Chief Inspector of Stock in the colonies were not filled by veterinarians until the twentieth century (1904 to 1923). The parlous state of veterinary services in the mid- to late nineteenth century can be gauged from the experience with bovine pleuropneumonia. When it was introduced into Melbourne in 1858, Victoria had only recently acquired the status of a Crown Colony and had no legal procedures nor veterinary staff to deal with diseases of any description. This, together with ignorance of the contagious nature of the disease, resulted in the government failing to adopt the recommendation of the consulting veterinary practitioner (for the first outbreak) to slaughter the entire herd. From this shipment — and other infected cattle imported over the ensuing twenty years — pleuropneumonia spread widely, and it was to be 116 years before Australia was declared free of this disease (1974).
In the mid- to late nineteenth century there was no inspection of dairy herds, dairy products or meat, nor adequate restrictions to prevent diseased animal products being used for human consumption; tuberculosis was assessed as present in 25% of cattle carcasses (55). Compulsory notification was introduced in Victoria in 1887. Infant mortality was high, and some outbreaks of typhoid fever and other diseases were distinctly traceable to unsanitary dairies. Parks, vacant allotments and streets were used for common grazing by cattle and stocking rates were high, providing good opportunities for the spread of tuberculosis. These problems abated as dairy hygiene and control of stock gradually improved over the ensuing decades. The last epidemic of milk-borne typhoid (440 cases) occurred in Melbourne in 1943. The outbreak was attributed to a single typhoid carrier working in a dairy which was packaging raw milk into bottles (36).

**Calf lymph for vaccinia**

Early supplies of smallpox vaccine were of poor quality and arrived too irregularly from Europe to satisfy a compulsory immunisation programme begun in 1854. The eminent veterinarian Graham Mitchell (see below) had been taught, in India, how to cultivate vaccinia in calves and harvest it for human use. In 1881, he was asked to assist the medical profession in Victoria after their early unsuccessful attempts to develop a vaccine. After initial success, seed lymph was provided from Manningtree, Essex (England), propagated in calves and used routinely for human vaccination. For a time, when there was no medical officer available, Mitchell vaccinated many human subjects and issued vaccination certificates (11). Despite recognising his expertise in preparing vaccine and immunising children, a segment of the medical profession objected to his involvement in a medical matter, and Mitchell was forced to cease vaccinations (46). An official Calf Lymph Depot producing smallpox vaccine under joint medical and veterinary supervision operated in Melbourne from 1882 until well into the twentieth century.

**ANTHRAX AND THE PASTEUR INSTITUTE IN AUSTRALIA**

Apart from some veterinarians who engaged in farriery, most were unable to make a living through their professional skills alone and hence resorted to other pursuits. By 1883 there were not more than about twelve veterinarians practising their profession throughout Australia, and there was only one fully employed veterinary surgeon in government service (Anthony Willows).

Australia was fortunate to count among these few practitioners some very competent veterinary surgeons, the most important of whom was Graham Mitchell. Anthrax had first been identified in Australia near Sydney, in 1847, where it was termed Cumberland disease. As for pleuropneumonia (see above), recommendations to slaughter the original infected herd were not followed. While such action could not have influenced its subsequent spread through top-dressing of pastures with non-sterilised bone dust contaminated with anthrax spores, it would undoubtedly have restricted initial dispersal of the disease by travelling stock, and some human deaths could have been avoided. Despite a government enquiry pointing out the similarities between Cumberland disease and anthrax, its aetiology remained controversial. In 1877, Mitchell published a pamphlet on Cumberland disease declaring it to be anthrax, but he was accused of scaremongering, despite the fact that persons skinning dead
sheep with the disease frequently became affected and died (49). Individual graziers and veterinarians such as Anthony Willows and Edward Stanley were quite convinced, and (in 1883 and 1885, respectively) they had advocated immunising sheep against anthrax by Pasteur’s methods. Willows claimed to have seen anthrax bacilli and experimentally transmitted the infection to three sheep. However, it was not until the first visit of Pasteur’s representatives to Australia in 1888 that the opinions of Mitchell, Willows and Stanley were vindicated by the isolation of Bacillus anthracis, and Cumberland disease was established unequivocally to be anthrax in further transmission trials.

Losses were sometimes catastrophic. L.W. Devlin (14) records that in 1885 on one combined property (farm) — comprising 220,000 sheep, nearly 5,000 cattle and 600 horses — a total of 42,000 sheep, 500 cattle and 60 horses died from anthrax. At the height of the epidemic, 500 sheep and 40 cattle were found dead in one day. Graziers concealed knowledge of their losses for fear of depreciating the value of their land and not being able to sell stock. A number of lay remedies, including purgatives and pasturing sheep with goats, were tried with little effect.

Pasteur’s representatives had come to Australia in 1888 to compete for an award of £25,000 for a biological method to exterminate rabbits and to undertake trials with Pasteurella avi septica. After some hesitancy, Pasteur subsequently also agreed that his staff could undertake a trial of his anthrax vaccine in Australia; the vaccine was made in premises at Rodd Island (in Sydney harbour), where its efficacy was tested privately before conducting more substantial field trials at Junee (New South Wales).

