Foreword and acknowledgements

Some amazingly detailed and scholarly accounts of the history of the veterinary profession have been written—but this is not one of them.

As a small booklet, this document can only paint the very broadest brushstrokes of the history of government veterinarians (vets) in Australia. This booklet also aims to celebrate the many achievements of government vets in Australia, and reveal the obstacles they faced, without—hopefully—boring the reader to death.

Some personal observations (in brackets) are scattered throughout the book to keep things interesting.

While an anecdotal history, this booklet refers to existing historical research, and uncovers a past which does government vets and the veterinary profession in general great credit.

It is fitting, then, that this booklet is the Australian Government Department of Agriculture, Fisheries and Forestry's official contribution to celebrating World Veterinary Year in 2011.

Many people assisted with the production of this booklet by providing materials, comments, references and permissions. They include the following: state and territory Chief Veterinary Officers; staff and members of the Australian Veterinary Association and Australian Veterinary Historical Society; and staff from CSIRO AAHL, Animal Health Australia and the Australian Government Department of Agriculture, Fisheries and Forestry.

I hope you enjoy *A Veterinary Awakening*.

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Section 1

A brief world history of veterinary medicine—including demons and divine wrath

The veterinary profession has come a long way over the past millennium.

Vets will be relieved to know that in 2011 it's unlikely they'll be required to chant incantations, make a ritual sacrifice, perform an exorcism or use any amulets, fetishes or totems—all legitimate animal healing practices in early times. Even following the appearance of veterinary surgeons in the 1700s, the use of magic to treat animals remained standard for animal doctors.

What's more, demons, divine wrath and metaphysical (occult) forces were blamed for pretty much every illness affecting domestic and wild animals.

A treatment for sick cattle from the late tenth century *Lacnunga* ('Remedies')

Take the wort, put it upon gledes and fennel and hassuck and 'cotton' and incense. Burn all together on the side on which the wind is. Make it reek upon the cattle. Make five crosses of hassuck grass, get them on four sides of the cattle and one in the middle. Sing about the cattle the *Benedicite* and some litanies and the *Pater Noster*. Sprinkle holy water upon them, burn upon them incense and give the tenth penny in the Church for God, after that leave them to amend; do this thrice.

Thus, outbreaks of rinderpest in Europe during the Dark Ages were often attributed to the influence of earthquakes, floods and comets. Pity also the poor souls who followed the recommended seventeenth century occult cure for broken wind in horses—a mixture of toads, swallows and roasted moles!

If the moon, stars and planets were not blamed for sickness, people looked next to demons and witches. *Maleficia* was the Latin term for a witch's evil acts, the most common of which was inflicting disease upon humans or livestock. In Europe and America, from the fourteenth to eighteenth century, one of the first questions often asked about animal disease was whether it was natural or caused by a witch.

In Ancient Egypt, the goddess Sekhmet was worshipped as the 'Lady of Pestilence' who could either avert plague and cure disease or send plagues against those who angered her.

Her priests—skilled healers of humans and animals—coated her statues with anthrax to protect them from theft and vandalism.

Other influences on animal healing were Ancient Greek theories of humoral pathology and miasma. Miasma, a form of 'bad air', was thought to cause diseases such as cholera. In contrast, humoral pathology viewed disease as a result of disturbances of body juices—blood, mucus and bile. Standard treatment for the latter was 'bleeding', a practice which persisted into the nineteenth century and gave rise to doctors and vets being called 'leeches'.

The word 'veterinarian' comes from the Latin *veterinae* meaning 'working animals'. In the first century, Columella, a Roman scholar and writer on animal care and breeding, used and recorded the term 'veterinarius' for a person who takes care of pigs, sheep and cattle. The term 'veterinarian' was first used in print by Thomas Browne in 1646.

While the Ancient Greeks contributed an investigative approach to explaining bodily structure and function, and developed comparative medicine, the idea of controlled scientific experiments would not appear until the nineteenth century.

Veterinary medicine goes along for the ride

From the first century AD until 1762, veterinary medicine developed mostly in conjunction with the growing military importance of the horse. However, while military efforts to maintain horse health contributed much to the development of veterinary medicine, military campaigns also frequently assisted disease spread during this period.

The knowledge gained during this period was captured in hand-written texts which—following the invention of the printing press—were reproduced in print and became influential veterinary texts. The first of these appeared in 1528, and was a copy of Vegetius' *Mulomedicina*—a comprehensive equine veterinary text produced around 500 AD.

Vegetius' work (see the text box) was a mix of magical, humoral and observation-based treatments and theories. Another influential print text reproducing knowledge from the first century was the *Hippiatrica*—a collection of letters between vets (often also farriers), cavalry officers and castrators. The large number of similar texts produced, many on royal order, following the advent of the printing press illustrates the importance of the subject at the time.

> ...this Distemper proceeds from great Labour and Fatigue, if Negligence follows upon it. Sometimes...from too much violent Heat, or from being exposed to a vehement Cold, or from the crudity of his Food, or from a suddenly growing Cold after being in a Sweat, or from the heat of new Barley.

Hapsburg Empress Maria-Theresa desired a new class of qualified veterinarians in her realm but recognised that the Austrian public held animal workers in low esteem. To overcome this barrier, she issued a decree in 1765 ordering punishment for anyone who opposed the teachers of the new veterinary profession.

A child of the Enlightenment: The first veterinary school

The eighteenth century Enlightenment, when reason and science began to usurp religion and magic in understanding the natural world, saw a more scientific approach to animal diseases. The Enlightenment also prompted the establishment of scientific academies in France, which promoted and organised new scientific disciplines—including veterinary science.

Along with the Enlightenment, another important impetus for the establishment of a veterinary school in France was animal disease outbreaks. Between 1710 and 1714, half the cattle in France were destroyed by rinderpest. More widely, the disease is thought to have reduced the cattle herds of Europe by several million in the early eighteenth century. There was public outcry, and most European states began to pressure their medical establishments for action.

Since little was still known about rinderpest when France suffered another outbreak in 1750, in 1761 Claude Bourgelat was able to persuade King Louis XV of France that the medical profession's efforts against the disease had failed. What was needed, Bourgelat argued, was a school producing trained veterinary specialists equipped with the scientific knowledge to combat rinderpest.

The king agreed to the idea, and a royal decree was drawn up which pithily described the school as a place 'where would be taught publicly the principles and the method to cure the diseases of livestock that would procure imperceptibly for the agriculture of the Realm the power to conserve livestock in times where this epidemic desolates the countryside.'

Having secured the king's agreement (and a grant) to found the school, Bourgelat oversaw the establishment of the first permanent veterinary school in Lyon in 1762, and a second in Alfort in 1765. These French colleges of veterinary medicine were to produce a number of important veterinary leaders instrumental in widely disseminating veterinary science and germ theory.

Over the next two decades, six similar veterinary schools were opened in Western Europe, and in 1791 the Royal Veterinary College opened in London. England's first veterinary school proclaimed itself, 'For the Improvement of Farriery and the Treatment of Cattle' and was headed by a graduate and former teacher of the Alfort veterinary school.

With the founding of the Royal Veterinary College in London, qualified vets there sought to distinguish themselves from unqualified competitors such as farriers, horse doctors, blood-letters, cow leeches and castrators. However, they were at first largely unsuccessful, prompting qualified army vet George Fleming to complain 'Veterinary

surgeons are only too often… looked down upon as little, if at all, removed from the illiterate farrier or cow-leech…'

Even with the introduction in England of the *Veterinary Surgeon's Act* in 1881, which regulated the use of the title 'veterinary surgeon', the situation improved only slightly (Australia's early veterinarians faced the same challenges, as will be seen in the next section). Throughout the 1800s scientific progress also failed to trickle down to the masses. Many European peasants and laymen clung to their belief that evil spirits caused animal disease, and that fire was an effective deterrent.

Scientific developments in bacteriology, parasitology and immunology were important for the further development and enhanced credibility of the profession—and the development of government veterinary services. Thus, vets such as Johann Frank, Jacques de Solleysel, Erik Viborg, Frederick Brauell, Jean-Baptiste Auguste Chauveau and HMO Delafond contributed much to the understanding of infectious diseases, both human and animal, and to the veterinary services.

The 'father of modern pathology', Rudolf Ludwig Karl Virchow of Schivelbein (Pomerania), coined the term 'zoonosis' to describe infections of animals that are in turn contagious to humans. Virchow founded the medical fields of cellular pathology and comparative pathology and was known for constantly urging his students to 'think microscopically'.

A highly selective timeline of early veterinary history

1900 BC Early Egyptian priest-healers record their veterinary techniques in the *Papyrus of Kahun*

500 AD Vegetius compiles the *Mulomedicina sine Ars Veterinaria* using his own and earlier Greek and Latin writings

650 AD Sun Yang writes one of the first Chinese veterinary medicine texts

800 AD Bachar publishes the *Book of Animals* (Kitab El Chaiwan), the first book in Arabic collating veterinary information on the treatment of animals

1000 AD The *Hippiatrica*—a Byzantine encyclopedia of horse medicine—is compiled by the Order of Constantine Porphyrogenitus

1500s *Propertees and Medcynes for a Horse and Mascal of Oxen, Horses, Sheepes, Hogges, Dogges* is anonymously published, as well as John Fitzherbert's *Boke of Husbandrie* (Book of Husbandry)

1530 Rusius' *Hippiatria* (the study/work of a horse doctor) is widely circulated in print

1598 Ruini's *Anatomy of the Horse* is published

1761 The first veterinary school (in Lyon) is founded

1791 The Royal Veterinary College is founded in London

1800s The microscope reveals the world of microbes, and a scientific method for identifying larger disease organisms and their role in the disease process

1802 Delabere Blaine writes the first English scientific exposition of veterinary medicine: *Outlines of the Veterinary Art*

1865 Identifying divine wrath as the source of Britain's rinderpest outbreak, Queen Victoria orders prayers to be made in every English church

1867 Medicine (both human and veterinary) benefits from the introduction of antiseptics by Joseph Lister

1868 French veterinarians Jean Villemin and Auguste Chauveau prove the infectiousness of tuberculosis in animals

1881 The *Veterinary Surgeon's Act* is passed in England and an anthrax vaccine is developed by Louis Pasteur

1882 Pasteur creates a rabies vaccine and Robert Koch discovers the tuberculosis bacillus

Australia's early road to government veterinary services

West coast Tasmania, town festival in the early days. Archives Office of Tasmania. ADRI AB713-1-3950.

New Holland and animal disease

In 1788, there were no veterinarians accompanying the First Fleet livestock brought around to New Holland—as Australia was then known. Six of the 18 000 convicts transported from around 1817 onwards gave their occupation as veterinary surgeon. However, it's unlikely that they were qualified vets (as vets are known to be people of strong moral fibre and hardly likely to steal a loaf of bread).

While qualified vets may have been absent, early colonists would have included farriers, farmers with animal husbandry skills, equine enthusiasts and stock breeders. On travelling to New Holland, they would have brought with them popular veterinary texts of the day such as *The Gentlemen's Farriery* and *The Family Horse Doctor*.

Fortunately for Australia, despite diseases such as rinderpest ravaging Europe during the 1800s, not many animals were shipped from there to the New South Wales colony (New Holland's largest colony) before 1820. Instead, shorter voyages were made from southern Africa, India and parts of South-East Asia. This meant that it wasn't until the 1850s that the colonies began to feel the effects of diseases introduced from the 'old-world'.

Thus, in 1800, Governor Philip Gidley King of New South Wales could report that, 'where sheep were taken care of they do very well' and in 1806 that 'No cattle in the world are less liable to disease than those in New South Wales.'

The gold rushes of the 1850s, however, greatly spurred migration and trebled Australia's population within a decade. Before then, the impact of more serious infectious diseases and parasites was limited by extensive (rather than intensive) livestock farming, and Australia's geographic isolation and unique ecosystems. But the rapid growth of Australia's population required more imports of livestock and their products, and more intensive livestock production. The development of refrigerated shipping also created rapid expansion in the dairy and beef export industries, although mishaps continued to result in some extremely rancid loads of meat and dairy arriving in England.

