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Hydatids: A Disease of Human Carelessness
A History of Human Hydatid Disease in New Zealand

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A thesis submitted for the degree of
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Hydatid disease caused by the parasite *Echinococcus granulosus* first became a human health problem in New Zealand in the late nineteenth century. Humans contract this potentially fatal disease by handling dogs that have eaten infected sheep carcasses. The disease is controlled by feeding dogs correctly and preventing them from straying. New Zealand's mild climate and large sheep population proved an ideal breeding ground for the parasite. Doctors and veterinarians understood the transmission of the disease, but for many years dog owners ignored their advice on prevention by continuing to feed their dogs on raw sheep offal. This study examines the unexpected difficulties New Zealand encountered in its campaign to eradicate hydatids. Until the late 1950s neither public education nor legislation had any apparent effect. The rising incidence of the disease, notably in children, finally shocked farmers and the public into demanding government action. The Government agreed in 1959 to support a national control campaign, anticipating that eradication would be achieved within three to five years. This study explains how the problem proved far more complex than officials had anticipated, and why a successful outcome took as much as thirty-five further years to achieve. But by the mid-1990s New Zealand could at last claim that it had virtually exterminated this dangerous and elusive parasite.
Preface

I am grateful to a number of people for their kind help and support during the preparation of this thesis. Barbara Brookes inspired me to find out what had delayed hydatid eradication, and Tom Brooking steered me wisely and patiently to the discovery of a positive conclusion.

I am indebted to the new friends I have made through my research, especially to Neil Aitken, Hazel Bisset and Bob Scott, who so generously shared their very personal experiences with me. My visits to them on the Maniototo are memories I shall always cherish.

I am grateful, too, for the interest and encouragement of Michael Gemmell, now Head of WHO's Centre for Surveillance and Control of Echinococcosis/Hydatidosis in Cambridge, England. He has generously shared much of his most recent work with me. I have been fortunate, too, to have useful telephone contact with Dr. Trevor Beard, now a Senior Research Fellow for WHO at the Menzies Centre for Population Health Research in Hobart, Tasmania, and with Joe Bramble, for many years a Senior Hydatid Inspector with the Tasmanian Department of Agriculture.

Closer to home, my many requests for help from the National Archives staff in both Wellington and Dunedin, from the librarians of the Otago Medical Library, and from the staff of the Hocken Library have always received a courteous and helpful response. David McDonald and Lynda Moore of the Hocken Library have both been particularly helpful.

Last but not least, special thanks to my friend John Johnston for his unfailing support and encouragement in the past year. Without his help my research would have been a far less rewarding experience.
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### Abbreviations

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<td>AJHR</td>
<td>Appendix to the Journal of the House of Representatives</td>
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<td>AUST. NZ J. SURG.</td>
<td>Australian &amp; New Zealand Journal of Surgery</td>
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<td>HCO</td>
<td>Hydatid Control Officer</td>
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<td>HRC</td>
<td>Hydatid Research Committee</td>
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<tr>
<td>HRU</td>
<td>Hydatid Research Unit</td>
</tr>
<tr>
<td>MAF</td>
<td>Ministry of Agriculture and Fisheries New Zealand</td>
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<tr>
<td>MJA</td>
<td>Medical Journal of Australia</td>
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<td>MOH</td>
<td>Ministry of Health</td>
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<td>NHC</td>
<td>National Hydatids Council</td>
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<tr>
<td>NZJAg</td>
<td>The New Zealand Journal of Agriculture</td>
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<tr>
<td>NZMJ</td>
<td>The New Zealand Medical Journal</td>
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<tr>
<td>NZ MRC</td>
<td>New Zealand Medical Research Council</td>
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<td>WHO</td>
<td>World Health Organisation</td>
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Introduction

Human hydatid disease is caused by a tapeworm so small that it is barely visible to the naked eye. The disease was unknown in New Zealand before the first half of the nineteenth century, when sheep infected by this parasite were imported into Australasia from the northern hemisphere by early European settlers. Once established in farm stock, the tapeworm known as *Echinococcus granulosus* became a growing threat to human health.

The disease is transmitted to humans by dogs that have eaten infected sheep carcasses. The parasite’s survival requires two hosts, most commonly sheep and dogs. Humans are accidentally involved in the tapeworm’s life cycle when they swallow hydatid ova, usually after handling an infected dog. The human host’s bloodstream transports the microscopic ova from the gut wall to the liver, lungs or other parts of the body, where they develop over time into potentially large and dangerous cysts. The disease is readily preventable with the co-operation of dog owners. Experience overseas has shown that human hydatid disease may be controlled in a community within ten to fifteen years if all dogs are fed correctly and prevented from straying.1

This study describes the efforts made in New Zealand through the past hundred years to eliminate human hydatid disease. It examines the difficulties of resolving a public health problem which requires medical, veterinary, and educational expertise. It considers community and individual responsibility for disease prevention, and the factors a government should take into account when considering national action against a human health hazard. It shows how the resolution of a health problem is influenced by the current social climate and by historical events. My thesis has not attempted to deal in any detail with the medical or scientific aspects of human hydatid disease, since these are already well documented in the professional literature.

Human hydatid disease has been mentioned many times during the past century in the New Zealand medical literature. As early as 1889 an article in the *New Zealand Medical Journal* by a Dunedin medical practitioner, R.G.Macdonald, described the essential preventive measures.2 Between 1895 and 1946 Sir Louis Barnett, a Dunedin surgeon, published over fifty articles on the incidence, prevention, and treatment of the disease. For many years Barnett recorded every hospitalised case in the country, filing his handwritten case notes in what became known as the Australasian Hydatid Registry.3

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1M.A.Gemmell, Interview with the author, 17 February 1997.
Parts of the register are still held in the archives of the Otago Medical School. Barnett also wrote many educational articles and pamphlets about hydatid prevention for the lay public. He and his medical colleague, Sir Charles Hercus, compiled and printed the first anti-hydatid posters, which were displayed throughout New Zealand in the 1930s and later.

Sir Neil Begg, paediatrician and Medical Director of the New Zealand Plunket Society, emphasised the high prevalence of the disease in children in articles he wrote in the late 1950s and early '60s. Begg also described how a network of voluntary control committees organised by farmers themselves eventually overcame public apathy concerning hydatid control. Dr Trevor Beard, a general practitioner in Tasmania, agreed with Begg's observations, pointing out in several articles how a similar movement a few years later had been highly successful in reducing the incidence of human hydatid disease in Tasmania.

United States veterinary scientists M.J. Burridge and C.W. Schwabe carried out an epidemiological study of the New Zealand hydatid disease control programme in the 1970s. They reported that the incidence rate of the disease in humans was then far higher amongst the Maori than the non-Maori population.

More than sixty University of Otago medical students chose hydatid disease as the topic of their fifth year research assignment for Social and Preventive Medicine between 1933-1966. Their unpublished dissertations provide a unique insight into the attitudes and knowledge of New Zealand farmers and their families in this period.

In 1964 Dr. F.S. Maclean of the Department of Health wrote an informative booklet, 
*Hydatid Disease in New Zealand*, describing events in New Zealand which led to the establishment in 1959 of a national control campaign. A clear and detailed analysis of the hydatid issue was published three years later by the Parliamentary Committee of Inquiry into Hydatids Eradication in its official report to Parliament in 1967.