The immunisation schedule consisted of an injection of a strain of B. anthracis of low virulence, and a dose of a more virulent strain ten to fourteen days later; sheep and cattle were then exposed to virulent B. anthracis culture another twelve to fourteen days later. In all trials, the vaccine gave almost full protection. Commercial development of the vaccine did not proceed immediately, however, because of a dispute between Pasteur’s staff and the Royal Rabbit Commission. Telegraphic communication between Pasteur and Germont on 19 October 1888 indicates that the Institute was prepared to supply cultures for the anthrax vaccine on a continuing basis, for a fee of £100,000 (8). This demand was later modified, and an offer to supply anthrax vaccine to all British colonies for £38,000 was tabled at the Inter-Colonial Stock Conference at Melbourne in November 1889. (These conferences discussed the need for legislation to deal with the importation of stock and animal products, culminating eventually in the development of a uniform quarantine policy enacted through Commonwealth quarantine laws, after 1909. It was agreed that the chief Inspector of Stock in each State should also be the Chief Quarantine Officer for the Commonwealth. The system has worked very well.) The offer to supply vaccine was rejected in favour of trying to convince Pasteur that the government would assist in providing facilities if he were to appoint agents in the colonies to provide vaccine direct to stockowners (56). Subsequently this demand was reduced even further. In Devlin’s account, which stems from his father’s correspondence with Pasteur, neither government nor stockowners would sponsor the offer, and the matter lapsed until Pasteur found a syndicate in Paris who agreed to fund the setting-up of a laboratory to manufacture and distribute anthrax vaccine at four pence per head for three years. For flocks of over 15,000 sheep, the price was reduced to 3½ pence per head (60), and attenuated seed cultures in quiescent state were sent from the Pasteur Institute in 1890 and grown up at Rodd Island. The laboratory later became known as the...
Pasteur Institute of Sydney. Devlin's father and his close relatives did much of the vaccinating. Over eight years, commencing July 1890, some 3,250,000 sheep and 50,000 cattle were inoculated twice with anthrax vaccine. On properties where death rates had been as high as 20%, the mortality declined to below 1%.

The quality of sheep improved substantially as a result of anthrax vaccination because, when losses had been high and numbers of stock low, culling was not attempted for conformation defects or other faults. By the mid-1890s the use of anthrax vaccine was diminishing, partly because stock owners found it costly and irksome to muster sheep for the two injections of vaccine, and because of some reports of low protection, attributed by Devlin to reduced antigenicity of the vaccine strain (14), by Stewart to deaths most likely not being due to anthrax (56) and by Todd to reduced potency of the vaccine, because it was distributed over vast distances in hot weather (60). Use of the vaccine also fell due to its high cost and to the adverse publicity received when episodes of vaccination failure occurred. Limiting transport of the vaccine for use in cooler months did improve the record of protection considerably.

Devlin (14) reports that Pasteur did not favour the development of a single-dose vaccine, but the economic need for one persisted. It was left to John Gunn, a grazier, who used notes and records loaned to him by Devlin's father (allegedly some of which were from Pasteur himself), and John McGarvie-Smith to continue this research. Gunn's first vaccines were cheaper (about two pence per head) and were produced in the heart of the anthrax zone, and thus did not require to be transported over long distances. Despite some progress, Gunn's early vaccines were not greatly successful due to sepsis after injection, but ultimately the combined efforts of both men were rewarded. When the Rodd Island laboratory was closed for civic reasons at the end of 1893, McGarvie-Smith allowed Pasteur's new representative (Dr Momont) to work in his laboratory in return for tuition in microbiology. Four years earlier, McGarvie-Smith had paid for six months tuition in bacteriology from O. Katz, Bacteriological Expert to the Rabbit Commission, who had trained under Robert Koch in Germany. Todd (60) thus attributes the success of Gunn and McGarvie-Smith to the blending of techniques acquired from both Pasteur and Koch, and applied specifically to solving Australia's requirement, for reasons of distance and climate, for a single dose anthrax vaccine. After heat-treating isolates to modify their virulence akin to that of Pasteur's first vaccine strain, they then gradually increased the virulence of those isolates by passing them through laboratory animals, ultimately selecting a strain of intermediate virulence which was just sublethal for sheep. The single-dose attenuated anthrax spore vaccine was initially produced commercially in 1897, some thirteen years before the first successful spore vaccines were reported from Europe. The relatively low prevalence of anthrax in endemic areas of Australia is a tribute to the effectiveness of this vaccine.

**EARLY DEVELOPMENTS IN NEW ZEALAND**

The virtual absence in New Zealand of causes and vectors of animal diseases known to farmers elsewhere provided a favourable environment for domestic livestock to flourish after they were introduced to the British colony, first by Captain Cook, then by Governor King and the Rev. Samuel Marsden, and eventually by emigrants who brought in many pedigreed animals. The sources of the stock appear to have been
almost entirely the British Isles, Australia and Chile. The early sheep industry was based on wool production only, but by the mid-nineteenth century it had been supplanted by a growing meat industry serving the canned meat trade. Surplus sheep were used to produce tallow.

The control of introduced stock diseases such as scab and pleuropneumonia was carried out by provincial councils until the central government passed the Eradication of Sheep Scab Act 1878 and the Stock Act 1893; the latter was subsequently consolidated to incorporate all previous stock disease acts. Scab appears to have been introduced from Australia and spread rapidly in some areas because of lack of fencing and the difficulty of controlling sheep movements in rough terrain. The appointment of stock inspectors, introduction of dipping with lime sulphur, branding, quarantine measures to contain affected sheep, and heavy fines for owners found to be in possession of affected sheep enabled the disease to be eradicated by 1890. Control measures included legislation whereby landholders were obliged to pay an annual levy of one farthing per adult sheep. This is one of the earliest records of a government levy to assist in disease containment, based on returns of stock numbers submitted by farmers themselves.

It is presumed that bovine tuberculosis was introduced into New Zealand with infected cattle early in the life of the colony. Open cases of tuberculosis in dairy cattle were recognised and condemned during regular visits to dairy herds which were required to be licensed. The passing of the Slaughtering and Inspection Act 1890, which legislated for the compulsory inspection of meat for export, was the catalyst for the development of the meat inspection service. Within two years it had led to twenty-five veterinarians being appointed, mostly for meat inspection itself, to complement J.A. Gilruth (see below) and three other qualified veterinary surgeons who then comprised the entire veterinary workforce.

The legislation also enabled the authorities to discover the prevalence of grossly recognisable internal lesions in stock. Tuberculosis was found to be about 6% in slaughtered dairy cattle, a fairly static figure over many years because of the relatively small degree of interchange among stock in the dairy industry, and the culling of open cases of tuberculosis from herds. C.S.M. Hopkirk (26) noted that pasteurisation of whey from cheese factories had substantially reduced transmission of infection, but that separation of cream on farms still provided a source of infection to swine, where skim milk was fed to pigs in combined dairy and piggery enterprises. Prevalence of tuberculosis in swine was assessed at 10%. By the mid-1930s, bovine brucellosis had become widespread and abortion storms were common; Hopkirk stated that 30% of cows reacted positively to the agglutination test and that 5% of cows and 12% of heifers aborted.