Unfortunately, with all these developments came disease, and while livestock quarantine laws were enacted in the 1870s, this was too little, too late. Consequently, imported livestock and products brought with them to Australia tuberculosis, bovine pleuro-pneumonia, foot and mouth disease, anthrax and a host of other diseases.

Scab here, there, everywhere

There was one livestock disease that did manage to make itself unwelcome very early in the history of the colonies—sheep scab.

It's thought that the first 44 sheep brought to Australia carried scab and footrot. By 1832 sheep scab was such a problem that legislation was passed for its control in New South Wales. This was Australia's first animal disease legislation.

Essentially, the *Scab Act 1832* prohibited the owners of infested sheep from turning them out onto others' property or driving them on any road. Under the legislation, male convicts found guilty of this could be 'worked in irons on the roads for up to six months'!

With outbreaks of sheep scab continuing to threaten the wool industry, other states also enacted scab legislation. Then, as legislation evolved, the colonies appointed scab inspectors with powers to inspect, detain, seize and destroy infected sheep.

FACT: Between 1830 and 1850 the value of Australian wool exports increased from £2 million to £41 million!

The problems with scab in the colonies did not lead pastoralists or the government to seek veterinary assistance. Somewhat of a law unto themselves, the oligarchy of wealthy graziers with vast properties and huge herds preferred to solve livestock problems in their own way—and ways compatible with their extensive livestock production, based on economies of scale. A prime example of this was their approach to the sheep scab problem. Instead of employing vets or shepherds to control scab, pastoralists instead invented acaricides, dips, races and drafting gates which allowed the treatment of thousands of sheep daily.

As a powerful group, pastoralists also easily effected legislative change, and were responsible for many acts and bills being introduced to protect their interests. Legislation steered by a wealthy pastoralist through the New South Wales Parliament in 1864 saw dipping made compulsory. This was regulated by the establishment of a permanent scab inspectorate funded by scab fees collected from pastoralists.

These moves—quickly imitated by other colonies—led to the eradication of sheep scab in 1896 from the continent, and Australia's first successful disease eradication. It was a low-tech affair, and mainly successful due to producer cooperation and the enforcement of legislation initiated by high-handed pastoralists. However, these measures were to become the foundation of animal disease control in Australia, and the government veterinary services. Scab inspectorates eventually grew into stock branches as their disease control roles expanded. Stock branches would later require the help of vets to tackle more serious animal diseases.

As a result of this development, instead of a state veterinary service like those in Europe, each Australian colony had a government 'stock branch', headed by a Chief Inspector of Stock. These were laymen rather than vets, and their attitude in general towards vets is best summed up by the withering comment of Victoria's Chief Inspector of Stock, Edward Curr, about 'the worthlessness of professional knowledge'.

Spare a thought for the scab inspector…

Scab inspectors were sometimes deeply unpopular people. Upon his appointment, William Dumbleton was described as 'disqualified for the office because of… his absolute ignorance of diseases of sheep'. Similarly, the *Adelaide Chronicle* said of sheep brought into Adelaide 'they are a mass of disease and yet this is allowed notwithstanding the appointment of an Inspector of Scab (who bye the bye (sic) does not know a scabby sheep from a clean one)'.

Australia's first scab inspector appears to have been William Dumbleton, appointed under the *Scab Act 1840*. A former butcher, Dumbleton was paid roughly £27 every three months. This seems slight reward, considering that in 1856, South Australia's handful of scab inspectors visited 35 sheep stations, inspected 186 274 sheep and travelled 1622 miles by horse.

Australia's pioneer vets

The livestock industries—wool, in particular—were largely responsible for the growth and prosperity of Australia in the nineteenth century. Yet it was nearly a century after the First Fleet arrived before governments employed veterinary surgeons to prevent and control livestock disease.

For most of the 1800s, the colonial governments would overlook the advice of the veterinary profession in favour of that of medical experts, who were viewed as a more respectable and reliable profession.

Mr John Stewart. Mitchell Library, State Library of NSW; gpo_082051

During this period, vets were also disadvantaged by the appointment of lay chief inspectors of stock to manage colony livestock matters.

The lack of veterinary influence was partly due to the small number of qualified veterinarians in the colonies—there were fewer than 50 qualified vets practicing in the whole of Australia in 1880. However, before the 1880s, the veterinary profession had also yet to establish itself and its credibility in Australia. Unlike Europe, New Holland's colonies had no professional association of veterinarians, no veterinary journals, or any educational institution offering a veterinary degree course. Even worse, there was no regulation of who could call themselves a veterinary surgeon and practice under that title. As a consequence, 'quacks' calling themselves vets abounded. In addition, there was a common belief that the expertise of vets was limited to horses.

Despite these barriers, the government stock branches did consult vets on occasion, and some of the earliest of these advisers to the government are described over the page. Note that these early vets were real hybrids—part private practitioner and part government vet.

Australia's first qualified veterinarian surgeon is thought to be John Stewart, who stepped off the boat and onto Sydney Cove in 1841. He set up private practice in Sydney which he ran in conjunction with a horse bazaar (market). A former professor of veterinary medicine in Glasgow, he was the author of two books before arriving in Australia: *Advice to Purchasers of Horses* and *Stable Economy*. He also acted as an adviser to the New South Wales Government on a mysterious new murrain[1]—Cumberland disease.

Cumberland disease was first reported in 1847, south-west of Sydney in Cumberland County, and was named after that area. Sheep died rapidly from the strange new disease, as did some of the men who disposed of the carcasses. The carcasses were markedly bloated and decomposed rapidly; the livers were 'a mass of rotten matter'. When a commission of enquiry was established in 1851, John Stewart was appointed a member. Probably due to Stewart's input, the commission recognised Cumberland disease as being similar to Germany's deadly *Milzbrand* and France's *maladie du sang*. They recommended that infected flocks and herds be prohibited from travel, and the carcasses of dead infected animals burned. Cumberland disease would later be identified as anthrax by another vet, Graham Mitchell.

1 Murrain literally means 'death' and was used in medieval times to refer to highly infectious diseases of cattle and sheep. Oddly, the word is also used in Australian newspapers as late as 1905.

The Cumberland disease inquiry was significant in that it marked the first occasion that the government in Australia officially called upon veterinary surgeons for advice. Sadly, however, the effect of this on subsequent disease control had all the impact of a flogging with a limp lettuce, as the following events show.

Pleuro strikes

The introduction of contagious bovine pleuro-pneumonia ('pleuro' for short) to Australia started with a shorthorn heifer called St Bees. Quite the beauty, St Bees was imported from London in 1858 to Melbourne, where she became the first diagnosed case of pleuro in Australia. Henry Wragge, a consulting government vet, identified St Bees' symptoms as pleuro (both pre- and post-mortem) and recommended that she and her herd be slaughtered. However, this suggestion wasn't at all popular with the herd owner, and with neither law nor public opinion at his back to support him, Wragge's advice was ignored.

When, 11 months later, it was decided to slaughter out the dying herd, vets Pottie, Miscamble and Gribton all confirmed pleuro by post-mortem examination. Then, in 1860, pleuro broke out on a neighbouring property, signalling the start of the most devastating livestock disease in Australia—a disease which would eventually cost many millions in lost livestock, restricted export opportunities and disease control measures.

Unable to resist snubbing vets, (like some people are unable to resist an extra biscuit at tea time) those in charge of organising the 1864 royal commission into pleuro did not appoint any vets. The vet-less commission then concluded (wrongly) that pleuro was not contagious or infectious, and that preventive inoculation was useless.

The subsequent rapid spread of pleuro had one benefit in that it spurred the governments of New South Wales, Victoria, Queensland and Tasmania to further appoint practising veterinarians as government consultants or inspectors.

Victorian pioneer vet, Graham Mitchell, was one person who strongly disagreed with the royal commission's findings. Mitchell found pleuro virus in the lungs of destroyed cattle and also performed successful inoculation experiments. Together with John Miscamble, Mitchell pioneered inoculation in Victoria.

The two vets experimentally refined Willem's tail inoculation technique and successfully inoculated herds. Their success with herd inoculation drew the attention of farmers and alerted them to the benefits of inoculation. Mitchell later sold his pleuro inoculating lymph for £2 per 100 head of cattle—a reasonable price in those days.

Forced to grudgingly recognise Mitchell's expertise with pleuro and other diseases, the Victorian Government appointed Mitchell a government vet in 1873 under the *Diseases of Stock Act 1872*. With his appointment, Mitchell helped ensure that reasonable control measures for pleuro were implemented in Victoria. However, while Mitchell's appointment greatly benefitted animal health in Australia, it was a difficult time for him. There was little love lost between Mitchell and Victorian Chief Inspector of Stock, Edward Curr (and the advice he provided on veterinary matters was about as welcome as boils).

The foot and mouth disease scare

It was fortunate that there were government vets present, albeit not full-time ones, when the first confirmed cases of foot and mouth disease (FMD) occurred in Australia. In 1871 and 1872, cattle imported to New South Wales were identified by government vet John Pottie as FMD infected and kept in quarantine for several months. Victoria also had an outbreak in 1872 on two farms, and the government-appointed inspection party included three vets. The party agreed on slaughtering-out and disinfecting both farms which was effective in eradicating the outbreak.

Mitchell's subsequent actions also ensured quarantine measures were put in place. When Mitchell earlier drafted a list of animal diseases likely to be imported into Australia with stock, and urged the government for routine quarantine inspection of stock, he was ignored. When he diagnosed a case of FMD in cattle at Werribee in 1872,

Curr refused to pass on the diagnosis to the minister, and told Mitchell his services were no longer needed. Deploring what he saw as inadequate disease prevention and response, Mitchell—rather naughtily—reported his diagnosis of FMD to Melbourne newspaper *The Argus*. Following the resulting public outcry, a total prohibition on the importation of cattle sheep and pigs from England into Victoria was imposed for seven years. While Mitchell's action was effective, it did not endear him to Curr, who would have preferred to keep the outbreak out of the media, and Mitchell in his place.

The effective response of hybrid government-private vets such as Stewart, Pottie and Mitchell to various disease outbreaks contributed much to changing government perceptions about the usefulness of the veterinary profession. While previously regarded as 'horse doctors', their assistance with diseases of sheep, pigs and cattle saw them regarded anew as a profession concerned with all livestock health. They also assisted colonial governments to recognise the value of veterinary inspection and advice in preventing the spread of infectious animal disease. In addition, while probably not invited to any high society tea parties, the appointment of vets as government consultants did increase their social and professional status.

However, in order to gain greater influence over what they considered to be properly veterinary matters (disease control and quarantine policy) vets would first have to raise the status of the profession in the colonies, and their numbers!

Queensland's first qualified veterinarian was James Irving, who migrated and settled in Brisbane in 1873. Due to the shortage of medical services in that area, Irving often treated human patients who couldn't find a doctor! In 1881 Irving became Queensland's government veterinarian which saw him advise the colony's police and postal department, and the Brisbane Tramway Company. He was also involved in government disease investigations and was an inspector of dairies for the city of Brisbane.

Australia's first veterinary school students, in front of the Melbourne Veterinary College with patients (circa 1883).
Photo courtesy of the University of Melbourne Archives.

Section 3

Early professional developments

The Colonies get a veterinary college and an association

When William Tyson Kendall arrived in Victoria in 1880, he observed that there were no more than a dozen qualified veterinary surgeons practicing in Victoria, but that every shoeing forge called itself a 'veterinary shoeing forge'.

Kendall, along with Graham Mitchell and several other qualified vets in Australia, had the following to say about the Australian veterinary profession in 1881:

'A large proportion of the stockowners and farmers have had no previous experience of the management of stock in countries or parts where veterinary surgeons were available, consequently they have had but a very imperfect knowledge of the utility of the profession and those who have endeavoured to obtain the services of veterinary surgeons have been so frequently imposed upon by men practicing under assumed titles that they have been led to form very unjust opinions of it.