More recently Michael Gemmell, for over thirty years Director of the New Zealand Hydatid Research Unit, has written many published and unpublished papers about hydatid control in this country and elsewhere. He included several of his own historical accounts of the Hydatid Research Unit in an unpublished, five-volume series, 'Hydatid Research in New Zealand', copies of which are held in the Hocken and the Medical

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School libraries in Dunedin. Gemmell's extensive series also includes technical articles by medical, veterinary and research scientists, most of which are outside the scope of my study.

The purpose of my thesis is to examine a specific public health problem from a historical perspective. My aim is to find out why a preventable disease took almost a century to eliminate from New Zealand. The medical profession had a clear understanding of human hydatid disease by the 1890s, yet its incidence continued to rise in this country until 1960. What factors delayed control? How could the disease have been eradicated earlier? What can be learned from New Zealand's handling of the hydatid problem? Has the issue finally been resolved? These are some of the more important questions my study addresses.

Chapter One, "A Disease as old as the sheep industry", gives a short account of the history and the nature of hydatid disease. It examines the lifecycle and transmission of the parasite, *E. granulosus*, and clinical and treatment aspects of the disease. It describes the geographical distribution of the parasite, mentioning successful programmes in a number of countries where control measures have been introduced. In the final part of the chapter I have attempted to humanize my study by describing the impact of hydatid disease on the lives of three New Zealanders. Two underwent major surgery forty to fifty years ago for the removal of hydatid cysts. The third, a leading South Island sheep farmer, has crusaded for hydatid eradication since a memorable conversation he had as a twelve-year-old with his grandfather in 1913.

Chapter Two, "The years of 'Ignorance and culpable carelessness', 1840-1934", describes how the parasite was introduced to New Zealand in about 1840, and how it came to be recognised as a human health hazard by the end of the century. Medical practitioners and veterinarians by then understood the transmission and prevention of the disease, but persistent under-reporting caused general apathy and a lack of organised action. Early attempts to educate the public seemed to have no effect on the majority of dog owners, who continued, as was customary in New Zealand at the time, to feed their dogs on potentially infected sheep offal.

Chapter Three, "An 'Extensive, Intensive and Expensive Campaign of Education and Persuasion', 1934-1956", describes continuing but ineffective attempts by individual medical practitioners and others to control the disease by public education and legislation. Throughout this period the incidence of the disease continued to increase, particularly in children. Community groups gradually showed increasing concern. By the late 1950s public opinion demanded collective action against the hydatid menace.

Chapter Four, "Apathy and Antipathy give way to public action, 1957-1964", shows how growing public pressure eventually persuaded political leaders to take official

action. In 1959 the Government set up a new organisation, the National Hydatids Council, to deal with the parasite. Members of the NHC expected to achieve eradication within a matter of a few years. But progress was slow. By 1964 the public had become disillusioned with the Council’s performance.

Chapter Five, “A policy of drift: Disenchantment with the National Hydatids Council, 1965-1991”, examines the strengths and weaknesses of the NHC during its thirty-two years in office. Its responsibilities were ultimately transferred in 1991 to the Animal Health Division of the Ministry of Agriculture. Human hydatid disease was by then virtually extinct in New Zealand, but the parasite was still occasionally found in farm stock. Control measures could now be safely down-graded, but not totally discontinued.

Chapter Six, “The parasite is almost beaten”, describes measures taken by MAP since 1991 to ensure that hydatids do not recur in this country. In this final chapter I reach a number of conclusions. There were many reasons for the length of time taken to rid New Zealand of hydatids. Eradication might have been achieved earlier if the problem had been tackled in a different way. But New Zealand had no precedents to follow, and mistakes were inevitable. It seems fair to conclude with Gemmell that New Zealand’s national control campaign was: “a very valuable pioneering control model”.¹¹

This study is significant for two reasons: first, it illustrates how a young country resolved a complex public health problem through a process of trial and error over several decades; and secondly, my thesis does more than examine the control of a specific human disease. In a broader sense it reveals aspects of twentieth century New Zealand society beyond the apparent parameters of my given topic.

There are many examples in my thesis of the influence of the current social climate on the hydatid eradication campaign. The campaign was greatly affected, for instance, by the wary attitude of some New Zealand farmers to change. Apathy and indifference to the hydatid problem persisted in many rural communities until the late 1950s, suggesting that farmers before that time tended to be unconcerned about public health matters which did not affect themselves or their pockets. For many years farmers disclaimed personal responsibility for the hydatid problem, which they insisted was a matter for the authorities to resolve. But their attitude changed dramatically in the 1950s and early ‘60s.

My study shows how attempts to influence New Zealand dog owners by conventional health education campaigns failed over several decades. But a new movement in the late 1950s persuaded most farmers to “organise themselves spontaneously” into highly successful local hydatid control committees.¹² The most significant “opinion formers”

¹¹M.A. Gemmell, Personal correspondence, 24 August 1996.
in the rural community proved to be relatives, friends and neighbours, who succeeded where professionals and officials had previously failed.

The campaign was affected, too, by New Zealanders' philosophical attitude to coercion. In an essentially democratic young country the public tended to view compulsion as an infringement of personal liberty. Admittedly farmers were already accustomed to legislation relating to the control of rabbits and noxious weeds, and to regulations concerning dairy milk. But politicians feared the powerful farming community would oppose compulsory dog dosing or government interference with the traditional method of feeding farm dogs on raw offal. To keep on side with farmers, the Government in 1959 set up a relatively autonomous hydatid control authority, rather than delegating responsibility for eradicating the parasite to its own animal health officials. This decision almost certainly delayed prevention of the human disease.

Cultural differences within New Zealand society influenced the progress of eradication in some parts of the country. The incidence of hydatid disease in mid-century was reported to be six times as high in Maori as non-Maori. One reason for this was the different way Maori treated their dogs. Working dogs were fondled and treated as family pets in Maori homes, but rarely allowed indoors by European farmers. Other reasons for the higher incidence amongst Maori included differences in literacy levels, in awareness, and in the Maori system of land tenure, which often resulted in small and economically unproductive units. The end result was that many Maori farmers lacked the incentive and the financial resources to build adequate killing facilities on their properties, or to feed their dogs on products other than raw offal.13

Economic factors naturally affected efforts to control hydatids. During the depression years of the 1930s little money was available for public health programmes. It was remarkable that Barnett managed to raise sufficient funds through an appeal in the *Otago Daily Times* in 1934 to set up a hydatid research department at the Otago Medical School. Wartime paper shortages in the 1940s curtailed the distribution of hydatids publicity information, and shipping problems delayed the importation of arecoline hydrobromide needed for dog dosing. But there were fewer difficulties when the country became more prosperous in the post-war years.

It was no coincidence that the Government decided in the more affluent era of the late 1950s to support a national hydatid eradication campaign. Two additional economic considerations influenced the Government's decision. The first was growing public concern about the substantial national loss of an estimated £1,500,000 annually in overseas earnings due to the condemnation of hydatid-infected sheep livers. The second was an offer made in 1959 to the Government by farmers to fund a national hydatid eradication campaign by imposing a tax on themselves of £1 per annum for every dog

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they owned. Such an offer was unprecedented worldwide, and one that no government was likely to refuse. The New Zealand Government took steps almost immediately to establish a national control programme.