**GILRUTH AND KENDALL**

The Pasteur Institute had a significant effect upon the directions taken by veterinary public health in Australasia, through its early involvement in the control of anthrax and through the training given to Gilruth, Woodruffe, Turner and Carne. It is said that Eli Metchnikov regarded Gilruth as one on the Institute's most brilliant students and collaborators (9). Gilruth was Chief Veterinary Officer in New Zealand from 1892 to 1908, after which, until 1912, he became Professor
of Veterinary Pathology when the University of Melbourne opened its new veterinary school.

It is Gilruth who deserves the credit for establishing a sound basis for the investigation of animal diseases, for establishing the meat inspection services and determining the basic structure and emphasis of the administration of livestock services in New Zealand today. Gilruth is also credited with the implementation of measures to eradicate anthrax and plague from New Zealand. Anthrax was introduced into New Zealand from Calcutta in unsterilised bone dust used for top-dressing pasture in the mid-1890s and there were many outbreaks in the ensuing decade. Gilruth argued persuasively for all imported bone meal to be sterilised at the port of dispatch or entry, and his persistence led the New Zealand government in 1904 to appoint inspectors in Calcutta and Sydney to oversee the effective sterilisation of bone dust there. Since 1907, there have been only three outbreaks, the last in 1954; the most plausible explanation for the paucity of subsequent domestic cases is that the anthrax spores/bacilli have been unable to persist in New Zealand soils due to high competitive microbial activity.

Gilruth campaigned for a research laboratory to be established on a 100-acre farm at Wallaceville, near Wellington. Over ensuing years the institute grew and provided the facilities and staff for the investigation of many diseases of public health importance, e.g. salmonellosis, leptospirosis, toxoplasmosis, brucellosis, etc.

Such was Gilruth's standing on animal diseases and human health that he was also appointed pathologist to the newly-established Department of Health in 1901. The medical profession recognised his skill; he is the only veterinarian to have been made an Honorary Member of the New Zealand Branch of the British Medical Association. In Australia, Gilruth is acknowledged for fostering active research in pathology and bacteriology. In the words of I. Clunies-Ross (9): "To give the names and achievements of those who were trained by him or who benefited from the tradition of research which he left behind him is to recite much of the outstanding record of accomplishment in the control of animal disease in Australia for the next twenty years — Bull and Seddon, Albiston and Turner, Bennetts and Gregory formed a band of devoted workers who have accomplished as much for their country as any other comparable group elsewhere." Woodruffe succeeded Gilruth as Dean at Melbourne University. During World War I, the veterinary school made thousands of human doses of anti-meningococcal antiserum in horses. Later, Seddon and Albiston directed the veterinary diagnostic and research laboratories which serviced the animal industries in New South Wales and Victoria respectively, and before going to the Council of the Scientific and Industrial Research Organisation — now the Commonwealth Scientific and Industrial Research Organisation (CSIRO) — Bull developed plans for a laboratory to serve the research and diagnostic requirements of the medical and veterinary services of South Australia (in conjunction with Sir Charles Martin, a former Director of the Lister Institute). The Institute of Medical and Veterinary Sciences was established in 1937. The concept was brilliant, allowing for cross-fertilisation of ideas between the medical and veterinary professions. Unfortunately, despite some successes, the arrangement did not live up to expectations and the two functions were recently separated. From 1929 to 1935, Gilruth was Chief of the Division of Animal Health of CSIRO (established in 1926), putting his energies into the direction of research on the major infective diseases.

W.T. Kendall occupies a special place in world veterinary history through his persistent efforts to establish the first school for veterinary education in Australia,
initially by lobbying the community for the creation of a government veterinary college and, when that was unsuccessful, by opening a private school in 1888, the Melbourne Veterinary College, which functioned effectively until responsibility for veterinary education was taken over by the University of Melbourne in 1909. Kendall’s other achievements included the establishment of the first veterinary association in Australia and he played an entrepreneurial and editorial role in trying to establish two of the first three veterinary journals in Australasia, all of which failed by attempting to be too ambitious.

In the mid- and late nineteenth century, laymen immunising cattle against *Mycoplasma mycoides* infection were instrumental in spreading *M. bovis* using inoculum taken from cattle with both pleuropneumonia and tuberculosis (29). Kendall took advantage of the presence of Pasteur’s representatives in Australia to receive instruction on how to cultivate *M. bovis*-free pleuropneumonia organisms in calves, supplying farmers for many years with pleuropneumonia vaccine, thereby reducing the spread of bovine tuberculosis and curtailing the occurrence of pleuropneumonia. Later, he was the first (1895) to test cattle with tuberculin imported from Germany (48). During the swine fever outbreak of 1903, Kendall was appointed to contain the disease. By making each veterinary surgeon in Victoria a temporary inspector of stock, suspending the marketing of store pigs and inspecting and branding all pigs sent to slaughter, the disease was almost eradicated within three months.

**SWILL FEEDING OF SWINE**

The 1927-1929 outbreak of swine fever was attributed to feeding ships’ garbage to pigs, and led to a prohibition for landing such waste at any Australian port unless it was destined for incineration (49). Feeding garbage to swine was outlawed in Australia in 1977 as a defence against the possible introduction of vesicular diseases. Coincident with this measure, the occurrence of salmonellosis due to *Salmonella cholerae suis* var. kunzendorfi has almost disappeared. (*Trichinella spiralis* is not present in Australia and is rare in New Zealand; *T. pseudospiralis* occurs in Tasmanian wildlife.)

**EFFLUENT**

Apart from the disposal of human sewage on special government farms, the problem of treating effluent from dairies, piggeries, calf-rearing lots and, more recently, from feedlots of beef cattle has not received the attention desired. Of particular interest is a yeast isolated by D.P. Henry (25) which has shown significant potential for degrading piggery waste; more recently, Henry has isolated other microbes which have wider application for degradation of many other types of biological wastes.