The Colonial Government being chiefly composed of a similar class of men has led to the employment of laymen and medical men in what are the legitimate duties of the veterinary surgeons only. At the present time there is not a single veterinary surgeon in the Australian colonies wholly employed in government service. All stock inspection is done by lay inspectors, except in doubtful cases where there is great difficulty and heavy responsibility. Then the veterinary surgeon is called in.'

JL Burns failed his first Melbourne Veterinary College exam because 'he was too well dressed and no one with gloves and cane could examine horses and cattle.' WAN Robertson, 1936

The present state of veterinary progress in these colonies is therefore similar to what it was in England fifty years ago…'[2]

To remedy this sad situation, vets set about professionalising veterinary medicine in Australia. Due to their efforts, in 1880 the first Australian veterinary association was formed—the Australasian Veterinary Medical Association. The association's president, Mitchell, and secretary, Kendall, also began publishing *The Australasian Veterinary Journal* in 1882.

Miss Belle Bruce Reid was Australia's first woman to graduate in veterinary science, receiving her degree from Melbourne Veterinary College in 1906.

The Australasian Veterinary Medical Association, with members from the various colonies and New Zealand, actively campaigned for the establishment of an Australian veterinary school. It also sought legislation granting qualified vets exclusive right to the title of 'veterinary surgeon'.

Both aims were accomplished—in 1887 the *Veterinary Surgeons Act* was proclaimed and in 1888 six students enrolled in the Melbourne Veterinary College, a private institution founded by Kendall. For the bargain price of 100 guineas, applicants could enrol in the four-year course offering subjects such as veterinary hygiene, meat inspection, *materia medica*, shoeing and morbid anatomy. The Victorian Secretary for Agriculture pronounced himself thrilled with the college's efforts, and even more thrilled at the prospect of having qualified inspectors for the proper supervision of export livestock and meat.

Aside from being instrumental in the establishment of Australia's first veterinary college, first national veterinary association and first veterinary legislation, Kendall should also be remembered for his contribution to disease control. He was, to a large degree, responsible for the instigation of a royal commission enquiry into bovine tuberculosis which saw the disease added to the *Stock Diseases Act*. He also drew attention to the dangers of spreading tuberculosis through pleuro inoculation and was successful in controlling (within three months!) Australia's first reported outbreak of swine fever.

Kendall also promoted animal welfare by establishing an animal hospital in 1885 in Fitzroy. These achievements probably far exceeded Kendall's hopes and expectations at age 12, when he announced to his family his decision to become a vet.

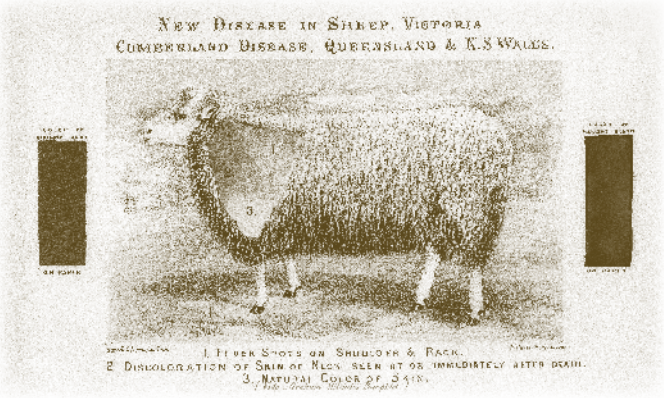
2 Report on Veterinary Science and Practice in Australia. Mitchell, Kendall, Stewart, Chalwin et al. *Veterinarian* (London) September 1881.

His contemporary and fellow Victorian, Graham Mitchell, also achieved much in his time. Having spent three years in India where he witnessed diseases such as FMD up close, he was a strong and vocal public advocate of veterinary inspection and quarantining of all imported stock. Incredibly, however, when he correctly identified Cumberland disease as anthrax in an 1877 booklet, and described its infectious danger to humans, authorities derided his diagnosis and stressed the non-contagious nature of Cumberland disease! Chief Inspector of Stock, Edward Curr, insisted that the disease was 'fluke under a peculiar aspect' and allowed the sale of diseased sheep to continue, as well as the skinning of carcasses.

Mitchell and Curr's disagreement over quarantine and disease matters, and their mutual disdain for one another, became venomous in an exchange of letters published in *The Argus* over anthrax. In one such letter, Mitchell refers to 'the unsatisfactory nature of reports emanating from the Stock department' and invites pastoralists to instead report cases of anthrax to him for investigation!

Sadly, the poor relationship between Curr and Mitchell typified the general mistrust at the time of laymen towards science (including veterinary science). Thus, despite the excellent disease investigation work and research of early vets such as Mitchell and others, their influence was restricted by the prevailing attitudes of those in power.

To fully address the growing anthrax and pleuro outbreaks in the colonies, vets would need to change government attitudes towards the role of science in disease control.



A plate from Graham Mitchell's book on Cumberland disease

Bacteriology and Cumberland disease

Despite John Stewart's advice in 1851 and Graham Mitchell's investigations published in 1870, in the 1880s many still believed anthrax (or Cumberland disease as it was known) to be caused by toxic weeds or liver fluke. Besides being an impressive display of ignorance, this thinking also meant that anthrax control was poor in many areas. As a consequence, Australia's first major disease of cattle spread largely unchecked during the forty years it was poorly understood, and thousands of cattle, sheep and horses died.

In a worsening of the disease, in 1885 alone, over 40 000 sheep died on pastoralist Arthur Devlin's properties in New South Wales. Following reports of the high mortalities, the New South Wales Chief Inspector of Stock had government vet Edward Stanley investigate. Stanley and his predecessor, Anthony Willows, were among the first full-time government vets in Australia.

When Stanley visited Devlin's property, milkweed was pointed to as the suspected culprit. Stanley, however, found anthrax bacilli through post-mortem examination. A pro-active government vet, Stanley felt it important to convince the property owners of the real cause of the disease. In a demonstration, he drenched six healthy sheep with the blood of one of the dead sheep. Within 40 hours, five of the six sheep were dead and Stanley had made his point that the milkweed was innocent. He also left Arthur Devlin a copy of Klein's bacteriology publication *Micro-organisms and Disease*. Published in 1884, it was cutting edge reading in microbiological science at the time.

Not yet done, Stanley also conveyed to Chief Inspector of Stock, Alexander Bruce, the scale of the fatalities and convinced him to look into preventative vaccination as a control option. He also recommended a government reward be offered for development of an anthrax vaccine. (It is somewhat baffling that there is no Australian currency or stamps with Stanley's face plastered on them, since his work certainly deserves recognition.)

The work of Edward Stanley and other vets demonstrated to both pastoralists and the government that science—in the form of bacteriology and vaccination—could usefully be applied to combat livestock diseases. However, Australian access to bacteriological expertise was limited—until the visit of the Pasteur Mission.

When government vet Edward Stanley gave pastoralist Arthur Devlin a bacteriology publication, little did he know that Devlin would become a bacteriology devotee, devouring every book on the subject. The Pasteur Institute later visited Devlin's Uarah property and anthrax vaccine trials were carried out at his Junee property. Arthur Devlin even became a vaccinator for New South Wales. Sometimes a little government vet extension work goes a long way…

Rabbits, disease and Pasteur's nephew come to town

Strangely, it was not anthrax or pleuro that first lured European microbiological expertise to Australia, but the rabbit plague.

In 1887, the New South Wales Government offered a £25 000 prize for a biological means of destroying rabbits. At the time, Pasteur needed money to fund his establishment of the Pasteur Institute, so his sudden and intense interest in Australia's rabbit problem was convenient for everyone.

In 1888 three representatives of the Pasteur Mission set sail for Australia: Adrien Loir—Pasteur's assistant and nephew, Dr Louis Germont and English interpreter, Dr Frank Hinds. Loir states in his memoirs that during the voyage he learnt English by chatting with the husband of famous Australian opera soprano, Dame Nellie Melba.

During the stay, the relationship between the Pasteur Mission and Australia was tempestuous (with more misunderstandings and disagreements than the average soap opera romance). To cut things short, the institute missed out on the £25 000 rabbit eradication prize but did develop and eventually produce anthrax vaccine in Australia until 1898. Loir also devised a vaccine for pleuro and trialled it at the Indooroopilly Sheep Quarantine Grounds in 1889. The Pasteur Mission's production of anthrax vaccine ceased following the success of another commercially produced anthrax vaccine. John McGarvie Smith, an Australian bacteriologist, developed a safer, one-dose anthrax vaccine in the 1890s in partnership with John Alexander Gunn.

The main benefit of the Pasteur Mission's visit to Australia and establishment of laboratories was the exposure of pastoralists, scientists and governments to microbiological science. As more learnt about bacteriology, they began to see the benefits of having scientific experts on hand to wage war against livestock disease.

As a result, at the 1889 Intercolonial Stock Conference colony representatives proposed the creation of an Australasian Stock Institute for bacteriological research. The idea was that the institute would be used to develop local scientific capacity—by conducting applied research and teaching microbiology to Australian students. Why import French bacteriologists when you could grow your own experts at home?

However, the proposal never eventuated because 1890 was the start of a decade of bank crashes and frozen foreign investment in Australia. This—together with production losses due to rabbits, drought and overstocking—saw proposals for the creation of animal disease research facilities quickly crushed. The situation for veterinary research was not to improve for another decade.

The only exception to this freeze was the establishment of the Queensland Stock Institute in Brisbane in 1893. It became the first government research institution established in Australia purely for the purpose of investigating animal disease.

English bacteriologist Charles Joseph Pound, a former Pasteur Institute student, was appointed director. Pound produced cultivated pleuro virus for inoculation which was widely distributed in Queensland. One newspaper later described him as 'the boffin who saved the cattle industry' for his work on tick fever.

Charles Joseph Pound. John Oxley Library, State Library of Queensland, negative number 161074

Pound began to investigate the 'redwater' disease among cattle in Australia's north in 1894. He quickly realised that it was carried by ticks and published this information in a book—*Redwater disease in cattle in the Gulf district*. When redwater disease first appeared in Queensland, up to 90 per cent of cattle in some areas died and it was estimated that some £3 million worth of cattle were lost during the first six years of the disease.

Pound worked with an American expert on tick fever—JS Hunt—to carry out inoculation trials in Australia. Once a method for producing tick fever vaccine from the blood of infected cattle was developed, Pound then also developed the multiple injection 'Pound syringe' for commercial sale. Known to be tireless in educating stockowners about the need for protective inoculation, Pound is thought to have saved hundreds of thousands of cattle from tick fever death with his campaign of lectures, demonstrations and publications. A tick fever research station established in Wacol in 1966 is named after Pound in honour of his achievements.

A new century brings change for government vets

Government vet transport at the turn of the century. (Man in sulky, Macksville, NSW. Mitchell Library, State Library of NSW; bcp_04594)

Would you like some hygiene with that food?

As a result of the increasing impact of livestock diseases in the late nineteenth century—and the successes of government vets and bacteriologists in combating these diseases—by the 1890s all the colonies had disease control legislation and government stock branches with either full-time or consulting government vets. While not all chief inspectors of stock were enamoured of vets, vets had certainly established their somewhat limited place within stock branches.

Social change at the end of the nineteenth century then created further changes for government vets. Social activism in England, Australia and the United States of America saw protest groups (including trade unions and suffragettes) lobby the government strongly for safe food. This politicisation of food safety, along with government reforms, led to food safety legislation being developed for the first time.

Most Australian colonies introduced legislation to prohibit the sale of diseased food in the 1880s. Government vets around the country rubbed their hands in glee, as—by providing assurance that food animals and products were free from diseases— veterinary meat and dairy inspectors became some of the first public health officials in Australia.