The history of hydatid eradication in New Zealand is an inspiring story which shows how the humanitarian initiative of a handful of individuals altered public attitudes, influenced government decisions, and eventually changed the behaviour of a nation’s dog owners. It is a story which needed to be told.
Chapter One

"A Disease as old as the sheep industry":
A global perspective

Since ancient times hydatid disease has taken its toll of human lives, particularly within pastoral societies. The disease has been responsible for human suffering world-wide, and for substantial economic loss in some affected countries. The present chapter sets the scene for my study by examining general aspects of human hydatid disease and considering the disease in a global context. It describes the nature of hydatid cysts, the life cycle and transmission of the parasite, *Echinococcus granulosus*, the major clinical features and methods of treating the disease, and its geographic distribution. The chapter also briefly describes global attempts at prevention and control. To give my thesis human interest the chapter ends by describing the impact hydatid disease has had on the lives of three New Zealanders.

**The nature of the disease**

Hydatid cysts have been known since ancient times in both animals and humans, but the parasitic nature of these "bladders" was not recognised until the second half of the nineteenth century. The causative agent, the parasitic tapeworm *Echinococcus granulosus*, probably evolved more than a million years ago in a wolf-deer life cycle in the Arctic zone of the northern hemisphere. The parasite evidently spread to many parts of the world with the domestication of animals and the introduction of animal husbandry some 10,000 years ago.\(^1\)

The Talmud, an ancient record of Jewish history and tradition, makes one of the earliest written references to hydatid cysts, describing them as "cystic lesions in the viscera of sacrificial animals".\(^3\) Hippocrates(460-379BC) referred to "tumours filled with water in the lungs of cattle, sheep and pigs", and noted a similar condition in human patients: "When the liver is filled with water and bursts into the epiploon, in this case the belly is filled with water and the patient dies".\(^4\) Galen(129-c200AD) interpreted the condition described by Hippocrates as "the rupture of a hydatid cyst into the peritoneal cavity". Galen himself was familiar with such cysts, observing that "The

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liver is very much inclined to produce hydatids. Sometimes, the liver of slaughtered animals is full of them.\textsuperscript{5}

The treatment of “cysts” was mentioned, too, in the writings of Rhazes (860-932), an eminent Persian physician whose text on therapeutics was a standard work for more than six centuries.\textsuperscript{6} Medical practitioners in the middle ages, according to Harold Dew, regarded what we now call hydatid cysts “as a manifestation of other morbid processes, calling them ‘degenerated glands, collections of pus, mucus, distended lymph spaces’”.\textsuperscript{7}

The medical profession did not recognise until almost the end of the seventeenth century that some cysts were animal in nature. Soon after this they realised that some of these “bladders” were a stage in the life cycle of parasitic tape worms. Rather than using the term “hydatid”, as had been done in the past, to refer to any cystic swelling, medical men came to restrict the meaning of “hydatids” to specific echinococcal or “true hydatid” cysts in humans, to distinguish them from non-parasitic tumours.\textsuperscript{8}

Human hydatid disease became better understood in the mid-nineteenth century mainly thanks to Friedrich Kuchenmeister, a German medical practitioner. With unusual insight for his time Kuchenmeister recommended in 1851 “that people who slaughtered domesticated animals should not be allowed to throw offal containing bladders (cystic worms) to dogs as food.”\textsuperscript{9} His advice has remained one of the cardinal principles of hydatid disease prevention until the present time. But little regard was paid to Kuchenmeister’s recommendations, perhaps because of his tedious and wordy style of writing.\textsuperscript{10}

A decade later another German researcher, von Siebold, discovered adult hydatid tapeworms in the small intestines of dogs experimentally fed with sheep livers containing hydatid cysts. His findings established the role of the dog as the parasite’s definitive host. Sheep were by then known to act as the intermediate host. In 1867 Rudolf Leuckart recorded the first complete and accurate account of the life history and morphology of \textit{Echinoccus granulosus}.\textsuperscript{11}

The first Australasian medical text dealing specifically with hydatid disease was published in 1884 by an Adelaide doctor, J.D. Thomas, who examined the aetiology, pathology, and clinical features of the disease under Antipodean conditions.\textsuperscript{12} The disease was relatively well understood by 1891 when the first New Zealand surgical

\textsuperscript{5}C.C. Galenus, In Grove, p. 320.
\textsuperscript{8}Grove, p. 320.
\textsuperscript{9}Ibid., p.342.
\textsuperscript{10}Ibid.
\textsuperscript{11}Dew, p.10.
\textsuperscript{12}Ibid.
Figure 1. Life cycle of *Echinococcus granulosus*.
removal of a hydatid cyst was performed in Dunedin Hospital by a young surgeon, Louis Barnett. 13

**Life cycle of *Echinococcus granulosus***.

The larval form of the tapeworm *Echinococcus granulosus* is the cause of human hydatid disease. The adult tapeworm is found exclusively in the small intestine of carnivores, usually the dog (the definitive host). Microscopic eggs from the adult worms are shed periodically in the dog's faeces and become widely dispersed, often by flies. The eggs may be swallowed by one of the parasite's potential intermediate hosts, for example by sheep or another herbivore, or by humans. The embryo hatches from the egg in the small gut of the intermediate host, burrows through the gut wall and is carried by the bloodstream to the liver, or on to another organ such as the lung. In this new location it develops into a cyst, which is a fluid-filled bladder that gradually enlarges to become a mass of small larval worms. The parasite's life cycle is completed when the cyst-infested organs of an intermediate host are consumed by a dog. 14

Hydatid cysts in humans are usually fertile, but modern burial rites normally interrupt the life cycle when humans are infected. Human cases occur only in parts of the world where other intermediate hosts are available, as in sheep-raising countries where dogs are fed on the infected viscera of farm-slaughtered sheep. 15

It is important to understand that dogs become infected only by eating hydatid cysts contained in the organs of infected grazing animals, while sheep and humans are in turn infected only by ingesting the parasitic eggs excreted by dogs. Humans cannot contract the disease by eating infected sheep offal, but in the past this fact has been widely misunderstood, with damaging effects to New Zealand's meat export industry. 16

**Transmission**

Humans probably become infected by hydatid disease most commonly from direct contact with infected dogs. 17 The parasite's eggs cling to a dog's fur, and humans can be infected by handling or fondling dogs. John Heslop, a Dunedin surgeon, noted the risk to children: "The danger of infestation is greatest in childhood, when intimate contact between child and dog are likely". 18 One of the possible reasons for the high

15 Ibid.
Plate 1. "Our friend the sheep-dog?". Propaganda photograph used in 1940s.
incidence until recently of hydatid disease in New Zealand's Maori population was the
domestic intimacy shared by Maori families and their working dogs.\textsuperscript{19}

The highest known prevalence of hydatid disease in humans anywhere in the world is
among the Turkana, a stock-raising people in northwestern Kenya.\textsuperscript{20} People in this
mountainous region share their sleeping quarters with dogs for warmth in the cold
desert nights, and “dogs are kept as ‘nurses’ to lick babies clean after they vomit or
defaecate”. Tribes people perpetuate the hydatid life cycle by placing dead human
bodies out in the desert for dogs and wild carnivores to eat. The Turkana people have
been found to become infected while very young. On the other hand the disease is rare
amongst the neighbouring tribe, the Masai, whose culture is different, and who do not
share the same close relationship with their dogs.\textsuperscript{21}

Lack of hygiene probably contributes to the spread of the disease, according to
J.B.W. Dunlop, a medical student, who commented in 1933 on the “unclean habits” he
had noticed on New Zealand farms. Dunlop was concerned to see “toddlers crawling in
the dust around dog kennels”. He claimed that farm workers who had been handling
dogs often failed to wash their hands before meals or at ‘smoko’ time. Dunlop
condemned the “unhygienic” habit amongst New Zealand sheep farmers of whistling
for dogs or stock by putting two fingers in their mouths.\textsuperscript{22} But possibly Dunlop’s
remarks reflected his own different background.