**ZOO NOSES**

Information on zoonoses in Australia is given by W.J. Stevenson and K.L. Hughes (54). Instructive booklets on the common zoonoses are available for distribution to workers in agricultural industries.
Parasites

_Echinococcus granulosus_ became established in Australia and New Zealand soon after settlement. A World Health Organisation (WHO) Collaborating Centre for Echinococcosis/Hydatidosis was established at Murdoch University in 1984, where morphological studies (59) have shown the existence of different strains, viz. a Tasmanian strain, an Australian mainland domestic dog:sheep strain and a dingo:macropod marsupial strain, although DNA homology studies (33) do not corroborate this finding. Irrespective of potential strain differences, policies against hydatid disease in Tasmania and New Zealand were based on similar principles and over two or three decades substantial advances were made in its control. In Tasmania, the prevalence of _E. granulosus_ in dogs has declined from 12.7% in 1965 to nil in 1991 (31). No new cases of human hydatid disease have been diagnosed in Tasmania in persons under twenty-two years of age since 1977, and the endemic cycle in sheep and dogs appears broken (19); none has been notified in New Zealand since 1974. Control measures were based on educating school-children and farmers about the cycle of infection by getting farmers to prevent dogs from eating infected offal. This was achieved by installing facilities to regulate the slaughter of sheep and disposal of offal on farms, introducing measures for the registration of dogs and restricting their uncontrolled movement, feeding commercial foods to dogs, regular surveillance and testing of dogs at risk to infection, judicious treatment, and by tracing infected sheep at slaughter to their farms of origin. An additional feature of the New Zealand campaign was the distribution of special instructive leaflets to gain the understanding and co-operation of Maori farmers and dog-owners.

Testing dogs at mobile caravans in Tasmania in direct view of owners elicited greater co-operation of farmers than in New Zealand where samples of purged faeces were sent to central laboratories (17, 47), undoubtedly affecting the rate of progress of the control schemes. In both regions the prevalence is now so low (e.g. New Zealand 1990 – less than 0.001% in sheep) as to present a dilemma over the cost-effectiveness of pursuing eradication and maintaining this status, compared to the cost of monitoring the current low prevalence by a variety of measures. Rickard’s group at the University of Melbourne, and Heath’s group at Wallaceville have been active in the search for improved diagnostic and immunogenic antigens which could be used against cestodes. Their work (24, 27) in developing the first recombinant vaccine against a cestode parasite (*Taenia ovis*) provides encouragement that genetically engineered vaccines against *T. saginata*, *T. solium*, _E. granulosus_ and _E. multilocularis_ are within reach, as is a reliable serological test for diagnosing _E. granulosus_ infection in dogs (16).

Flood irrigation of pasture with treated human sewage has been used to dispose of human faeces in Melbourne, Adelaide and a small number of country centres for almost a century. Today, only at Werribee (Melbourne) are cattle used for controlling grass growth on land fertilised with human faeces. Prior to 1933, when beef measles was first recognised there, no special measure other than routine meat inspection was used to restrict human consumption of meat originating from cattle on the sewage farm. The above episode, which appears to be related to a chance finding of a moderate but active infestation of *Cysticercus bovis* in one ox, provoked such interest in the community that legislation was enacted to prevent cattle on the farm being sent for human consumption (44). Release of cattle from this farm for slaughter and human consumption was granted during World War II, when the Commonwealth government moved to secure maximum supplies of meat. After the war, State
authorities continued this policy with the provision that only cattle over eighteen months could be turned off and that they must be slaughtered at specifically registered abattoirs where they are subjected to rigorous inspection. Carcasses with one cyst are automatically frozen for fifteen days; judgment on carcasses for domestic consumption is varied according to the number and distribution of cysts. Significant progress is being made in investigating the prospect of preventing *C. bovis* infection in cattle by vaccination (30).

Despite the uncontrolled introduction of *T. solium* in the intestine of migrants and tourists, *C. cellulosae* has never become established in Australia and is regarded as an exotic disease of swine. This circumstance has been favoured by regulations preventing the access of pigs to pasture fertilised by treated human effluent and intensification of the Australian pig industry with no feeding of pasture or crop forages.

Important contributions to public health were made by A.J. Bearup (3), who elucidated the life cycles, pathogenesis and epidemiology of *Spirometra erinacei* (sparganosis) and some human and zoonotic hookworms.

**Q fever**

No record of veterinary public health would be complete without reference to the outstanding medical research performed by E.H. Derrick (13) and his colleagues, and F.M. Burnet and M. Freeman (7) in elucidating the cause of abattoir fever (Q fever), now known to occur world-wide. Derrick’s colleagues demonstrated the roles of wildlife maintenance hosts (e.g. bandicoots) and tick vectors in transmitting *Coxiella burnetii* infection; but knowledge of the involvement of placentas, foetal fluids and udder tissue in propagating infection eluded them until overseas workers attributed Q fever in abattoir workers to their exposure to aerosols created during the slaughter of pregnant or lactating ruminants. Because infection of ruminants cannot be prevented, and prophylactic measures by management are either unpredictable in their effectiveness or industrially unacceptable, research has centred on attempts to prevent infection of workers by immunisation. R.A. Ormsbee’s findings in the United States of America have been adapted to produce a non-irritant immunogen comprising a small dose (25 /µg) of purified antigen, which produces effective immunity in non-sensitised subjects. This has resulted in the marketing of a highly effective Q fever vaccine, Q-Vax, which is now being widely promoted as protection for workers exposed to infection (34).

**Viruses**

Another medical group to the forefront of arbovirus research was led by R. Doherty at the Queensland Institute of Medical Research. Among the viruses studied, often in conjunction with CSIRO scientists, were Ross River, Barmah Forest and Sindbis viruses (15).

Velogenic Newcastle disease is not present in Australasia, but the causative virus (NDV) has been the subject of research in a number of Australian laboratories. The first reported human case was F.M. Burnet himself (6) who developed conjunctivitis after a laboratory accident with an infected egg. A second case occurred a few years later in the same institute. It has since been pointed out that these incidents passed unobserved, while a more recent case (1987) in a worker at the high security Australian Animal Health Laboratory was the subject of unjustified media attention.
The experimental inoculation of human volunteers with the virus of contagious ecthyma of sheep is of some historical interest (42). Lesions were mild, lasting for up to one month, and were followed by solid immunity.