Also, as germ theory became more accepted—and meat and milk were identified as sources of tuberculosis and other disease infection—new food safety requirements evolved. The United Kingdom required all imported meat to be inspected under veterinary supervision, and all Australian colonies enacted the *Livestock and Meat Export Act of 1895*. To meet the export meat inspection requirements, more full-time government vets were appointed.

Then, in 1896 Samuel Cameron became Veterinary Inspector for the Victorian Board of Public Health. This appointment made him one of the first vets to become an inspector in Australia. With his passion for meat hygiene, Cameron was also largely responsible for creating the *Meat Supervision Act of Victoria 1901*, which regulated—for the first time—the slaughtering of cattle for domestic consumption. This legislation followed a report to the Victorian government that the high rate of tuberculosis in the colony was largely due to infected meat.

Cameron also drafted, and was pivotal in having enacted, the *Milk and Dairy Supervision Act 1905*. (Latte lovers thus have government vets like Cameron to thank that their latte art—the swirly milk shape on the surface—is tubercle free.)

With the growing public concern about food safety, the New South Wales Board of Health also appointed two vets as inspectors in 1896, and Weir was made Inspector of Stock in Western Australia. Once in power, these vets quickly recruited more vets to staff their departments. Thus, when Edward Stanley became Chief Veterinary Inspector of the New South Wales Board of Health in 1892, more vets were employed there than in the Stock Branch of New South Wales!

It was clear, then, that towards the end of the nineteenth century, vets were poised to finally wrest control of animal disease matters away from doctors, pastoralists and laymen. This development continued when, in 1902, the appointment of stock inspectors by local stock boards (mainly pastoralists) ceased. Under the new system of examination, the first successful examinee to become a stock inspector was a vet.

The role of food safety appears to have played an important role in the great government vet revolution. Sadly, however, in accounts of Australian history, the birth of food safety

Mazyck Porcher Ravenel should be remembered for his temerity in contradicting the view of the famous Robert Koch that bovine tuberculosis posed little threat to humans. Ravenel, at the International Conference of Tuberculosis in 1901, stated clearly his view that Koch was wrong, and that a human could be infected with bovine tuberculosis (for example, through drinking infected milk). Disagreement on the subject continued worldwide for many years.

measures is often overshadowed by Federation, so take a moment to dwell on it before reading on.

The profession grows up as the colonies get federated

In the 1890s, we saw, livestock disease problems were mounting in Australia. Anthrax was widespread, cattle tick fever was a serious problem in Queensland, pleuro and bovine tuberculosis were ubiquitous, and rabbits had become problematic. At the same time, the livestock industries were expanding, in particular, the beef and dairy industries. Thus, by 1900, Australia's dairy herd numbered 1.4 million and some 90 per cent of milk went into butter and cheese production. Most of this product was exported to Britain.

However, the government, public and pastoralists were also at last beginning to appreciate the benefits that vets and science could bring to the livestock industries and public health. Bacteriology, inoculation and vaccine were viewed as potential answers to many problems. The end of the nineteenth century was also the beginning of more government vets, as food safety required more veterinary meat and dairy inspection.

To get a broader perspective of life in Australia at the start of the new century, one should remember that horses were still the main form of transport, home electricity was not yet common and women's skirts were big—really big—(see the 1890s bustle on this page). Also, up until Federation in 1901, Australia's colonies were independently self-governing and tended to squabble like siblings. Newspapers before Federation are full of accounts of colony rivalry, jealousies and disputes. Under these conditions it would have been very difficult to undertake national livestock research or animal health programs.

Bigger than an 1890s bustle, then, was the Commonwealth quarantine legislation enacted in 1908. It resulted in state and territory Chief Inspectors of Stock being appointed Commonwealth Chief Quarantine Officers—who then all had to agree on how to jointly administer the new legislation for national animal health outcomes.

In the 1800s, intercolonial conferences had seen ministers of agriculture and chief inspectors of stock meet regularly to discuss disease and quarantine matters. However, it was still quite an achievement that the 1909 meeting of chief inspectors of

1890s bustle

stock managed to agree (with minimal hair pulling) upon a uniform system for administering the *Quarantine Act 1908*.

Perhaps agreement was facilitated by the happy presence of many vets—by 1909 vets had managed to find their way into the chief inspector position in New South Wales (JD Stewart), Victoria (SS Cameron) and Western Australia (RE Weir).

Veterinary research flourishes in Australia (at last)

The chief inspectors of stock, particularly JD Stewart, repeatedly called for the establishment of a government laboratory with a chemist, animal pathologist and bacteriologist to undertake expert research on local stock diseases. In response to Stewart's expert badgering, the New South Wales Government established the Government Bureau of Microbiology in 1908.

The same year saw Kendall's private Melbourne Veterinary College taken over by Melbourne University (much to Kendall's financial relief) to establish a faculty of veterinary science at that university. Up to this time, Kendall's college had produced Australia's first 57 veterinary degree graduates—largely due to his personal efforts in establishing, funding and running the college. Kendall became a lecturer at the newly established veterinary school, while Scotsman John (Jock) Anderson Gilruth was appointed as Dean. Part of the university's newly formed

JD Stewart. Photo courtesy of Dr Frank Doherty, Hon. Archivist, AVA

veterinary school, the Veterinary Research Institute at Parkville, was formed the following year. One of the school's graduates, Herbert Seddon, undertook research at the new facility on bovine brucellosis, which JD Stewart had identified in dairy cows in coastal New South Wales.

Not to be outdone by Victoria, Queensland opened the Stock Experiment Station Complex (now known as the Animal Research Institute) in 1909. Bacteriologist CJ Pound (the boffin who saved the cattle industry) was made director and during his time there, the facility dispatched 34 219 doses of tick fever vaccine, 726 634 doses of pleuro vaccine and 25 500 doses of blackleg vaccine.

South Australia then established its first veterinary research laboratory in 1910, in an extension built onto Royal Adelaide Hospital. A section of the newly built Institute for Medical and Veterinary Research was given the name of Government Laboratory for Bacteriology and Pathology. In 1912, a young Lionel Batley Bull joined the laboratory and over the next 22 years published 33 papers while working there, before becoming a public figure working for the CSIRO.

The veterinary school at the University of Sydney also opened in 1910, and expert badgerer and former Chief Inspector of Stock, JD Stewart, was appointed chair of the new school. It was the perfect position for Stewart to carry out his moulding of Australia's future veterinary leaders.

The government vet's best friend in the early 1900s—the horse

Arthur Ernest Moore was a vet and stock inspector for the district of Port Stephens in New South Wales from 1912. In an interview published by the Gloucester District Historical Society he recounted:

'In the early years I rode the whole district on horseback, and later had two horses in a sulky and outrigger, carrying a bridle and saddle in the sulky. Later again I changed to a buggy, and as the duties became more exacting and demanding, I purchased my first car—a Dodge—in 1927 and carried on with cars, having had 15 years with horses...'

The *Australian Veterinary History Record* also reveals that in 1923 the Northern Territory's Chief Inspector of Stock requested a motor car to carry out his work which covered the entire territory. His request was denied, and he continued to carry out his duties with saddle and pack horse until 1927.

It was to be a busy two decades for Stewart who, in addition to grooming vet students for future government glory, also became President of the Australian Veterinary Association (formed in 1921), and later secured the passage of the 1923 *Veterinary Surgeons Act* which regulated the profession in New South Wales.

The formation of the Australian Veterinary Association had been proposed in 1914 but—as it turned out—a war got in the way.

The war years

The First World War ate up vets and horses like a hungry beast; 125 Australian vets served in the Australian Imperial Force, and 121 000 horses were sent to war. Sadly, only one of these horses returned to Australia. Many of the horses were used to transport equipment, artillery and supplies, but an unknown number were cavalry mounts.

The first military contingent to leave Australia in 1914 consisted of 20 000 men, 7500 horses and 19 Veterinary Officers. These horses and vets were at least fortunate in that valuable lessons had been learnt during the Boer War (1899-1902) about the effective organisation of military veterinary services.

The Australian Army Veterinary Corps (AAVC), formed in 1909, played a vital military role in keeping Australia's forces mobile. Officers in the AAVC were responsible for directing, inspecting and reporting on the veterinary care of horses, and for training in shoeing, horse care and veterinary first aid. They also arranged the evacuation of sick and wounded animals, and ensured the provision of supplies for animal health (the rumour that AAVC officers were also responsible for reading sick horses a bedtime story is just that). The most common ailments vets treated were mange, picked up nails and the effects of mustard gas.

The war also saw more Kendalls distinguish themselves. In 1917, Ernest Arthur Kendall, son of William Tyson Kendall, established the Australian Veterinary Hospital. This hospital—near Calais, France— treated 25 000 animals injured in the war.

While the First World War inevitably caused much suffering to humans and animals alike, it did have a beneficial effect in creating a national consciousness and identity in Australia. Those who had previously viewed themselves as colony or British subjects now saw themselves as Australian citizens. As a result, the newly federated colonies were more prepared to work together to achieve national goals.

Max Henry referred to this in the first issue of the Australian Veterinary Journal in 1925 when he wrote:

'...in some ways, nothing could have done our profession more good. For the first time in our history men from all Australia were thrown together in such a way as to obliterate the names of the different States. The word 'Australia' was carried on the shoulders of every man and it became a matter of far more importance that a man was '4th Division' than that he was 'N.S.W.'; the latter fact counted for nothing.'

Max Henry. Photo courtesy of Dr Frank Doherty, Hon. Archivist, AVA.

The war was, however, slightly disastrous for the newly established university veterinary schools in Melbourne and Sydney. Since gender roles at the time said it was better for girls to bake something nice than enrol in veterinary science, the schools were largely dependent on male enrolments. But the war absorbed most young men, and during the war years enrolment in the Sydney vet school dropped to just four.

However, even in 1919 there were still only 13 students enrolled in veterinary science and it's thought that the advent of the automobile deterred enrolment, since many still believed that vets derived their primary income from treating horses.

In the 1920s the vet school situation was worse in Victoria where—unlike in New South Wales—vet school graduates were not employed by the government. In 1928, only one student was taking classes at the University of Melbourne, and the school was forced to close by withdrawal of its government grant. The Veterinary Research Institute, however, remained open and was used by researchers to investigate a number of unappetisingly named animal diseases, including cheesy gland. (I may never eat cheese again!)

The war on pleuro and bovine TB in the 1920s

While Victoria enacted legislation in 1905 to improve herd health and hygiene standards of the dairy industry, and a rigorous control program was implemented under Cameron, the war interrupted control efforts and pleuro became widespread again. This was despite its almost complete eradication by 1914 in Victoria.

Taking up the battle again after the First World War, a cattle compensation act was introduced in 1925, and by 1929 pleuro was eradicated from Victoria. However, severe outbreaks of pleuro continued to occur in northern Australia, particularly in Queensland, in the 1920s.

Max Henry, appointed Chief Inspector of Stock and Chief Veterinary Surgeon of the New South Wales Department of Agriculture in 1923, began his war on bovine disease in the 1920s by implementing the Tubercle-free Herd program in 1925. Part of the national dairy herd testing scheme introduced following the war, New South Wales herds supplying raw milk to large cities were tested for tuberculosis and, if declared free, retested again in 12 months.

Believing pleuro to be another important disease for eradication, Henry had firm ideas about achieving its demise. Several areas of New South Wales had been free of pleuro for more than 10 years by 1927, and Henry enforced a quarantine line to maintain this freedom. He also made testing and certification for livestock moving into these areas mandatory. The procedure of declaring protected areas free of pleuro was so successful that other states soon adopted it.

During his 24 year reign of the department's veterinary services, Henry also furthered the cause of the government vet by insisting that all stock inspectors were vet school graduates. He was also responsible for the creation of districts controlled by district veterinary officers, who supervised the disease control activities of stock inspectors. Under Henry, government vets sprouted like daisies all over New South Wales.

In 1936 Herbert Seddon was appointed chair of the newly established Faculty of Veterinary Science at the University of Queensland. However, with nearly all students and many staff enlisted in the war, teaching ceased at the end of 1942 and wasn't resumed until 1949.