Direct contact with dogs is not the sole source of human infection. It is possible to
contract the disease from contaminated food or drinking water. Of three New Zealand
women who had hydatid cysts surgically removed in the 1960s, two told an interviewer
they were “very keen on dogs”, and had had contact with them over a long period. But
the third hated dogs and “never went near them”. When asked how each believed they
had been infected, the first said she owned a pet dog that roamed about and sometimes
killed sheep. Her dog became infested, she said, and she admitted often having handled
it without washing her hands. The second, a young woman who “lived in a shambles
of a house”, said she had often brought home stray dogs. She thought she had
contracted the disease from one of the strays. The patient who disliked dogs said she

\textsuperscript{19} M.I. Burridge & C.W. Schwabe, ‘Hydatid Disease in New Zealand. An Epidemiological Study of
Transmission among Maoris’, \textit{American Journal of Tropical Medicine and Hygiene}, \textbf{Vol.26}, 2, 1977,
p. 264.
\textsuperscript{21} D.I. Morris & K.S. Richards, Hydatid Disease, \textit{Current medical and surgical management}, Oxford,
\textsuperscript{22} J.B.W. Dunlop, ‘A public health survey of Tapanui with special reference to the prevalence of hydatid
disease in the surrounding district’, Unpublished 5th year Medical Students’ dissertation for Social and
Preventive Medicine, Medical Library, University of Otago, Dunedin, 1933, p.44.
HYDATIDS IN HUMANS

There's no easy way of removing an hydatid cyst. It always means a major surgical operation. Sixty per cent of all hydatid cysts in humans are in the liver.

Thirty per cent of all hydatid cysts in humans are in the lung.

Ten per cent of all cysts in humans are found in any other part of the body with a blood supply, e.g., kidneys, bones, spine, heart or brain.

The hydatid worm is carried only by dogs, and humans become infected only after they have taken in an hydatid tape worm egg passed by a dog.

Dogs become infested with hydatid worms only if they eat a cyst, found commonly in the internal organs of sheep.

There would be NO hydatid cysts in humans and NO operations and NO hydatid deaths if all dog owners would—

Keep their dog under control.
Feed them on prepared foods only, tinned or dry. DEFINITELY NOT OFFAL.

Plate 2. Pamphlet used for anti-hydatid education.
Source: Dept. of Agriculture & Tasmanian Hydatids Eradication Council, 1977
thought she had been infected by chewing pieces of grass contaminated with hydatid eggs.\textsuperscript{23}

Recent research findings have shown that hydatid eggs deposited in dogs' droppings remain fertile for several months, and are widely distributed by flies or by wind, sometimes infecting human food or water supplies.\textsuperscript{24} In the Turkana region of Kenya investigators have observed dogs defaecating in or near water wells, or in pools used as human drinking water.\textsuperscript{25}

The potentially harmful effect of dogs on human health was the subject of a recent article in \textit{Community Medicine}, which noted that: “Dogs act as a reservoir or vector of human pathogens”.\textsuperscript{26} An article in \textit{The Lancet} referred directly to the role of dogs in the transmission of hydatid disease:

Why dogs were first domesticated is unclear, but it was probably due to a combination of factors such as their value in hunting, transportation, defence, herding, scavenging, and fighting and their usefulness as food, bedwarmers and pets. Whatever the reason, the relationship between man and dog facilitates the transmission of about fifty diseases. One of the most important of these, although not the most prevalent, is hydatid disease.\textsuperscript{27}

Barnett constantly warned the New Zealand public in the 1930s and '40s about the danger of handling dogs, referring in a widely distributed Health Department pamphlet to: “Our Friend the Dog in an Unfriendly Role”.\textsuperscript{28}

**Clinical features and treatment**

Current medical literature describes human hydatid disease as “an unpleasant and dangerous condition”.\textsuperscript{29} According to New Zealand hospital records in the 1940s, one in approximately seven cases proved to be fatal.\textsuperscript{30} Recent research suggests that people of any age are susceptible to infection, although the disease is probably commonly acquired in childhood. Cysts are generally slow to develop, and a latent period of from five to twenty years before the onset of symptoms is not unusual.\textsuperscript{31} Symptoms depend upon the site, type and rate of growth of the cystic lesions. Cysts may reach an

\textsuperscript{23}G.W.Watson, “Hydatids eradication and prevention in New Zealand”, Unpublished 5th Year Medical Student’s dissertation for Social & Preventive Medicine, Medical Library, University of Otago, Dunedin, 1966, p.30.
\textsuperscript{25}Morris & Richards, p.20.
\textsuperscript{27}Anon, ‘Man, Dogs, and Hydatid Disease’,\textit{The Lancet}, January 3, 1987, pp.21-22.
\textsuperscript{31}T.C.Beard, 'Evidence that a hydatid cyst is seldom "as old as the patient"', \textit{The Lancet}, July 1, 1978, pp. 30-32.
Figure 2. Geographical distribution of *Echinococcus granulosus*.

enormous size, sometimes rupturing into surrounding tissues with high risk to the patient. The most common sites are the liver (65%) and lungs (25%), but cysts may form in the brain or elsewhere in the human body. Some remain symptomless, and their presence is first discovered at post-mortem.32

The onset of the disease is usually insidious. Routine x-ray sometimes reveals the presence of previously unsuspected cysts. Of the three hospital patients interviewed in 1966 after their operations for the removal of cysts, one recalled complaining to her doctor of abdominal swelling, another of chest swelling, and the third of ‘a heavy feeling in the chest and pleura’.33 Hydatid cysts in any site are easily mistaken for a variety of malignant and nonmalignant tumours, while symptoms of cysts in the lung often resemble those of advanced tuberculosis.34

Surgical treatment is the standard therapy. But some cysts are inaccessible to operation, and surgery can be hazardous. There is always the risk of rupturing the cyst or introducing secondary infection.35 A 1987 report claimed that surgery in New Zealand cured 50-90% of cases, depending on the number and location of the cysts and the quality of the surgical intervention.36 Since the early 1980s chemotherapy has offered an alternative method of treatment for cases where surgery was considered to be too risky or impossible. The modern drugs albendazole and mebendazole have both proved effective in a number of cases.37

Geographic Distribution

The parasite Echinococcus granulosus survives in a wide range of climates and host relationships, as its distribution from north of the Arctic Circle to the southernmost tip of Argentina suggests.38 The prevalence of hydatid disease is generally high in regions having a high ratio of sheep per head of human population, together with a large population of working dogs. During much of the present century its incidence has been highest in the great sheep breeding nations such as Greece, Australia, New Zealand, South America, and in northern and central Asia, parts of Africa, and the Middle East.39 In 1922 the ratio of 15 sheep to every human in New Zealand was the highest in the world. Australia had the second highest ratio with 13:1, while the figure for Argentina

34Schroeder et al, p. 976.
35Ibid.
37Schroeder et al., p. 976.
38Morris and Richards, p.3.
39Heslop, p.500.
Figure 3. Graph showing reduction in *Echinococcus granulosus* infestation in Iceland. 