**Tuberculosis**

Tuberculosis was widely established in cattle herds in Australia before the end of the nineteenth century and was the subject of an extensive government enquiry in Victoria in 1884-1885 (45). S.S. Cameron, appointed Veterinary Inspector to the Board of Public Health in Victoria in 1896, campaigned vigorously for the inspection of cattle for tuberculosis and the education of the public about the dangers of infection through the milk supply. Cameron’s efforts led to government inspection of dairies and the creation of a milk laboratory for routine testing of Melbourne's milk supply. Cameron became Chief Veterinary Inspector (Victoria) and because of a shortage of veterinarians he appointed and trained stock inspectors to screen animals for disease for later adjudication by veterinarians. In Victoria, affected cattle were rarely killed until the Cattle Compensation Act 1924 deemed farmers should be compensated for identified tubercular reactors, which encouraged the culling of infected cattle and swine. Using Koch’s old tuberculin, testing for bovine tuberculosis was largely carried out on a voluntary basis until World War II. Post-war control programmes within the various states were gradually expanded to cover the national dairy herd, substantially reducing the prevalence of infection, with eradication of tuberculosis from dairy cattle being achieved in the late 1960s. The impetus for changing from control programmes financed by the States to a national eradication scheme, financed by the cattle industry, the States and the Commonwealth, came with the advent of more sensitive and specific tuberculins, particularly purified protein tuberculin derived from *M. bovis*. National control and eradication commenced in 1976 and was based on first obtaining data on disease prevalence, then regularly testing herds, slaughtering cattle reacting to tuberculin, tracing cattle found infected at slaughter to their herd of origin, and maintaining effective quarantine to prevent re-infection in clean herds and areas (1). In the final stages of eradication, a gamma interferon assay for tuberculosis developed by CSIRO (50) is improving detection of anergic cattle. Compensation at market value has been paid to owners of infected and/or reactor commercial cattle, partly from consolidated revenue and partly from a levy on slaughtered cattle. Currently, most of Australia is free of bovine tuberculosis, and low prevalence of infection remains in remote herds of beef cattle in northern Australia. By 1989, 276 herds comprising less than one million cattle remained under eradication surveillance. The history of eradication of bovine tuberculosis from cattle in New South Wales has been described by P.J. Mylrea (40).

Factors hindering the final eradication of tuberculosis have been the reservoirs of infection in feral buffalo, incomplete mustering of stock in rugged areas, inadequate facilities for holding cattle for testing, operator fatigue under the conditions of test and the specificity (> 95%) of the tuberculin test. Helicopters have been used to locate and muster cattle in remote areas. Where there is persistent infection in extensively managed herds, emphasis in control is focusing upon de-stockling, including the slaughter of all buffalo herds where cattle are raised. The monitoring of slaughtered cattle and tracing of infection back to herds of origin continues throughout Australia.

Testing for tuberculosis in dairy herds in New Zealand began in 1945, using old tuberculin administered intradermally. The scheme was free, and initially voluntary. Compulsory testing for town supply dairy cattle commenced in 1956, for factory
supply dairy cattle in 1961 and for beef cattle in 1970. By 1991, only 2.7% of cattle herds and 3.7% of farmed deer herds were infected. Eradication has been hampered by a high endemnicity of *M. bovis* infection in possums (*Trichosurus vulpecula*), providing significant sources for reinfection of cattle.

**Brucellosis**

The national policy for eradication of brucellosis was implemented in 1970 (1). Prior to this, Tasmania had made significant progress in controlling the disease (reducing prevalence from 13% to 2.6% in thirteen years) and was declared provisionally free in 1972. Elsewhere, control programmes were largely conducted on an *ad hoc* basis, for the accreditation of breeding herds. The national eradication policy was based on the compulsory immunisation of cattle and the culling of reactors to serological tests until the prevalence of brucellosis declined to about 2%, after which vaccination was prohibited and compulsory testing of cattle began for brucella antibody (complement fixation titre $> 1:2$). Strain 19 was used throughout Australia except in remote areas where 45/20 was used. Vaccination was phased out in the early 1980s.

The testing regime for brucellosis comprised the screening of sera by the Rose Bengal Plate test and bulk milk by the Milk Ring test. Positive serum samples were assayed by a complement fixation test, and where there was a positive bulk milk test cows were tested individually. All reacting cattle were slaughtered and compensation paid, as for tuberculosis.

Restrictions were placed on the movement of cattle from herds in eradication or control areas to areas declared to be free of disease. Brucella-free status was maintained by monitoring sera obtained from identified cattle and herds using a trace-back tail tagging system, latent infections were detected by anamnestic response to an injection of 45/20 vaccine, and aborted foetuses were monitored for *Brucella abortus* infection.

Australia and New Zealand are now free of bovine brucellosis. The eradication programmes have effectively boosted productivity, avoided a potential threat to export markets for meat from these countries, and eliminated a potential health hazard for humans. *B. suis* infection remains endemic in feral pigs in Australia, so that processing feral pork remains a risk for pig hunters and abattoir workers servicing the export market. Brucellosis is not endemic in commercial piggeries: *B. suis* is absent from New Zealand; *B. melitensis* is absent from Australasia as a whole.

**Leptospirosis**

Research into haemoglobinuria of calves, abortion and mastitis of cows, and neonatal mortality in swine was spearheaded by research workers at the Animal Research Institute in Queensland (57) and later work on epidemiology by Marshall in New Zealand. Along with Q fever, leptospirosis is one of the two most important agricultural zoonoses, as well as being an important cause of infection among those enjoying recreational sports along natural waterways. One feature which has been associated with higher prevalence of industrial leptospirosis has been the trend towards larger herds and the use of raised platform dairies or herringbone dairies with “pit” access areas for operators, both of which lead to potentially increased exposure of the face to splashing urine. Recognition of the ways in which infection can be minimised/prevented by improved personal hygiene, attending to management
practices and effectively immunising cattle against leptospirosis to reduce human exposure have been important developments in veterinary public health in Australasia.

**Melioidosis**

Queensland workers (10) were also to the fore in recognising the occurrence of *Pseudomonas pseudomallei* in animals in Australia, and that soil, or more particularly water and mud, were the reservoir of infection to animals and humans. Some public health concerns remain in tropical Australia about the possibility of *P. pseudomallei* being spread by the drinking of raw goats’ milk.