The establishment of the Glenfield Veterinary Research Station in 1923 was a further boon to New South Wales. While the Department of Agriculture was established in 1890, until Glenfield was built, laboratory samples had to be sent to either the Bureau of Microbiology or Sydney University. Herbert Seddon— who fully shared Henry's beliefs about the importance of disease control and prevention—was made Glenfield's director, and Seddon

and Henry's partnership ensured a good marriage of field and laboratory services.

Besides overseeing department laboratory testing, Seddon also led the facility's research in the areas of cattle infertility, bovine brucellosis, pleuro and sheep diseases.

The steppe-murrain

In the 1700s, in the trail of mounted armies, a murrain swept from the Russian steppes into West Europe. It killed over 200 million European cattle in the eighteenth century, and then spread from Egypt to South Africa, where it succeeded in killing 90 per cent of the country's cattle before its eradication in 1904.

Little wonder, then, that when steppe-murrain (rinderpest) appeared in Western Australia in 1923, there was much consternation—both government and public. When the disease was diagnosed by government vets and the minister informed, he immediately cabled the Prime Minister and requested a government vet familiar with rinderpest be sent to assist.

Dr WAN Robertson, Chief Veterinary Officer of Victoria, travelled to Western Australia and confirmed the diagnosis of rinderpest. He was then promptly appointed control of the eradication program. His quarantine of infected farms and slaughtering-out was effective, as was surveillance of animals in the buffer zone. Also effective was the employment of some 200 men to patrol infected boundaries day and night to prevent animal movement from infected areas.

It's thought that the disease may have originally entered via Fremantle Port, where ships departed for Asia with live ruminants, and sometimes returned carrying sheep skins, live animals (kept for ship provisions) and animal waste.

FACT: In 1922 the Commonwealth Department of Health assumed responsibility for the *Quarantine Act 1908*. However, until WAN Robertson was appointed Director of the Division of Veterinary Hygiene in 1926, the department had no veterinary staff!

As a result of the outbreak, quarantine procedures were tightened. For example, manure from returned ships was no longer allowed to be collected and used on market gardens. Also, the return of sheep skins from Singapore was banned, and garbage and offal on ships was dumped at sea instead of being fed to local pigs.

The outbreak, which spread among 28 herds and in the areas of Beaconsfield, Belmont, Bassendean and Rottnest Island, was controlled within 64 days. However, almost 3000 livestock were destroyed in the effort, which angered many locals. In a meeting between Robertson and angry dairy farmers, *The West Australian* quotes Robertson as saying:

'You think it is a pleasure for me to destroy your cows. I am following the dictates of science. To exterminate the disease a line of healthy cattle should be killed around the infected area. There was not the slightest doubt in my mind that it was rinderpest and the order was made for destruction…If the disease gets beyond control it will not be a few in Fremantle wanting milk but the whole of Australia wanting meat and milk. Millions will be ruined instead of hundreds being inconvenienced.'

Following the events in Western Australia, the Department of Health Director of Quarantine concluded in 1924 that the occurrence of rinderpest in Australia: 'serve(d) to indicate the need for a reliable system of veterinary hygiene within the Commonwealth, as it is clear that no quarantine, however well-designed, can be relied on to prevent infallibly the introduction of epizootic disease.'

Subsequently, in 1926, the Division of Veterinary Hygiene was established within the Department of Health. The rinderpest outbreak in Western Australia had undoubtedly contributed to the creation of this division—and the appointment of Robertson as the first Australian Government veterinary officer. However, other influences were also present.

The 1925 Australian Royal Commission on Health formally recognised that vets played an important part in safeguarding public health. It also made recommendations seeking better coordination between the Commonwealth Department of Health and the states on matters such as food and drug standards, and management of infectious diseases such as tuberculosis. It further recommended that an expert in veterinary science be made head of the Veterinary Quarantine Division to advise state officers. (This confirmed what Australian vets already suspected: everyone wanted vets running the country.)

Bubberman said…

The release of the Bubberman report was another spur to improve government vet services in the 1920s. The Director of the State Veterinary Laboratory in Java, Dr Bubberman, visited Australia in 1923 to report on the suitability of Australian dairy cattle and beef for feeding the Dutch military forces in Java (now known as Indonesia). Rather unkindly, he described the Western Australian veterinary service as 'primitive' and commented:

'It is to be hoped that the Rinderpest which broke out in November, 1923, in the State in question will have opened the eyes of the authorities and will bring about an extremely necessary reorganization of it.'

The veterinary staff there was indeed enlarged, and a veterinary pathologist, HW Bennetts, appointed.

Bubberman also strongly criticised the appointment of laymen (rather than vets) to manage the Commonwealth Serum Laboratories, the Experimental Station at Yerongapilly and the Dairy Branch of the Public Health Department in New South Wales. As a final blow, he recommended that dairy cattle from South Australia, Western Australia and Queensland be excluded from export to Java.

In response to this report and the rinderpest events, at the Conference of Chief Quarantine Officers held in 1925, quarantine regulations were comprehensively revised. The next comprehensive revision of quarantine law was not until 1933, by which time scientific advances and increased air transport necessitated many changes. With the 1933 revision, a requirement for all livestock import certifications to be issued by vets was created, and even more government vets sprouted around Australia.

Australia and the OIE

The Office International des Epizooties (OIE) based in Paris was formed to combat rinderpest and other contagious diseases of animals. Today the OIE is also known as the World Organisation for Animal Health.

An agreement to form the OIE was signed in 1924 by 28 countries, and Australia acceded in February 1925. Thus, Australia has been an OIE member country since 1925. The Office of the Chief Veterinary Officer (within DAFF) coordinates Australia's OIE work which includes regular disease reporting, commenting on draft OIE standards and participating in specialist commissions, ad hoc groups and working groups.

A joint FAO/OIE announcement of global rinderpest eradication is expected this year. The official announcement will mark the first time in history that efforts have succeeded in wiping out an animal disease in the wild, and only the second time that a disease has been completely eliminated thanks to human efforts.

Dr Clunies Ross. Mitchell Library, State Library of NSW; hood_30331

Section 5

The golden era of veterinary research in the Twenties and Thirties

The 1920s: the ‘golden era’ of veterinary research in Australia

Until the 1920s, vets in Australia either undertook research under their own steam, or with the assistance of industry, universities or state governments. To the outrage of many, national government planning, organisation or funding of livestock research was conspicuously absent. This was despite the livestock industries contributing to over 60 per cent of the national agricultural output—roughly an average of £140 million a year.

The need for livestock research was also quite urgent in the 1920s. British health authorities had banned the import of Australian beef due to worm nodules (some people are so fussy) and then stopped lamb and mutton imports because of cheesy gland infection. Various diseases were also costing the livestock industries large sums in production losses and control measures.

In addition, Australian vets would have noted with envy animal health research activities abroad. In 1924, the World Organisation for Animal Health was established to deal with contagious diseases of animals, and considerable research was being undertaken in the United States by the Bureau of Animal Industry.

In the 1920s, Australia was still somewhat tied to the mother country’s apron strings, both economically and psychologically. Thus, when Britain pushed Australia to

John (Jock) Anderson Gilruth became acting Chief of the Animal Health Division of the CSIR at age 58 and was alarmingly direct. In response to one sheep breeder's questions about the inability of his flock to thrive, Gilruth retorted, "Why don't you feed your bloody sheep?"

use science to increase agricultural productivity, and offered some funding, the cause was warmly embraced. As part of Britain's research push, Sir Frank Heath visited Australia in 1925 to advise on the direction and structure of government involvement in science. His subsequent report saw the creation of the Council for Scientific and Industrial Research (CSIR) in 1926.

While in 1925 all states had their own veterinary laboratories which undertook diagnostic and research work, this research was largely isolated. Thus, there was little understanding of how to cooperatively organise research efforts to gain maximum benefits for producers. Heath urged more collaborative investigation of livestock problems and greater Australian Government and industry involvement.

How this was to be achieved, however, was not clear. Strong leadership was needed and, to this end, in 1928 CSIR executives invited Sir Arnold Theiler to Australia to investigate Australian animal health problems. Behind their invitation was the secret hope that he might be persuaded to lead an animal health division of the CSIR, and gain the popular support of pastoralists and their purses.

Theiler was the internationally renowned 'father of veterinary science' in South Africa, and had successfully established and directed the famous Onderstepoort Veterinary Research Institute in Pretoria. However, he rejected the offer to become Chief of the CSIR Animal Health Division, and the job went to Jock Gilruth instead.

In 1928 the CSIR also invited Arthur William Turner to work for the new Division of Animal Health, based on his impressive livestock research track record. In 1925 Turner had identified the agent causing black disease in sheep (infectious necrotic hepatitis), assisted by earlier work by vets which implicated liver flukes in allowing bacterial invasion of the liver.

Proving that timing really is everything, Turner's research work influenced the CSIR executive's formation of the Division of Animal Health. His research breakthrough came just as the idea for the new division was brewing, and his work demonstrated the considerable benefits to be had from a disease model of animal health that focused on pathology. This was in contrast to the prevailing animal husbandry approach which treated breeding and nutrition as more important than disease prevention and control. The research of Turner, then, was instrumental in ensuring the place of disease research and veterinary scientists within the new Division of Animal Health. Once again, government vets had staked out an important bit of territory for themselves.

Veterinary researchers attack livestock problems

During the 1920s the CSIR researched a range of livestock problems. Sheep ked and lice were investigated, and Itch Mite—a new parasite of sheep—was identified. In the same decade, Harold Bennetts in Western Australia identified Beverley disease in sheep as a clostridial disease. Researchers around the country also investigated arthritis in lambs, scabby mouth, cheesy gland, ringworm, liver fluke, helminth parasites, hydatid disease and other diseases of sheep. The control of liver fluke in sheep, which had been causing losses of over £1 million a year, was an important outcome of 1920s CSIR research.

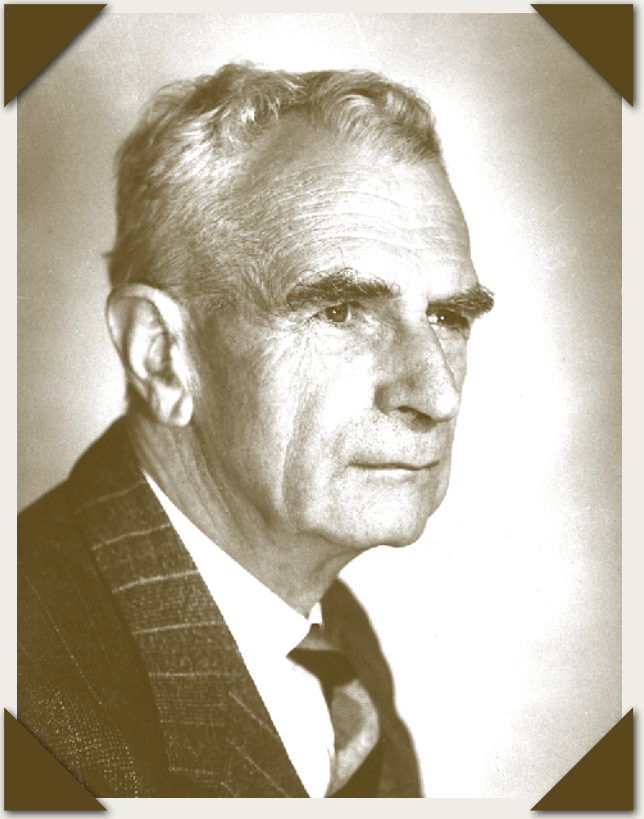
Due to this wide-ranging research on the diseases of sheep (cattle diseases were somewhat neglected until the 1930s) the 'golden era' of veterinary research further eroded the notion of vets as 'horse doctors'. Also, notably, the relatively few vets who generated an enormous amount of livestock research were mostly graduates of the first vet schools established in Australia.

Thus, the University of Melbourne vet school could claim as graduates AW Turner, Herbert Seddon, Lionel Batley Bull, Harold William Bennetts, John Legge and Ralph Bodkin Kelley.