Number of reported echinococcus patients in Iceland from 1896–1940 and reported deaths from echinococcosis since 1911.
and Uruguay was 5:1.\textsuperscript{40} Hydatid disease has had a high incidence in each of these countries, but has now been effectively controlled in all except Uruguay.\textsuperscript{41}

Currently the disease is most widespread in "under-developed countries with pastoral economies, especially with large rural populations, where public health measures are difficult to enforce".\textsuperscript{42} The Turkana people in northwestern Kenya have already been mentioned as having the highest known prevalence in the world. Colonial medical authorities in Kenya did not recognize the disease until the 1950s, and an incidence rate of 96 per 100,000 was estimated in 1976, more than seven times the previous record rate in Cyprus.\textsuperscript{43} Countries such as China, where "its incidence is likely to be high", do not maintain or publish accurate health records. Even in developed countries where detailed health statistics are maintained, the prevalence of the disease has been underestimated. In some cases symptoms are incorrectly diagnosed, not all patients are admitted to hospital, or cysts remain untreated. The global incidence of human hydatid disease is therefore impossible to estimate.\textsuperscript{44}

**Global attempts at prevention and control**

Prevention of human hydatid disease is achieved by breaking the life cycle of *Echinococcus granulosus*. The simplest way to do this is to prevent dogs from eating infected offal or sheep carcasses, as Kuchenmeister observed in 1855. Kuchenmeister also advised people not to drink unboiled water, and not to eat raw fruit or uncooked vegetables which might be contaminated with hydatid eggs. But as I have already mentioned, his recommendations were largely ignored.\textsuperscript{45}

The first country to control hydatid disease successfully was Iceland. In the mid-nineteenth century one in every five or six Icelanders harboured hydatid cysts. In 1863 Professor Harald Krabbe, a Danish parasitologist, was called in from Copenhagen (Iceland was then a territory of Denmark) to advise the Icelandic government on the problem. All Krabbe could initially suggest was to kill a great number of the shepherds' dogs. But the Diet rejected this proposal as unacceptable. Instead it successfully reduced the number of dogs by banning them within the boundaries of the capital city, Reykjavik, and by increasing dog taxes. New legislation ensured that dogs were treated regularly with anthelmintics, that potentially infected offal was buried, and that stock was slaughtered only in approved abattoirs. Every Icelandic family received a copy of Krabbe's educational booklet explaining how the disease was spread and how it might be averted. The consequences of all these measures were that by 1927 only one in 1500

\textsuperscript{40} Morris and Richards, p. 21.
\textsuperscript{41} M.A. Gemmell, Personal correspondence, 24 August 1996.
\textsuperscript{43} Kiple, p.703.
\textsuperscript{44} Morris and Richards, p.20.
\textsuperscript{45} F. Kuchenmeister, (1855), In Grove, p. 342.
of Iceland’s human population had hydatid infection, and by 1977 the disease was considered to be eradicated.\(^{46}\)

However, many factors peculiar to Iceland contributed to the success of the campaign, according to Burridge and Schwabe. The island had a small human population, a very high literacy rate in the last century, and its people spent long winter evenings by the hearth with little choice of family reading matter apart from the Bible, the Icelandic Sagas, and Krabbe's booklet. Iceland also had a short killing season for sheep of only six or seven weeks annually. And perhaps most significantly of all, farming practices on the island changed late in the last century; male lambs were killed at a much younger age than previously, giving hydatid cysts insufficient time to reach maturity. Consequently, the Iceland experience was somewhat unique, and provided only limited guidance to other governments who became interested in the following century in setting up hydatid control programmes.\(^{47}\)

A very successful anti-hydatid campaign was introduced in another island, Tasmania, in the 1960s, almost exactly one hundred years after Iceland first introduced control measures. As in Iceland, the Tasmania campaign aimed to break the life cycle of \(Echinococcus granulosus\) at the point where dogs ate infected sheep offal. The Tasmanian authorities had the advantage, however, of access to modern scientific knowledge and technology, and the opportunity to observe the strengths and weaknesses of the eradication campaign introduced in the previous decade by the New Zealand Government.\(^{48}\)

Following the example of Dr. Neil Begg in New Zealand, Dr. Trevor Beard created a degree of public awareness of hydatids in Tasmania in 1962 by personally organising farmers' meetings and forming voluntary action committees. These were as successful in Tasmania as they had been in New Zealand, and resulted in the Tasmanian Government's agreement in 1963 to mount a State control programme. The campaign was at first envisaged as being similar to the New Zealand scheme, but some important administrative differences emerged as Tasmanian plans took shape. In contrast to setting up a non-governmental hydatid control authority, as New Zealand had done in 1959, responsibility for hydatid control in Tasmania was placed from the start entirely in the hands of the Department of Agriculture. A more coercive approach than had been adopted in New Zealand proved to be appropriate in Tasmania. Soon after the official campaign was launched in 1965 dog testing became compulsory, and in 1969 legislation was enacted to ensure that infected farm properties could be legally

\(^{46}\)Grove, p.342.
quarantined. New Zealand did not introduce similar regulations until over twenty years later.49 Beard points out, however, that measures which worked well in Tasmania might not have done so in New Zealand. For historical and perhaps cultural reasons a different philosophical attitude to compulsion prevailed in the two campaigns.50

Both countries recognised the need for a public educational campaign, as Iceland had done a century earlier. But instead of relying on conventional health propaganda in the form of pamphlets and posters, as New Zealand had done for several decades with little effect, Tasmania adopted the more direct approach of face-to-face education by agricultural field staff with farmers whose dogs tested positive on the dosing strip. This proved to be both effective and cost-saving.51

Within twelve years the campaign in Tasmania had virtually achieved its objectives. Until 1963 as many as 15 new cases of human hydatid disease per 100,000 had been reported annually, but after 1975 the number of new cases dropped to almost zero.52 And in 1996 John Beswick announced that Tasmania was “provisionally free of hydatids in animals”.53 In comparing the eradication campaigns in Tasmania and New Zealand we should remember, however, that the Tasmanian authorities faced a smaller task, which involved fewer farmers and not as many sheep and dogs.

A number of other countries have introduced successful hydatid control programmes in the past thirty to forty years, some with assistance from the World Health Organisation. Amongst these are Cyprus, the Falkland Islands, Argentina, Peru, Uruguay, Bulgaria and parts of Russia. The principal control measures almost universally adopted in these places included compulsory registration of dogs, stray dog control, obligatory dosing and testing of dogs, a public health education programme, meat inspection, and slaughter control.54 These measures all featured either sooner or later in the eradication campaign in New Zealand.