**Salmonellosis**

Prior to the 1960s, investigations into salmonellosis concentrated on assessing prevalence, epidemiology, and tracing the source of infection for outbreaks of disease. *Salmonella dublin* was first isolated in 1941 but it was not until the 1970s that it spread rapidly, affecting calves and then adult cattle; infection is now endemic in southeastern Australia. *S. typhimurium* is also widespread in Australasia. While a few isolates of *S. enteritidis* phage type 4 are isolated annually from poultry or poultry products, they do not appear to have the virulence of European strains and local infection is of no consequence.

The development of export trade in live sheep brought with it increased awareness of the need to combat salmonellosis (20) as in early shipments 42% of sheep deaths during shipping, or while being fed prior to shipping, were attributed to the disease. In combating this loss, attention first focused on animal welfare issues and management, by training sheep to eat pelleted feed in troughs before embarkation and by reducing the proportion of “shy feeders”. Considerable effort was put into researching factors influencing the transition from pasture to shipboard conditions, in some instances using simulated voyages. This had important benefits for the welfare of animals and reduced mortality significantly, but the unpredictable occurrence of salmonellosis helped stimulate a search for effective vaccines. There have been very successful recent trials with a vaccine based on Stocker's genetically-controlled, live, non-reverting, aromatic dependent mutant of *S. typhimurium* to prevent sheep dying from salmonellosis in the live sheep trade (4), although more work is required before this vaccine can be exploited commercially.

**Lyme disease**

Lyme disease was first recognised clinically in Australia in 1980, although there is serological evidence of its earlier existence (54). Much remains to be learnt about the epidemiology of Lyme disease in Australia and the vectors have not been identified.

**Dairy Health**

The importance of monitoring dairy health has not been lost on Australia and New Zealand, which have relied significantly upon the export value of their dairy produce; C.D. Wilson’s 5-point programme for controlling mastitis was commonly practised. New Zealand has been a leader in mastitis research from early times. By the 1930s, a system for controlling mastitis was widely practised, based on disinfection of teats after milking and on the Whiteside test, whereby those cows with more
significant reactions were milked last. Even by this time experimental and commercial vaccines had been tried extensively without benefit. Contributions to veterinary public health by Australian scientists include the pharmacodynamic studies of the therapeutic value of penicillin for mastitis (39), the incorporation of dyes into intramammary antibiotic infusions to encourage farmers to discard milk containing antibiotics (12), the modification of teat cups by installing baffle plates to prevent backflow of milk during milking (35) and the development of herd health programmes for the control of bovine mastitis (38). As part of health programmes, "dry cow intramammary therapy" is now widely practised throughout Australasia.

In 1977, an episode of gastro-enteritis in infants was traced to salmonella contamination of dried milk used to manufacture dried infant foods in Victoria. This had far-reaching effects on industry, with the setting-up of a regimen for routine sampling of dried milk powder from all factories, requiring the education of factory workers in combating salmonellosis, establishing a process of export certification that dried milk had met Australian microbiological standards, and improving the existing system for reporting the isolation of salmonellas to health authorities.

More recently, industry has responded to increased international awareness of the potential for food-borne transmission of Listeria by adopting comprehensive food standards for listeria clearance from dairy products.

**MEAT INSPECTION AND MEAT HYGIENE**

The Australian export trade in meat to the United Kingdom had its beginning when the world's first freezing works were built on Sydney's waterfront in 1861, giving impetus to the establishment of formal inspection processes to satisfy overseas requirements for the domestic sale of meat. Following Mort's failed venture to export meat on the Durham in 1873, the first successful cargo of frozen meat (and butter) arrived at London in 1880, on the S.S. Strathleven.

Between 1890 and 1910, Argentina established a successful mercantile business in chilled meat which had dire consequences for the Australian frozen meat trade. Chilled meat was more acceptable to consumers and, because of much shorter shipping time from Argentina to Europe than from Australia, spoilage of meat en route was of less significance. Over the ensuing decades, scientists at CSIRO (Empey, Scott, Vickery) examined methods for achieving conditions of hygienic slaughter and chilling to allow Australia to regain its competitiveness. Research on meat in Australia has concentrated on muscle structure and microbiological spoilage, and has led to the delivery of fresh products to almost any market. However, the discovery that chilled meat had negligible microbial contamination and growth when transported in atmospheres of carbon dioxide was also of major significance for Australian trade (61).

C.S.M. Hopkirk (26) also attributes the unfettered multiplication of stock in New Zealand to the opportunity to supply the British domestic market with meat and dairy produce after the introduction and refinement of methods for freezing and storing meat, and to the international development of a mercantile industry equipped with ships fitted with cold storage facilities. The first frozen meat cargo to leave New Zealand (in 1882), on the sailing ship Dunedin, contained 3,521 mutton carcasses, 449 fat lamb carcasses and 22 carcasses of pork; it took ninety-eight days to reach
England. By 1931, the storage capacity for mutton alone was estimated to be 5,582,549 carcasses (of 27 kg each). Trial shipments of chilled beef using the CO\textsubscript{2} method were made in 1933, although the New Zealand beef industry has been always dwarfed by the mutton and lamb, wool and dairy industries.

Records of early meat inspection procedures in Australia are sparse, but clearly even by the early 1900s they were inadequate, as United Kingdom authorities complained of numerous onchocerca nodules left in beef briskets, and rejected some shipments of Australian forequarter beef. Such nodules did not occur in European beef carcasses and were investigated thoroughly by J.A. Gilruth and Georgina Sweet (18). To overcome objections, the brisket was excised from the forequarter and the balance exported separately as a crop. This was necessary more for aesthetic or political than for public health reasons, as *Onchocerca gibsoni*, if ingested, has not been shown to be harmful to humans. The stifle joint was also opened and connective tissue examined for nodules.