Sydney Dodd: Veterinary researcher, professor, chief veterinary officer

A graduate of the Royal Veterinary College of London in 1902, Sydney Dodd was veterinary officer to the Tenth Hussars in South Africa, and witness to the host of epizootics that took hold following the Boer War. (Many Australian vets also saw service during the Boer war). Working with Theiler in South Africa for a while, he travelled to Australia in 1907 and promptly became one of the foremost bacteriologists in the country. He worked—in quick succession— for the Queensland Government, and then the newly established vet schools in Melbourne and Sydney. He specialised in protozoan diseases and his work on black disease in sheep paved the way for Turner's research. Dodd was also known for being a bit of a softie, feeding tidbits to dogs staying at the University of Sydney Veterinary Clinic as patients.

Over at the University of Sydney vet school, graduates included the influential figures of Lionel Rose, Ian Clunies Ross, Harold Roy Carne, Grahame Edgar and Reginald Gunn.



Lionel Bull, Chief of the CSIR/O Division of Animal Health and Nutrition, 1935-1954. ©CSIRO

Australia's 'golden era' of veterinary research, then, owed much to the establishment and teaching of the earliest university veterinary schools. Professors and lecturers at these institutions would have been justifiably proud of their veterinary hatchlings, some of who later became lecturers and professors themselves.

Farmers immunising a young sheep against enterotoxaemia, or 'pulpy kidney' disease. Archives Office of Tasmania. ADRI: AB713-1-3183

Journal \ jûrnəl \ **(noun): a serious, scholarly publication**

The *Australian Veterinary Journal*, established by the Australian Veterinary Association in 1925, was an important vehicle for the Australian veterinary profession to publish and develop scientific knowledge. Where else could vets read about exciting local developments in cheesy gland research?

Vets unable to attend association meetings could also thrill to the journal's accounts of association activities, research findings and distant colleagues' experiences—whether they were government, university or privately employed. Furthermore, the journal supplied information about disease manifestation and conditions specific to Australia—information which, according to editor, Max Henry, was hard to come by elsewhere.

The journal was heavily dependent on the work and contributions of Australian Veterinary Association (AVA) members to keep it afloat, and—intermittently—editorial exhortations appear for greater efforts by members. Even in the very first journal issue, the President of the AVA calls on members' contributions to make the journal a success.

We are fortunate in having secured the services of Mr. Max Henry as Editor of our Journal, but his task is onerous and, though his energy is boundless, I confidently appeal to every member of the profession not to "flog the willing horse," but to add, each and every one, his own contribution, great or small, for welding into this link which will bind us together for advancement.

Fellow veterinarians, the Journal is yours to make our mar, and the decision is with you as to whether the profession is to be strong in unity or to continue as independent units without cohesion and without adequate influence.

Believing that the overwhelming desire is for improvement, for advancement, for united effort, the Council of Australian Veterinary Association has organized the Journal which is now launched, and on behalf of the Council I commend its care and encouragement to the earnest consideration of every member.

I wish the Journal every success.

W. A. N. Robertson,
President.

The 1930s: Depression, Zebu cattle, the war on parasites and the arrival of the chook vet

Due to its heavy dependence on agricultural and industrial exports, Australia was hit extremely hard by the worldwide Great Depression in the 1930s.

Despite the difficulties, veterinary research managed to progress.

South Australian sheep farmers (and sheep) benefitted from identification of the causes of a wasting disease called 'coast disease'. CSIR scientists discovered that the cause was cobalt and copper deficiency in pastures, and developed a commercially available cobalt pellet that could be inserted and left in the sheep's rumen.

Bacterial research also saw a vaccine developed to prevent botulism in sheep. The disease was first observed by Bennetts in the 1920s to be caused by sheep in Western Australia supplementing their diet with rabbit carrion—(yum).

Vets: the wind beneath the wings of poultry research

Glenfield Research Station began work on protecting poultry from disease in the 1930s, and Carne and others gained significant understanding of poultry diseases such as Infectious Laryngotracheitis, pullorum and fowl coryza. Their work not only made for scintillating party conversation, it also laid the foundations for devising effective control measures to protect Australia's growing poultry industries.

During this period, Webster also created attenuated strains of fowlpox virus for different poultry species. Demonstrating the benefits of poultry disease research, in 1937 Len Hart produced a rapid pen-side test for pullorum which greatly assisted with testing and control of the disease.

Move over sheep, it's time for more cattle research

In 1932, the Empire Marketing Board and the Australian Government provided a grant to CSIR to establish an animal disease research station in Queensland for research on pleuro. Gilruth, then acting Chief of the Animal Health Division turned to Turner to lead the research team at Oonoonba, Townsville.

Turner's team researched pleuro, peg-leg disease and tick-borne diseases in cattle. Again, Turner was involved in an important research breakthrough. A broth was created for growing and sustaining pleuro organisms which permitted vaccination using hypodermic syringes. This was a vast improvement on the primitive technique of using a stringy seton which was dipped into an infected animal's chest, threaded through a needle and then into a healthy animal.

The new technology made the vaccine transportable and also allowed the safest strains with the best coverage to be developed artificially.

Gilruth also turned his attention to the cattle tick problem in Australia's north. During his time in the Northern Territory as an administrator, Gilruth had made extensive investigations of the tick problem. He was certain that the solution lay in the cross-breeding of British cattle breeds with tick-resistant breeds which were also more genetically suited to the northern environment. Gilruth tasked animal geneticist Ralph Kelley with sourcing and cross-breeding Zebu cattle, which are also known as Brahman cattle. In 1933, 19 Zebu cattle were imported into Sydney and Kelley played a leading role in cross-breeding experiments which successfully produced tick-resistant breeds. These breeds later became the main type of cattle produced in the north.

The war on parasites, or 'just say no' to trematodes, nematodes and cestodes

In 1929, the CSIR had appealed to the livestock industries for capital to build an animal health laboratory. Sir Frederick McMaster, a grazier, responded with a donation of £20 000 and the laboratory was named after him when built at Sydney University alongside the vet school. The McMaster Laboratory opened in 1931, and was headed by Ian Clunies Ross. Parasitologist, Roy Carne, also had his own specially equipped laboratory where he happily studied cheesy gland all day long as well as pregnancy toxaemia in ewes.

Believing it's what on the inside that counts, the McMaster Laboratory staff primarily focused on intestinal helminth parasites of sheep, and many advances were made by Clunies Ross and others in understanding the specific epidemiology and ecology of parasites causing gastroenteritis in sheep.

Flystrike research takes off

Research on flystrike was of great economic importance—in 1933 the disease was estimated to cause £4 million in losses annually. This was aside from the horrific suffering of sheep having their flesh eaten by fly larvae.

Early on, Lionel Bull recognised the part played by *Pseudomonas* spp. and other skin organisms in preparing the site for flystrike. In separate flystrike research, Seddon—working with HG Belschner and CR Mulhearn—undertook 'wrinkle sorting' experiments which demonstrated breech wrinkle as a key predisposing factor for breech and tail strike.

Seddon, Belschner and Mulhearn proposed breeding away from the Merino to reduce wrinkles. However, the advent of mulesing and more sophisticated insecticides pre-empted further research in this area. Recently, however,

insecticide resistance has seen renewed interest in genetic breeding for blowfly resistance as a 'clean and green' solution to flystrike, and an alternative to mulesing.

Bull, on sheep

Bull successfully investigated a number of sheep diseases. One of his most important breakthroughs, made with Dickinson, was finding the cause of cheesy gland in sheep.

They identified the presence of *Corynebacterium* in sheep yards and camps as the culprit. Previously it was thought that sheep contracted the disease when their shearing wounds came into contact with shearing boards. By locating the source of infection in sheep yards, prevention was possible by placing newly shorn sheep into rested paddocks, rather than infected yards or camps.

Tasmania leads the way in brucellosis and bovine tuberculosis eradication in the 1930s

By the 1940s Tasmania had virtually eradicated bovine tuberculosis in its herds. This success was due, in great part, to compulsory testing schemes and producer cooperation. While 40 per cent of dairy cows supplying Launceston with milk were shown to be infected in 1925, this was reduced to less than 1 per cent in 1935.

Inspired by Tasmania's achievements, in the 1930s Victoria and New South Wales Department introduced similar testing schemes for accrediting herds shown to be tubercle-free. As a result of these schemes, tuberculosis prevalence in tested herds steadily reduced.

As well as being the first state to eradicate bovine tuberculosis, Tasmania was Australia's leader in the attack on brucellosis. In the 1940s (before vaccination) brucellosis infections sometimes resulted in 100 per cent abortion in some dairy herds. In Tasmania a state scheme was introduced in 1934 for accreditation of brucellosis-free herds.

Sheep at the McMaster Animal Health Laboratory were equipped with faecal bags for the collection of worm egg and larval samples. ©CSIRO

A histopathology preparation room at the McMaster Animal Health Laboratory. ©CSIRO

Section 6

The Second World War and the post-war era—new challenges for government vets

More war

With a mechanised army in the Second World War, one might assume that vets were not essential to the war effort in the 1940s. Wrong! Military vets ensured food safety for armies through meat, slaughter and dairy inspection. In addition, not all of the Second World War took place in terrain suited to vehicles. For example, in Papua New Guinea's vast stretches of inaccessible mountain jungle, horses and mules were just the thing for supplying artillery and rations to armies.

Also, after the bombing of Darwin in 1942, the Northern Territory was declared a military area and civilians evacuated to Alice Springs. This required military vets to take over all government veterinary services in evacuated areas.

During the war, Australian vets on the home front also did their best to address production diseases and inefficiencies that threatened food supplies for allied troops, citizens and export markets.

Extra vets were also needed when the United States Army based its troops in Queensland. The United States Army required its troops to receive milk from tuberculin-tested herds. Legislation was enacted to allow testing by contracted vets, and by 1962 some half million cows a year were being tested in Queensland.

Dangerous breakfast preferences

Approximately 5500 United States troops were billeted in Riverwood, a Sydney suburb near Bankstown. Having sworn an oath to fight the enemy—and not one to give up bacon and eggs for breakfast—troops were supplied with imported ham, bacon and pork when local production failed to meet demand, but the imported pork products carried with them classical swine fever virus.

Contact with Australian pigs then occurred through contracted piggeries collecting the army base's discarded food scraps (including pork) and failing to adequately boil them down before feeding them to pigs.

Max Henry had a Swine Fever Command set up before the laboratory results from dying pigs were even confirmed, and every government veterinary officer was alerted. Due to his rapid action and effective tracing, the outbreak was controlled within eight weeks.

However, the incident brought home to veterinary authorities that the war and technological change were making Australia more vulnerable to the introduction of animal disease. With great foresight, Lionel Bull had already argued the need for rapid and accurate exotic disease diagnosis in 1941. The immediate outcome was the creation of the FMD Diagnostic Committee which drafted an emergency management plan for the disease.

Later, continued concern about the exotic disease threat would lead to the creation of a national high security emergency animal disease laboratory.

Run, rabbit, run

While humans were busy making war between 1939 and 1945, Australian rabbits had been busy breeding. Rabbits grew to such plague proportions in many regions of Australia that huge chilling plants had to be constructed to store the hundreds of thousands of rabbits trapped by bounty hunters each week.

While Bull and Mules had begun investigating the use of myxomatosis in the 1930s, their research ran into a roadblock when they were refused permission to conduct experiments in the wetter parts of Australia—where mosquitoes and other winged vectors could transfer the virus between adjacent warrens.

Eventually permission was gained, and experiments began in 1950. After what seemed like initial failure, the virus began to spread rapidly, and millions of rabbits were killed in just a few months. While a gruesome sight, the efficacy of myxomatosis allowed recovery of Australia's wool and meat production to the tune of $68 million.