From a global perspective Gemmell recently named the essential pre-conditions for a successful hydatid eradication programme. These include adequate administrative, operational, and financial resources; availability of effective technology for breaking transmission; favourable socio-ecological conditions; recognition of the socio-economic importance of the disease; and public support for a control campaign.55 The significance of some of these factors was not fully understood in 1959 when New

51 McConnell & Green, 1979, p.141.
52 Ibid., p.143.
53 T.C. Beard, Personal correspondence with M.A. Gemmell, 3 April 1997.
Zealand pioneered a modern national hydatid eradication campaign. My study shows how, by learning from its mistakes, New Zealand eventually developed a successful programme which achieved its objectives.

The impact of human hydatid disease on three lives:

**Hazel, a country school teacher**

When she was 17 years old, Hazel had a hydatid cyst the size of a large man’s fist surgically removed from her chest wall. It left her with a disfiguring scar for the rest of her life. She remembers her time in hospital as a “dreadful, appalling and agonising experience”. The pain after her operation was “unbelievable, devastating”.

Hazel believes she became infected by hydatids as a young child. Her father owned kennels in a small provincial town, where he bred spaniel pups to sell to a Dunedin pet shop. Hazel was brought up with the pups, which she dearly loved. Her father always fed them on raw offal, not realising any risk was involved at the time. People in the 1930s “did not know about hydatids”. Even when compulsory dog dosing was introduced while Hazel was in her teens, dosing regulations did not apply to pups under six months of age. Hazel was brought up to wash her hands before mealtimes. She recalls that her parents were strict about family hygiene.

When she was nine or ten years old Hazel first noticed pains in her chest. Her mother applied hot poultices, but the pains continued. She became a frail child, often too unwell to go to school. When the public health nurse examined children at her school, Hazel was told to stand at the end of the line. She heard people say she had tuberculosis. She felt “unclean”, ostracized, afraid, without knowing why.

The situation came to a head when as a seventeen-year-old she underwent a routine medical examination for admission to Teachers’ College. An x-ray revealed the cyst. She was referred to a specialist in Dunedin, who arranged for her to have surgery almost immediately. A large hydatid cyst was removed from her chest. Her recovery was long and painful. Hazel describes hydatid disease as “an appalling disease; a disease the public in general know little about, unless they’ve had personal involvement”. She says the disease spoilt her youth. “It still affects me”.56

**Bob, a retired sheep farmer**

Bob was a thirty-five-year-old farmer with three young children and a fourth one on the way when he developed a large hydatid cyst in the head of his femur which necessitated the amputation of his right leg. This was in 1956.

He spent his childhood on his father’s sheep farm, and always liked dogs. He remembers that his father fed the dogs on raw offal, as most farmers did in the 1920s

56H. Bissett, Taped interview with the author, 13 September 1996.
and '30s. The family knew nothing about hydatids at the time. His mother had been a nurse before she married, and she drilled her children to wash their hands regularly. Bob does not know how he became infected with hydatids. Nobody else in his family contracted the disease.

He first noticed pain in his leg when he was eight or nine years old. The family doctor suggested he had “growing pains”, but when they became worse in his teens the doctor said he might have a tubercular abscess in his thigh. At sixteen he had an operation on his hip, but nothing was found. Over the next nineteen years the pain slowly grew worse. His femur fractured several times for no apparent reason. Finally in 1955 an x-ray revealed a large hydatid cyst in the head of his femur. Aspiration did not relieve his symptoms, and he was told that his life was in danger unless the leg was amputated. He agreed to surgery.

Bob’s reaction to the loss of his leg was “It was not of great momentum. The only thing that struck it home to me was that I had a close shave”. For two years he did whatever farm work he could on crutches. He remembers how hard life was for his wife, with a new baby and three young children. The two older boys had to milk the cows before setting out for school each morning. But the situation slowly improved as Bob’s mobility increased and family life gradually returned to normal.

Despite his experiences, Bob was not interested in joining his local hydatid control committee, although he remembers attending one of Begg’s meetings. Asked if he thought the Government should have introduced stricter measures against careless dog owners, Bob spoke for many New Zealand farmers of his time in replying: “You don’t go around telling your neighbours what to do”.

Neil Aitken, farmer and part-time Hydatid Control Officer

Neil first became interested in hydatids in 1913, soon after his parents moved from Dunedin to take up sheep farming in the remote Styx valley in Central Otago. His grandfather, a Dunedin doctor, visited the family from time to time. On one memorable occasion the doctor caught his twelve-year-old grandson, Neil, feeding raw sheep offal to the farm dogs. His grandfather gave Neil a stern lecture on the danger to his family of doing this. The doctor opened up the sheep liver with his pocket knife, showed the boy two hydatid cysts, and told him about the worm’s life cycle. Neil told me “I have never forgotten this”.

When Neil eventually took over the farm after his father retired, he made sure his working dogs were well cared for and never allowed to eat sheep offal. When dog dosing was first introduced, Neil not only dosed his own dogs regularly, but made regular visits to all the farms in the Styx valley to dose his neighbours’ dogs. He even

57Bob Scott, Taped interview with the author, 14 September 1996.
invented a portable kit for on-the-spot detection of infected faecal samples. In 1943 he helped scientists to set up the Styx Field Trial in his home area, and he was associated with this study for many years.

In 1960 Neil became involved in setting up a voluntary control scheme in the Maniototo area. He later travelled by invitation throughout New Zealand, helping other farmers to set up their own committees. In 1979 Neil was awarded an OBE in recognition of his outstanding contribution to the eradication of hydatids.58

Neil's story is an example of the personal dedication of a few individual New Zealanders to the eradication of human hydatid disease. A memorable event in his boyhood captured his imagination, and led to his life-long interest in the disease.

The experiences of Hazel and Bob illustrate the intense human suffering caused by this "appalling" disease. Probably both became infected as children because they loved dogs. Most New Zealanders were unaware of the danger of hydatids when Hazel and Bob were growing up in the 1930s. Dogs were fed on raw offal as a matter of course. Both were, in Begg's words, "innocent victims", in an era of "ignorance and culpable carelessness”.

58J.N.Aitken, Taped interview with the author, 26 September 1996.
Chapter Two

The Years of "Ignorance and culpable carelessness", 1840-1934

By the mid-twentieth century human hydatid disease in New Zealand was reportedly three times as common as in Australia, and twenty times as common as in England and Wales.¹ Between 1891-1935 as many as 3,051 diagnosed cases were treated in New Zealand's public hospitals; 563 deaths were recorded, and the mortality rate was 15%.²

This chapter describes how the main wave of European settlers introduced *Echinococcus granulosus* into New Zealand around 1840, and how the parasite had become recognised as a growing threat to public health by the turn of the century. I explain why the disease was constantly under-reported, and I identify those sectors of the population which were most at risk. Finally I consider the efforts of a few committed individuals to reduce the prevalence of the disease in this early period, and I suggest why their efforts had little apparent effect.