As a result of overseas concern with Australian beef, the Commonwealth Government invoked its constitutional powers and appointed a veterinary officer to supervise inspection of export beef in Queensland. This was later extended to cover the export trade in all states of Australia. In 1916, the Commonwealth Government expanded its role by establishing an inspection service of meat inspectors under Commonwealth jurisdiction. Primary inspection was carried out by meat inspectors with veterinarians advising and having overall responsibility, as is still the case in abattoirs slaughtering solely for the Australian domestic market.

The studies by F.H. Grau and L.E. Brownlie (22) led to recognition that salmonellae increased in the forestomach and mesenteric lymph nodes (37) when ruminants are stressed by transportation, overcrowding, deprivation of food and water and by wide fluctuations in environmental temperature. In addition, studies by M.G. Smith and F.H. Grau (53) showed that hides of slaughtered cattle were frequently contaminated with salmonellae. W.A. Royal (c. 1965) flirted with the concept of competitive exclusion and the inhibitive effect of volatile fatty acids. Where tuberculosis was not a risk, slicing lymph nodes which are palpably normal was seen to be contraindicated because of potential transfer of salmonellae onto knives. These studies were the catalyst for revising slaughtering protocol and meat inspection procedures to minimise contamination of carcasses from pathogenic bacteria on hides (41), on knives with their associated scabbards used in slicing lymph nodes or trimming, on other meat processing equipment and on the hands of abattoir staff (52). Awareness developed that the variable prevalence of contamination at different stages of processing was a reflection of different work practices in abattoirs. Recognition that meat inspection procedures were developed around the need to detect tuberculosis in all its forms has led to further modification of procedures for domestic meat inspection (32) now that bovine tuberculosis has been eradicated from all but a relatively small area of northern Australia. In effect, these recommendations reduced the number of incisions of lymph nodes and, in 1986, the Commonwealth made similar reductions for export meat. A review is underway which may see further reductions.

Inspection procedures and judgements for international trade of meat are based on European and North American disease regulations. These judgements are particularly harsh for New Zealand lamb which is free of all OIE List A diseases, and enforcement of these regulations increases the cost of processing. In such circumstances, less rigorous inspection adds little or no risk to the search for lesions.
It is becoming increasingly evident that in countries where disease recognition systems are effective, inspection procedures for the export meat trade should be based upon the prevalence of defects or diseases in each country, and not on an internationally common procedure (23).

Animal welfare issues such as humane slaughter of stock, minimal stressing of animals transported for slaughter and de-horning (which also reduces bruising) have provided further impetus to change in veterinary public health practices (5, 21). Illegal substitution of one species of meat for another in commercial overseas markets led to the development of a plethora of tests which could differentiate the host origin of raw and cooked meat products, e.g. agar gel diffusion (58), iso-electric focusing (51), enzyme-linked immunosorbent assay (ELISA) (62) and radio-immune assays (28), which are more reliable than simple precipitin tests. Standards and prohibitions were also developed for livestock feed additives (2).

Effect of the Pure Foods Act

The United Kingdom remained the primary market for Australian frozen meat until the early 1960s, when the United States of America became the major importer of Australian manufacturing beef. The enactment of the Pure Foods Act 1965 in the United States of America was of crucial significance to the Australian meat export industry. This act laid down detailed requirements and standards for meat slaughtering, processing and storage within the United States of America and in those countries exporting meat to the United States of America. These standards are now the basis of Australia's current meat orders, and to satisfy the new requirements more meat inspectors were recruited and more veterinarians employed, many from overseas.

At the time when the need came for more inspection staff, due to increased inspection procedures, Australia's national cattle herd and sheep flock were at their highest ever level, and the meat export industry was booming. Since then, national livestock numbers have decreased substantially and, until recently, changes in inspection procedures have mainly resulted from crises and threats to Australia's export trade.

Up to the 1960s, the majority of meat exported was fresh, chilled, frozen or canned. With the increase in fast-food products such as hamburgers, the export of boneless meat became popular. This brought changes to the technology of production, including ante-mortem veterinary inspection and post-chilling processing of bulk meats, with the advent of cartoned meat versus carcass or quarters. Veterinary input increased in the inspection process due to the need to make morbid diagnoses and the use of veterinary skills in problem-solving and epidemiology. The number of veterinary staff increased from about fifteen to 190 during the late 1970s, and currently stands at 160. In 1971, the first quality assessment system using structured recording and reporting was established for boneless meat. There is an increase in this type of inspection, viz. the use of quality management procedures to maintain suitability of food products for human consumption, which is important as food-borne transmission from animal products is rare in Australasia, due to the excellent herd health status. When food poisoning occurs, it is due to handling practices among retailers and consumers. Building up an awareness of the dangers of unhygienic handling practices after processing is an important element in developing quality management systems. The adoption of the concepts involved in Hazard Analysis and Critical Control Point (HACCP) analysis is an essential part of this process.
Australasian trade has always been at the mercy of political authorities in other countries, however the maintenance of sound scientific and veterinary controls has assisted in minimising this interference. In 1970, the United States of America banned the import of Australian mutton because of caseous lymphadenitis (CLA) in sheep carcasses. (Trade bans had been in place some thirty years earlier, providing the stimulus for the studies by Carne into pathogenesis of CLA.) The market was re-opened after the veterinary staff of Australia and US Federal Inspection Service developed inspection techniques which removed lesions or carcasses when the disease was systemic. The market was closed for about three months. (CLA is less prevalent in New Zealand, and all suspect cases are subjected to stringent inspection.) Sweden also demanded more rigorous standards for inspection of Australian meat destined for its market, after a serious outbreak of human salmonellosis (1977) was traced to ingestion of raw meat from Australia. Such incidents are exceptional.

Meat is recognised as a major vehicle for the transmission of pathogens to humans. Traditional meat inspection indirectly addresses the risk from food-borne pathogens by monitoring hygiene in abattoirs, by hygienic dressing procedures to minimise contamination and with effective use of refrigeration.

The development of quality assurance programmes based on HACCP principles has gained momentum internationally during recent years. Such programmes provide a more specific and critical approach to the subject of microbiological hazards than historical inspection processes. The strategy addresses microbiological risk during production, rather than relying on inspection to remove the risk. The Australian Quarantine and Inspection Service (AQIS) has been to the forefront in developing quality assurance programmes which can be adapted by industry into everyday operations, and in providing the concept of quality assurance for use both in Australia and internationally. Quality assurance provides expanded opportunities for self-regulation in industry within a structured framework, while at the same time improving the safety of meat.