The great Tasmanian vet shortage

In 1942, pressured by an acute shortage of vets, Tasmanian Chief Veterinary Officer, RCT Philp, introduced a nationalised veterinary service (NVS) in Tasmania. Unique in the English–speaking countries, the service encouraged government vets to undertake clinical works as well as their departmental work. Stockowners were provided with a heavily subsidised clinical service, as there was only a moderate flat fee for most visits.

Releasing the Myxoma Virus for rabbits. ©CSIRO

The Northern Territory blooms under Rose

With the war at an end, Colonel Alfred Rose arrived in the Northern Territory in 1946 to take up the post of Chief Veterinary Officer. Government veterinary services had long been neglected in the Northern Territory. However, straight-shooter Rose was a gifted leader and quickly established the Animal Industry Branch (AIB) and greatly expanded its resources and functions. This included establishing veterinary research on wildlife, animal husbandry and poisonous plants.

Under Rose, AIB staff numbers grew almost as quickly as Australia's rabbit population—going from 11 staff in 1947 to 118 in 1965. He also rewrote animal industry legislation, encouraged farm herd vaccination for pleuro, renovated the facilities for travelling stock and produced droving programs for scheduled disease inspection. One of his most successful innovations was the creation of the Central Australia Protected Area, from which pleuro was eradicated by 1958, and which greatly reduced spread of the disease between the Northern Territory and South Australia.

Post-war developments

Following the war, lipstick factories could go back to making lipstick instead of munitions, soldiers rushed back to their families and sugar addicts rejoiced at the end of sugar rationing.

Abattoirs and Freezing Works, Somerset, Government Inspector. Archives Office of Tasmania. ADRI: AB713-1-3542.

The growth of intensive livestock production systems also increased, and more government vets were needed to monitor the health of intensive systems, which were more vulnerable to infectious disease.

The development of a national pleuro eradication program in the late 1950s also saw further demand for government vets, as did the post-war expansion of Australia's export markets for livestock products (mostly beef). Importing countries demanded greater levels of veterinary inspection at Australian export abattoirs.

The new trade opportunities also saw researchers focus on enabling Australia's livestock industries to be globally competitive, by improving genetics, pastures and husbandry for optimal production.

It's all about freedom

Despite the need for increased productivity, disease freedom still remained an important goal for Australia. Australia's new export markets were free from FMD, and required the same freedom from trade partners.

One recognised threat to Australia's disease freedom was the thousands of post-war European immigrants doing their best to smuggle their favourite foods from FMD endemic regions into Australia. Similarly, increased air travel (following the advent of jet aircraft in the 1950s) and changing political geography in the region were viewed as possible threats to Australia's quarantine barrier.

> In 1949 the CSIR became the CSIRO and a vet, Ian Clunies Ross, was appointed to lead not just the Animal Health Division, but the entire research organisation. (Vets around the nation looked at each other speculatively and wondered if world domination by vets was imminent.)

These threats led veterinary authorities in Australia to examine closely their preparedness to effectively handle an exotic disease outbreak. What they saw filled them with discontent; Australia had little expertise in studying viral livestock diseases and was reliant on overseas expertise and laboratories for exotic disease diagnosis. In a nutshell, Australia's animal disease preparedness was not up to snuff.

This was completely unacceptable as in the mid-1950s there were estimated to be some 150 million sheep on the continent, and sheep and cattle products were the bulk of the nation's exports. The protection of livestock from exotic disease was essential. What was needed was a plan for a national veterinary virology laboratory.

Towards this plan, the CSIRO established a virology section in 1958. This was the first unit in Australia to be specifically devoted to research on virus diseases of animals. However, an exotic diseases committee—established in the early 1960s by the Australian Veterinary Association—identified that national resources in the 1960s were still insufficient to rapidly diagnose or control an exotic disease incursion. The committee recommended the development of a central laboratory, staffed with experts in exotic disease diagnosis. This recommendation was seconded by an independent CSIRO-commissioned review.

However, for political reasons, the CSIRO Australian Animal Health Laboratory would not be officially opened until 1985. In the meanwhile, the New South Wales Department of Agriculture established a virology laboratory in 1969 which undertook important research on a number of viral infections affecting Australian livestock.

Nobody likes a threat to their export markets

In the 1960s, while veterinary authorities were cogitating about exotic disease preparedness, and researchers were looking for ways to increase productivity, Australia's livestock export markets were rudely threatened by new overseas import requirements.

In 1965 the West German Department of Health specified that from 1966 onwards, only brucellosis-free herds would be accepted for meat import. Then, also in 1960s, the United States stipulated that carcases with any tubercular lesions would be rejected, and that imports of casein and milk powder from countries with bovine tuberculosis or brucellosis would be restricted.

As Australia's major beef export market, the announced expected freedom from bovine tuberculosis in the US by 1984 also caused consternation.

Suddenly, the national eradication of bovine brucellosis and bovine tuberculosis gained new priority, and in the 1970s the first national campaign to eradicate these diseases commenced.

While most states and territories already had test-and-slaughter programs for bovine tuberculosis and brucellosis (which also compensated producers for compulsory slaughter), the national eradication was still a huge undertaking. Before eradication was achieved, around 27 million blood samples were tested at laboratories.

The swinging Seventies

The Seventies weren't all bell-bottom pants, sideburns and platform shoes. The Australian College of Veterinary Scientists was formally established in 1971, and continues today to assist vets in all fields of work to pursue postgraduate and proficiency qualifications.

Australia was also declared free from pleuro in 1973 (an event way more important than the birth of lava lamps and disco). Pleuro had prevented the export of live cattle from Australia for over a century, and its eradication enabled new export opportunities—as well as sparing many cattle from a very painful disease.

Unlike pleuro, bovine tuberculosis remained a problem. The greatest challenges to eradication occurred in the extensive grazing areas in central and northern Australia, but government vets and station owners soon came up with cunning solutions. Weaning and age segregation, heifer segregation and infrastructure investment strategies all accelerated eradication, as did research development of improved bovine tuberculosis testing methods.

In another major coup for government vets, the Bureau of Animal Health was created in 1974. It became Australia's central coordinating body for veterinary matters, and permitted a national approach to disease epidemiology and control.

Headed by vet Bill Gee, and residing within the Australian Government Department of Agriculture, Fisheries and Forestry, the bureau was created with the aim of centralising the provision of animal health in Australia. Thus, it assumed coordination of the newly created national brucellosis and tuberculosis eradication programs.

Computer nerds make friends with veterinary epidemiologists

With the intensification of livestock production, the need for disease monitoring and surveillance increased. The modern computer provided the means for managing this data, and for modelling production systems and disease. In the 1970s the first Australian university graduate program in veterinary epidemiology (using computer modelling) was developed, and vets could officially join the nerd-herd, so to speak. In the 1970s, government vets also began to develop health programs for herds based on their epidemiological modelling work.

The bureau's wordy official mandate was 'the eradication and control of major endemic and exotic animal diseases by working closely with the Australian Veterinary Association, CSIRO and state and territory departments of agriculture'.

Also in the Seventies, the CSIRO pulled off a research hat-trick; the toxins causing lupinosis in sheep were isolated, a vaccine was developed for campylobacteriosis in cattle, and the bacterial toxins responsible for annual ryegrass toxicity were isolated and identified. They also reaffirmed their love of poultry by establishing an Avian Diseases Section within the CSIRO Animal Health Research Laboratory.

The Eighties say goodbye to bovine brucellosis

The Eighties were an exciting time for government vets—well, even more exciting than usual. In 1984 the Australian Government Department of Health transferred animal and plant quarantine functions to the Department of Primary Industry (now the Department of Agriculture, Fisheries and Forestry). Incorporating the Bureau of Animal Health, the new organisation was called the Australian Agricultural Health and Quarantine Service (AAHQS). Now that all the government vets were together in a single department, organising fondue parties was that much easier, not to mention coordinating veterinary matters.

Protective laboratory suits at AAHL. ©CSIRO

Then, in 1985, the Australian Animal Health Laboratory (AAHL) was opened. AAHL was Australia's first national high-biocontainment research facility and the first in the world to receive accreditation as an International Collaborative Centre for New and Emerging Diseases by the World Organisation for Animal Health.

Since its establishment in 1985, AAHL has tested tens of thousands of samples, demonstrating Australia's continuing freedom from a range of diseases, including FMD, bovine spongiform encephalopathy, scrapie and numerous diseases of pigs, poultry and fish. AAHL scientists have also made significant contributions in developing diagnostic tests for FMD that do not require live virus, and developing more specific and rapid tests for the diagnosis of diseases such as bluetongue, Newcastle disease and avian influenza. AAHL's work greatly supports veterinary authorities in the diagnosis and control of suspected outbreaks of exotic disease, and government vets with a hankering for exotic disease expertise can undertake training at AAHL in disease recognition.

In another departmental shuffle, in 1986 the Australian Quarantine and Inspection Service (AQIS) was established,

The Australian Animal Health Laboratory opened in 1985. The CSIRO's AAHL is one of the most sophisticated laboratories in the world for the safe handling and containment of animal diseases.

and assumed responsibility for animal, pest and plant quarantine and border control (and the soulfully cute quarantine beagles). Along with the beagles, quite a few government vets were employed by AQIS, particularly in the area of meat inspection. Following a meat substitution scandal in 1981, when 'beef' briefly became a synonym for kangaroo meat, many government vets were involved in a decade-long reform process. They researched and implemented better technology, procedures and legislation for assuring meat and food quality.

Then, in a glorious end to the decade, Australia was declared free from bovine brucellosis in 1989 (and government vets celebrated with a month of nightly fondue parties). Private vets had played a key role in the brucellosis eradication campaign by undertaking testing, vaccination, abortion investigations, and post-mortem exams. In North Queensland, they had also worked with departmental staff and owners to draw up property eradication plans. Established local vets also did much to open up communication between district vet officers and pastoralists averse to the government.

At the same time, bovine tuberculosis continued to remain resistant to eradication in the north, and new financial assistance and tax incentives were provided to assist stock owners with the eradication costs of destocking, testing and infrastructure improvements.

Flying vets and Judas cows

In the frenzy caused by Dolly the sheep being cloned from an adult somatic cell, some may have missed the historic events going on in the world of government vets in the 1990s.

After many years of service and significant research work, the Glenfield Veterinary Research Station closed in 1990. However, new facilities also opened; the Parkville Veterinary Research Institute in 1991 and the Elizabeth Macarthur Agricultural Institute in 1990.

Another new development was the creation of an Australian Government statutory authority—the Australian Pesticides and Veterinary Medicines Authority (APVMA)—in 1993.

Since nobody likes too much Dieldrin, DDT or antibiotics in their food, states and territories have, for a long time, required chemical products to be evaluated before they can be legally supplied, sold or used for agricultural or veterinary purposes.

In a move to centralise the registration of all agricultural and veterinary chemical products in Australia, the APVMA replaced the old system whereby each state and territory had its own system of registering and prescribing the use of veterinary chemical products. Government vets at APVMA now provide a valuable service in reducing the potential risks to trade and consumers of chemical residues in food and fibre products.

Also big in the 1990s was Australia's declared freedom from bovine tuberculosis in 1997. While eradication had been relatively quick in the south, the remote northern regions—with their extensive herds, lack of fencing, rugged terrain and feral buffalo acting as reservoirs—proved much trickier. Still, vets came up with equally cunning solutions to achieve a complete muster. Radio collars on 'Judas cows'—who seek out feral cattle and buffalo—were used to track down 'unmusterable' cattle and buffalo which had craftily developed nocturnal grazing habits to avoid detection.

Government vets even took to the skies—using light aircraft to cover the enormous distances involved in eradication work in the Northern Territory and North Queensland.

Innovative partnerships—Animal Health Australia

In another positive move, governments and major national livestock industry organisations in Australia united in 1996 to form the Australian Animal Health Council Ltd, a not-for-profit public company. The council commenced operating under the more user-friendly business name of Animal Health Australia in February 2000. Animal Health Australia manages approximately 50 national programs on behalf of its 31 members; these programs improve animal and human health, biosecurity, market access, livestock welfare, productivity, and food safety and quality. The organisation is unique—most countries do not have a similar organisation providing joint government and industry funding and planning for national animal health.