**Introduction and spread within New Zealand**

Early medical experts agreed that the hydatid organism was not present in either the Maori or the Aboriginal population prior to European settlement.³ A flock of merino sheep imported into New Zealand from New South Wales shortly before 1840 may well have been responsible for the introduction of *Echinococcus granulosus* to this country. The parasite was probably already well established in parts of Australia by the time it first entered New Zealand. In 1834 John Wright, an early settler in New Zealand, arranged for 102 merinos to be shipped across the Tasman from Sydney to the North Island, marking the beginning of a permanent sheep industry in this country. Other settlers who owned suitable grazing land soon followed suit. During the following decade sheep stations were successfully established in both the North and South Islands, and further shipments of merino stock arrived on a number of occasions from Australia.⁴

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For about forty years merino remained the predominant breed on sheep stations throughout the country. New Zealand's principal exported sheep products at the time were wool and tallow, for which merino were particularly well suited. But this changed in 1882 with the introduction of refrigerated shipping technology, which opened up a flourishing market for New Zealand meat in Europe. A variety of British sheep including Romney, Southdown and Border Leicester were brought into New Zealand to cater for this major new industry. These breeds eventually replaced merino in most parts of New Zealand except on high country sheep stations, where the cold winters continued to make merino the preferred wool-producing breed. Probably the hydatid parasite was re-introduced a number of times in breeding stock in these early years. Regulations for the inspection and quarantine of imported livestock were not established in New Zealand until 1893.

Dogs were almost certainly introduced at the same time as sheep, according to Gemmell, "since evidence is recorded of packs of stray dogs attacking sheep flocks during this period". The first official publication to mention hydatids was The Fifth Report of the Department of Agriculture, which referred in 1897 to the health hazards created by stray dogs:

Large numbers of useless dogs are found everywhere, all of them liable to disseminate broadcast among their excreta the Taenia echinococcus. It is an unfortunate fact that few people recognise the danger involved in feeding dogs on all manner of rubbish obtained from butchers' shops, especially the lungs and livers of sheep studded with watery cysts.

The Sixth Report of the Department of Agriculture drew attention in 1898 to the increasing prevalence of the hydatid tape-worm, and its danger to human health:

The prevalence of hydatids throughout the colony is very noticeable. It is an extremely rare experience to make a post-mortem examination in any adult animal, bovine or ovine, without finding a considerable number of hydatid cysts in the body, the lungs and liver being their favourite locations. The fact that these cysts form a phase of the life-history of the tape-worm of the dog should now be well known to the general public, and, seeing the danger to human health involved by their increasing prevalence, it would be well if all dog owners were to dose their dogs with some efficient vermifuge once or twice yearly.

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5 M.A.Gemmell, 'Hydatid Disease in New Zealand: The First Hundred Years (1873-1972)', In unpublished papers, Hocken Library, University of Otago, Dunedin, 1973, p.55.
6 Ibid.
There is little doubt that animal infestation increased in many parts of the country over the next few decades. Reports from several regions in the 1930s stated that at least 55% of all sheep carcasses were by then infested with cysts, variously found in the liver, lungs, spleen, heart and intestines. Older sheep were far more likely than lambs to harbour cysts, which were often visible and palpable, although in most cases asymptomatic during the host’s lifetime. This is important to note, since it explains why the majority of farmers were for many years not greatly concerned about cyst-infested carcasses, as long as these were accepted by butchers and abattoirs. It was not until well into the twentieth century that things changed with the introduction of more rigorous standards of meat inspection. Until then cysts were seen by farmers as a relatively harmless and inevitable part of sheep-station life. Had the obvious presence of cysts threatened the farmer’s pocket, serious efforts would probably have been made by the farming community much earlier than they were to rid New Zealand of the parasite.

The infestation rate among New Zealand working dogs in this period varied from one region to another, and indeed from farm to farm. A 1933 report quoted an infestation rate of 38% amongst farm-dogs in the Tapanui district of West Otago, compared with a rate of only 21.3% a short distance away in Central Otago. Probably between one in three and one in five of all New Zealand farm-dogs harboured hydatids.

**Recognition of a human health problem**

Human hydatid disease appears to have caused increasing concern in New Zealand from soon after 1850, although its incidence was not officially recorded until 1891. It became a notifiable disease as early as 1873, when regulations required all medical practitioners to notify cases of hydatid disease under Section 79 of the Health Act. But the introduction of compulsory notification did not guarantee accurate statistics on the incidence of the disease. W.B. Mercer, one of the country’s earliest Medical Officers of Health, wrote in 1925 to the Director of Health: “Less than one-third of cases treated in Public Hospitals are notified. Doctors are failing to carry out their responsibilities under the Health Act.” It is likely, too, that many cases were either unrecognised or misdiagnosed. In addition, some patients are thought to have made a spontaneous recovery, while others probably did not seek medical treatment. According to John

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11 J.B.W. Dunlop, A public health survey of Tapanui with special reference to the prevalence of hydatid disease in the surrounding district. Unpublished 5th Year Medical Student’s dissertation, Social and Preventive Medicine, Medical Library, University of Otago, Dunedin, 1933, p.36.
13 Dunlop, p. 35.
14 Gemmell, p. 55.
15 W.B. Mercer, Correspondence with Director, Dept. of Health, 1 Oct.,1925, National Archives, Wellington, H1, 131/8 Hydatids 1914-58.
Heslop, the Dunedin surgeon, as many as 90% of hydatid patients probably never got to a hospital.\textsuperscript{16}

Throughout the twentieth century constant under-reporting of the disease continued to impede public action towards its prevention. An editorial in the \textit{Medical Journal of Australia} in 1996 observed: “Notorious under-reporting of cases of hydatid disease [in Australia] has made it easier for authorities to remain inactive to the need for control.”\textsuperscript{17} This comment could equally well have been made of the situation in New Zealand.

The full impact of the disease in terms of human suffering and potential loss of life came to be recognised in 1891 by a young New Zealand surgeon, Louis Barnett, who later became Professor of Surgery at the Otago Medical School. The significant occasion for the twenty-five-year-old surgeon was his first operation to remove hydatid cysts. Barnett wrote forty-five years later of the deep and lasting impression the case made on him:

The first major operation I ever performed on my own responsibility was on May 4, 1891, at the Dunedin Hospital. The case was that of an attractive little boy, aged four, whose health troubles were diagnosed as being due to a hydatid cyst of the liver. I opened and drained a large cyst of the liver, and I thought the patient would do well. But it was not to be. My little patient developed post-operative lung complications and died fifteen days after the operation. Autopsy revealed that in addition to the hepatic cyst there was a simple cyst the size of a duck’s egg in the base of the left lung, which had burst into a bronchus. This experience gave me a jolt which I well deserved, but it was the beginning of a keen and abiding interest in hydatid disease.\textsuperscript{18}

From that time Barnett dedicated much of his career to alleviating the human suffering caused by hydatids. He crusaded a programme to educate the New Zealand public about the nature of the parasite and its prevention, and continued to write articles about the disease until his death in 1946.