Woodward Royal Commission

Incidents of meat substitution detected in 1981, although limited to a handful of unscrupulous operators, had the potential for detrimental effects on Australia's export meat industry largely due to media attention. Australia responded by introducing very stringent security arrangements in boning rooms, chillers and cold stores such as sealing of cartons, chambers and transport vehicles, introduction of meat transfer certificates, species testing, etc.

The 1982 Woodward Royal Commission had far-reaching effects on both domestic and export meat industries. Existing legislation was found to be inadequate in the level of penalties, and also in that many of the "offences" uncovered, although considered unethical and not within the intention of the law, were not actual breaches of the legislation and therefore not subject to prosecution. The Export Control Act and its associated Orders were devised to remove these loopholes. The Commonwealth Government established the Export Inspection Service (EIS), now AQIS, to be responsible for inspection of all export meat.

Organochlorine and antibacterial residues

In 1987, port-of-entry testing of Australian meat products by US authorities detected violative levels of organochlorine residues. Trade to the United States of
America was actually halted until Australia could demonstrate that procedures were in place to ensure that no violative meat was included in export consignments. Exhaustive testing of fat samples was initiated to detect and condemn carcasses with residues above the maximum residue limits. As time progressed, Australia was able to clear farms of origin through extensive farm-by-farm testing. It was found that the percentage of violative meat was around 0.4% on a national basis, which Australia had recognised through its national residue survey (established since 1962). The traceback mechanism put in place during this period is unsurpassed elsewhere. The advantages of this traceback system clearly go beyond detection of residues, with benefits extending to all aspects of Australia’s livestock industries such as control and eradication of endemic and exotic diseases, and feedback to producers of information from post-mortem examinations and from tests carried out during processing. Australia’s approach to antibacterial residues in livestock products has been to educate veterinarians and farmers about the use and misuse of antibacterial agents, and to detect their unauthorised presence by regular screening of products during processing. It has also been promoting the need for international cooperation in developing uniform methods of testing for residues.

EDUCATION

With Australasia being so reliant upon animal production, the five veterinary schools have maintained a substantial content of veterinary public health in their curricula. The first postgraduate course in veterinary public health was established by Francis at the University of Queensland in 1975, but there are now similar courses with differing emphases at most of the Australasian veterinary schools. Continuing education is provided by courses run by the universities and by the Australian College of Veterinary Scientists through its Chapter in Veterinary Public Health. Perusal of the indexes of the Australian Veterinary Journal (established 1925) and New Zealand Veterinary Journal (established 1953) shows how important these two journals have been in contributing to international veterinary public health.

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HISTOIRE DE LA SANTÉ PUBLIQUE VÉTÉRINAIRE EN AUSTRALASIE. - K.L. Hughes.

Résumé: L'isolement géographique de l'Australasie a contribué de façon importante à limiter l'introduction de maladies exotiques ou la propagation de
celles qui furent introduites lors de la colonisation. Certaines maladies, telles que la gale psoroptique, la tuberculose ou la brucellose, se sont largement répandues et il a fallu, pour en limiter la diffusion, recourir davantage, pour le bétail, au transport ferroviaire ou routier, améliorer les moyens de repérage et de rassemblement des troupeaux en brousse (par hélicoptère) ainsi que les épreuves diagnostiques et appliquer des méthodes permettant d'identifier les élevages d'origine des animaux reconnus malades ou porteurs de lésions à l'abattoir.

L'importance de la mortalité due à la fièvre charbonneuse entre 1860 et 1880 a conduit un consortium à créer à Sydney, en association avec l'Institut Pasteur, un laboratoire qui produisit un vaccin contre le charbon bactérien de 1890 à 1898. Le vaccin développé par Pasteur et administré en deux injections ne put concurrencer un vaccin sporulé utilisable en une seule injection, qui fut obtenu sur place par Gunn et McGarvie-Smith. En Australasie, les principales réussites en santé publique vétérinaire ont été l'éradication de la brucellose, l'éradication quasi totale de l'hydatidose en Nouvelle-Zélande et en Tasmanie, les progrès substantiels réalisés vers l'éradication de la tuberculose des principales régions d'Australasie et la mise au point et la commercialisation d'un vaccin contre la fièvre Q chez l'homme.


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HISTORIA DE LA SALUD PÚBLICA VETERINARIA EN AUSTRALASIA. – K.L. Hughes.

Resumen: El aislamiento geográfico de Australasia es un factor que impidió significativamente la introducción de enfermedades exóticas y limitó la propagación de las que fueron introducidas después de la colonización. Algunas enfermedades como la sarna psoróptica, la tuberculosis o la brucelosis se propagaron extensamente y, para limitar su difusión, fue necesario desarrollar más intensamente el transporte del ganado por tren o camión, mejorar los métodos de localización y de agrupamiento de los rebaños en las sabanas (por helicóptero) así como las pruebas de diagnóstico, e introducir métodos eficaces para identificar los rebaños de origen de las enfermedades señaladas en los mataderos.

La alta mortalidad en Australia debida al carbunco bacteridiano entre 1860 y 1880 incitó un consorcio a crear en Sydney, con la ayuda del Instituto Pasteur, un laboratorio que produjo una vacuna contra el carbunco de 1890 a 1898. La vacuna desarrollada por Pasteur y administrada en dos inyecciones no pudo competir con una nueva vacuna esporulada administrada en una sola inyección, que fue posteriormente puesta al punto en Australia por Gunn y McGarvie-Smith. Los mayores logros de la salud pública veterinaria en Australasia han sido la exitosa erradicación de la brucelosis, la erradicación casi total de la hidatidosis de Nueva Zelanda y Tasmanía, el progreso significativo logrado en la erradicación de la tuberculosis de toda Australasia exceptuando algunas regiones muy limitadas y la puesta al punto y la comercialización de una vacuna contra la fiebre Q en el hombre.

PALABRAS CLAVE: Brucelosis - Carbunco bacteridiano - Control - Erradicación - Hidatidosis - Pasteur - Tuberculosis.

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