Not only is Animal Health Australia unique, it is also the custodian of the Emergency Animal Disease Response Agreement (EADRA)—a contractual arrangement between governments and industry to collectively and significantly increase Australia's capacity to prepare for, and respond to, emergency animal disease incursions. The EADRA is a world-first initiative; a legally binding agreement between Animal Health Australia, the Australian Government, all state and territory governments, and 14 livestock industry signatories. The EADRA, which was ratified in 2002, facilitates rapid responses to emergency animal disease incidents.

The EADRA is underpinned by AUSVETPLAN, the Australian Veterinary Emergency Plan. Authority for the development and maintenance of AUSVETPLAN also rests with Animal Health Australia. Drafted by experts (mostly vets) from Australian national, state and territory governments and the livestock industries, AUSVETPLAN manuals document the national contingency planning framework for the management of animal disease emergencies in Australia. With its comprehensive range of up-to-date, disease-specific response manuals, Australia is a global leader in animal disease response planning and preparedness. In a nutshell, AUSVETPLAN sets the world standard for disease planning. Government vets can be proud of the role they play in contributing to this standard of disease planning and preparedness.

Government vets today and in the future

From scab to fab: comparing the veterinary situation in the nineteenth and twenty-first centuries

Looking back over two centuries, in the 1800s there was only one private veterinary college offering a degree in veterinary science. Today there is at least one university vet school in each mainland state. Furthermore, in the 1880s Australia had no animal disease laboratories. However, by the 1930s most states had research facilities and diagnostic laboratories, and in 2011 all states and territories have these—in addition to access to Australia's national laboratory.

Likewise, full-time government vet numbers in Australia have expanded from just one in 1883 to several hundred in 2011. Also, from a total absence of government vets in policy-making positions up to and during the 1880s, in the early 1900s most states had vets in charge of disease control and quarantine matters. In the 1920s, government vets also attained Commonwealth government positions. Today, each state and territory has its own government veterinary service, working with that of the Australian Government.

Veterinary research also grew from the self-resourced experiments of individual vets such as Graham Mitchell in the 1860s, to state and territory research in the early 1900s, and then national research programs in the 1920s and onwards.

Government vets have also played an important role in Australia's trade and economy. As a country, we export more than half of all our livestock products, and overseas market entry is largely gained due to the control, inspection and approval of exports by government vets. In addition, access to foreign markets, also facilitated by government vets, has allowed livestock industries to expand beyond supplying the Australian domestic market, and to achieve significantly higher returns.

Finally, in the early 1800s Australia had an enviable level of livestock disease freedom, except for the ever-present scab. However, by the 1890s a number of serious diseases were hurting animal health, public health, productivity and trade markets. This situation was reversed in the twentieth century, as government vets employed legislation, disease management programs and research to eradicate and prevent many diseases—reclaiming Australia's enviable level of disease freedom. The past few decades have also seen significant changes in Australia's ability to detect and manage disease outbreaks and potential threats.

The cost of disease and the value of disease freedom

The following is a selection of just some of the many diseases eradicated from or prevented from entering Australia through the efforts of government vets and others.

Equine influenza (EI): In August 2007, equine influenza was diagnosed in Australia. The subsequent response to eradicate infection within the states of New South Wales and Queensland involved 10 000 properties over an area of approximately 280 000 square kilometres, and the vaccination of more than 140 000 horses. The direct cost of the response was over $100 million. The last known clinical case was on 25 December 2007, and Australia's freedom from EI declared on 30 June 2008. Australia was again recognised as EI-free by the OIE in December 2008.

Bovine Spongiform Encephalopathy (BSE): A number of countries in Europe and Asia, as well as the United States and United Kingdom have reported cases of BSE. In most countries, incidence of the disease put a big hurt on beef exports—the European Union banned the import of beef from the United Kingdom for ten years. In the United Kingdom epizootic of BSE during the 1990s, more than 179 000 cattle were infected and 4.4 million slaughtered during the eradication program. Australia is free from BSE because entry has been prevented through import bans on meat and bone meal since the 1960s. In addition, testing through the National Transmissible Spongiform Encephalopathies Surveillance Program (NTSESP) demonstrates Australia's ongoing freedom from BSE, and will provide early detection should the disease occur.

Peste des petite ruminants (PPR): PPR is a viral disease (similar to rinderpest) of goats and sheep which is

characterised by fever, necrotic inflammation of the mouth lining, and enteritis. It is endemic in West Africa and is described as the most destructive viral disease against small ruminant flocks. A major constraint to intensive small ruminant farming in affected areas, mortality in susceptible flocks varies from 10 per cent to 100 per cent and morbidity from 50 per cent to 100 per cent. The disease has never occurred in Australia and that's how we'd like to keep it.

Highly pathogenic avian influenza (HPAI): While the H5N1 strain of HPAI has never been reported in Australia, there have been five outbreaks of other HPAI strains in commercial bird flocks, all of which were successfully eradicated. The last reported case was in 1997 in Tamworth, NSW. Previous outbreaks occurred in commercial poultry farms in Victoria (1976, 1985 and 1992) and Queensland (1994). A stamping-out policy based on slaughter, disinfection and movement controls was applied, and all outbreaks were eradicated before any significant spread occurred. While not confirmed, poultry contact with wild birds carrying HPAI was thought to be the cause of the outbreaks. To provide some idea of what an outbreak of H5N1 might cost Australia, the Netherlands spent more than 150 million to eradicate the disease in 2003. Government vets in Australia have worked with policy makers, industry and others to make sure that comprehensive biosecurity, quarantine and response measures are in place to protect against the disease.

Emerging Infectious Diseases—a special challenge

As vets know, diseases are tricky, cunning things. They get bored with where they live and pop up in new geographic areas. Or, in a microbial make-over, they change their virulence and other characteristics. In extreme cases, microorganisms suffer a mid-life crisis and decide to extend their host range and incidence, or develop multi-drug resistance. For all these reasons, vets like to keep a close eye on what are called emerging infectious diseases (EIDs).

Graham Mitchell's nineteenth century research on the emergence of anthrax in Australia is probably the earliest EID research by a government vet in Australia. More recent research by government vets includes that on Menangle virus, Hendra virus and Nipah. In fact, Australia's investment in EID expertise and detection capability has seen a number of its government vets selected to participate in international expert groups which steer global research and response policies against EIDs. As Australia's Nobel Prize winner, Peter Doherty—also once a government vet—likes to say, 'don't underestimate the 'science' in 'veterinary science'.

How do government vets in Australia make a difference today?

Today government vets...

- prevent, eradicate and manage animal diseases in Australia and abroad
- respond to emergency animal disease outbreaks and participate in simulation exercises
- participate in global and regional disease control programs and projects
- help improve public veterinary services in developing countries
- monitor wildlife for exotic animal disease
- support Australia's trade, industries and economy through export certification, import risk assessments, and by fulfilling international disease surveillance and reporting requirements
- train Australian Veterinary Reservists to respond to emergency disease outbreak/incursions
- monitor and provide assurance of animal welfare
- undertake applied research and development projects
- monitor locally produced and imported food
- protect public health against zoonotic diseases and the misuse of veterinary drugs
- assist the livestock industries with animal productivity, health, biosecurity and surveillance
- monitor and plan for exotic animal disease incursions
- develop scientifically based animal health and welfare policy and advice
- develop international trade rules
- negotiate market access for Australian agricultural, pharmaceutical and service industries.

Looking for a government veterinarian?

You may find them in some unusual places... and doing unexpected things!

…inspecting salmon farms in **Norway**...

…negotiating trade and market issues in **overseas Australian embassies**...

…**on a plane** accompanying incoming horses...

…supervising PhD students...

…surveying animal health in **East Timor**...

…assisting with avian influenza prevention in **Indonesia**...

…assisting epidemiological studies of human disease at the **Department of Health and Aging**...

…tracking feral pigs in **Far North Queensland**...

…at international trade negotiations in **Geneva**...

…sampling wild birds in the **Northern Territory**...

…training livestock officers in **Papua New Guinea**...

…discussing international animal health standards **at the OIE in Paris**.

An alphabet of veterinary challenges and opportunities

A is for AQUATIC HEALTH: There is a growing need for aquatic veterinary services driven by the strong global growth in aquaculture, and the emergence of many transboundary diseases in aquatic animals.

C is for CLIMATE CHANGE: Vets are already looking at possible future animal health scenarios caused by climate change. For example, arthropod-borne viral diseases are likely to continue to spread as climate change extends the range of disease vectors. In this case, veterinarians will have an important role collaborating with, or working within, public health and environmental agencies. Monitoring the global animal health environment for signals preceding emergent threats to animal (and human) health is, and will remain, a significant future challenge and opportunity for vets.

E is for ECOHEALTH: EcoHealth is a new approach to understanding and promoting health bringing together vets, physicians, ecologists, economists, social scientists, planners and others to comprehensively study and understand how ecosystem changes are implicated in newly emerging infectious diseases such as Nipah virus and Hantavirus.

F is for FOOD INSECURITY: The Food and Agriculture Organization estimate there were 923 million undernourished people in 2007. Since food insecurity has been steadily increasing over the past few decades, the number of undernourished people can be expected to grow. Improving livestock health and productivity is one way of increasing food security—and an opportunity for vets to help combat world hunger.

G is for GLOBALISATION: Globalisation has increased the potential for rapid disease and pest spread, and unsafe food reaching numerous consumers in distant markets. With the increased mobility of these threats, it's important that vets step up their efforts in building regional disease control capacity and contribute to global or transboundary approaches to animal disease control.

I is for INFORMATION: The ability to collect and rapidly disseminate national data on animal diseases is becoming more and more essential for countries to access national, regional and international markets. Vets will continue to play a key role in developing essential animal health surveillance and reporting systems.

L is for LIVELIHOODS: Animal disease outbreaks and response/mitigation measures have a significant economic impact on livelihoods. These impacts are multi-dimensional and not always well understood. A future challenge for vets and others will be integrating research on livestock value chains into effective disease response strategies.

O is for ONE HEALTH: Collaboration between public health experts, veterinarians and ecologists will be essential for combating emerging infectious diseases. Why? Because these diseases require management approaches combining public health, veterinary and ecological expertise, surveillance and response. Since emerging infectious diseases are on the increase, the need for collaborative approaches will also increase.

P is for PREVENTION: Prevention really is better than cure, if the cost of disease outbreaks is compared with that of preventive measures. And, as animal and human health agencies move away from reactive response and towards proactive prevention, more emphasis is being placed on early reaction mechanisms and resources such as animal disease intelligence and networks. Vets have a key role to play in developing the required networks and mechanisms for early disease warning and response measures.

S is for SUSTAINABILITY: Vets need to promote and participate in animal health policy, programs and research that support sustainable natural resource management. This includes addressing the world's dwindling biodiversity.

T is for TRADE: Animal health trade issues aren't getting any simpler. Veterinary involvement will increasingly be required in the negotiation of international agreements, standards, guidelines and recommendations, as world animal health and trade environments grow more complex.

W is for WELFARE: The trend in animal welfare in Australia is one of increased citizen and consumer awareness and expectation. Vets will continue to play a role in developing welfare standards that meet these expectations while also remaining scientifically based.

Z is for ZOONOSIS: Many human infectious diseases and most emerging infectious diseases are zoonotic. Highly pathogenic H5N1 avian influenza outbreaks and the H1N1 pandemic illustrate the considerable impact of such outbreaks. The zoonotic disease threat may intensify as populations continue to become more mobile, densely housed and closely associated with animals. Poor livestock health management, lack of vaccination, more intensive livestock production and increased animal product processing may also provide increased pathways for zoonoses. Combating zoonoses may become one of the most important challenges for vets in the future.

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Numerous issues of the *Australian Veterinary Journal*, particularly those from between 1925 and 1960, also provided much valuable historic information.