The first reference to hydatid disease in New Zealand’s medical literature appeared in an article in the \textit{New Zealand Medical Journal} in 1889 entitled: ‘Hydatid Disease in New Zealand’. Its author, Doctor R.G. Macdonald, had previously circulated an informal questionnaire to: “every practitioner in New Zealand whose address I could find”, asking how common the disease was in that practitioner’s area, whether it seemed to be related to occupation, how it was being treated, and whether his colleague could suggest any preventive measures. Macdonald described the response he received as: “most gratifying, though the information conveyed in some of them is a little meagre.” He concluded that: “Almost every practitioner in the South Island has seen

\textsuperscript{16}J.Heslop, Interview with the author, 4 March 1996.
cases of it.” In some districts, he noted, it seemed much more common than in others, or else: “the diagnosing powers of some men are much keener than of others.” Macdonald went on to say:

Otago and Southland are the chief breeding-grounds of hydatids in New Zealand. Why this should be is a little difficult to say. Perhaps the humidity of the climate may have something to do with it; also, no doubt our larger population must influence the question.\textsuperscript{19}

Later, however, Macdonald observed that hydatids appeared to thrive equally well in such contrasting climates as Australia and Iceland: “It is difficult to believe that climate has much, if anything, to do with its frequency. Possibly the flesh-eating propensities of the South Islanders is a probable cause.” In the same article, (1889), Macdonald estimated that as many as one person in every 7000 might be affected in the South Island, compared with only about one in 20,000 in the North Island.\textsuperscript{20}

### Regional incidence

Very possibly the discovery of gold in the South Island in the 1860s indirectly assisted the spread of hydatids. Gemmell clearly thought so, judging by remarks he made about the disease in personal correspondence with John Heslop: “It [hydatid disease] seems to have been an enormous undocumented medical problem in the latter part of the 19th century; especially in the mining towns where stray dogs and lack of hygiene must have made [it] one of the most important diseases along with tuberculosis causing death.”\textsuperscript{21} But I have been unable to verify his claim.

Barnett spoke in March 1897 of his concern about the spread of the disease in New Zealand. At a British Medical Association meeting in Nelson he noted its increasing prevalence in Dunedin, where: “there always seemed to be at least two cases receiving hospital treatment at any given time. In the early days such patients appeared to have become infected in Victoria or South Australia prior to settling in Dunedin. But more recently,” Barnett noted, “one sees often enough patients with hydatid cysts who have lived for many years in Dunedin, and have evidently contracted the disease there”.\textsuperscript{22}

Until 1907 more cases continued to be reported from Dunedin than from any of the other main centres. Barnett wrote: “The provincial statistics show that in Otago the disease is far more prevalent than in other parts of the Dominion”.\textsuperscript{23} He blamed the carelessness of dog owners, and the polluted city water:

\textsuperscript{20}Ibid., p. 89.
\textsuperscript{21}M.A. Gemmell, in private correspondence with John Heslop, 12 August, 1990.
\textsuperscript{22}L.E. Barnett, ‘Some observations on hydatid disease,’ \textit{The Australasian Medical Gazette}, Vol. 16, May 20, 1897, p. 222.
\textsuperscript{23}L.E. Barnett, ‘Hydatid Disease and its Prevention,’ \textit{The School Journal, Pt III. } March, 1908, p. 43.
Ignorance and culpable carelessness prevail among those who have to do with sheep-dogs and sheep, and also amongst those who are expected to provide to the inhabitants of cities a pure water supply, and amongst those again who are in the habit of drinking water from running streams."

Perhaps in reality the incidence of the disease was not greater per head of population in Dunedin than elsewhere in New Zealand. Dunedin was the largest of the four main centres at this time, so it could be expected to have the highest actual number of cases. Also a higher percentage of cases may well have been correctly diagnosed in this city than elsewhere, since Dunedin was the location of New Zealand’s only medical school at the time. The city’s doctors may well have had better diagnostic skills and more knowledge of hydatid disease than their colleagues elsewhere, and thus have reported a higher proportion of cases. Notification rates have been shown to vary from region to region.

From about 1910 the rate of hydatid admissions to Dunedin Hospital slowly dropped, while continuing to rise sharply in Christchurch. By 1924 Canterbury had become the worst affected region.

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<thead>
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<td><strong>The relative order of frequency of hydatid cases in the seven most affected hospitals in a six year period, 1924-1929:</strong></td>
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<tr>
<td>Christchurch</td>
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<td>Dunedin</td>
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<td>Palmerston North</td>
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<td>Wellington</td>
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<td>Auckland</td>
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<td>Napier</td>
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<td>Timaru</td>
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(Adapted from Barnett, 1934)

As Table 1 illustrates, an increasing number of cases were by this time being treated in smaller New Zealand hospitals, amongst them Palmerston North, Napier and Timaru hospitals. Each served an extensive rural area where sheep breeding was the leading local industry.

Statistics comparing the regional prevalence of hydatid disease reflected the northerly population drift occurring in New Zealand at this time. After the gold rush Dunedin ceased to be the most populated of the four main centres. In contrast, northern centres, notably Auckland, continued to grow rapidly. To compensate for demographic change,

24Barnett, 1897, p. 223.
Barnett decided that a more accurate way to express the prevalence of hydatid disease was to compare hydatid hospital admissions with all hospital admissions in any given region. Table 2 confirms that Canterbury was at this time the most affected region, and Auckland the least.

**TABLE 2**

Comparative prevalence of hydatid disease in the public hospitals of New Zealand's four main centres, 1924-1932

<table>
<thead>
<tr>
<th>City</th>
<th>Hydatid patients</th>
<th>Total patients</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auckland</td>
<td>20</td>
<td>38,887</td>
<td>1 in 1,944</td>
</tr>
<tr>
<td>Wellington</td>
<td>23</td>
<td>30,425</td>
<td>1 in 1,323</td>
</tr>
<tr>
<td>Christchurch</td>
<td>102</td>
<td>29,726</td>
<td>1 in 291</td>
</tr>
<tr>
<td>Dunedin</td>
<td>58</td>
<td>20,475</td>
<td>1 in 353</td>
</tr>
<tr>
<td>All New Zealand</td>
<td>453</td>
<td>318,834</td>
<td>1 in 704</td>
</tr>
</tbody>
</table>

(Adapted from Barnett, 1934)

Concerning the overall prevalence of the disease in New Zealand, Barnett repeatedly pointed out that hydatids were taking a far heavier toll than was suggested by government statistics. Public records merely recorded hospital admissions. They did not include what probably amounted to numerous cases not treated in public hospitals. The real extent of the human costs, Barnett wrote in 1909, should be a cause for considerable public concern:

The total number of cases occurring throughout New Zealand during this period of ten years (1897-1907) must have exceeded considerably the alarming figure of 1000. Hydatid disease, when not fatal, usually necessitates a long period (months or even years) of enforced idleness, and the individuals affected are for the most part otherwise healthy young men and women engaged in agricultural and pastoral pursuits.

In stock animals, at least 50% of those killed for food consumption harbour hydatid cysts.

In 1926 Barnett estimated the number of new cases then occurring annually in New Zealand to be about 150, with a mortality rate of about 15%. Taking into account the increase in the population over the previous two decades, Barnett was able to say: “There is no evidence to show that the incidence [of hydatid disease] is either increasing or diminishing. I am satisfied that it could be very decidedly reduced - possibly almost to vanishing point - if a vigorous campaign against hydatid infection were instituted.”

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27Ibid., p. 194.
The tragedy was that Barnett’s words in the *New Zealand Medical Journal* were almost certainly unread and therefore unheeded by the majority of New Zealanders. Constant efforts made by him and a handful of others, mainly medical practitioners, in the early years of the twentieth century to bring the problem to the public’s attention had regrettably little impact. Another thirty years were to pass before the ‘vigorous campaign’ he advocated in 1926 came to be finally launched on a national scale.

**Predisposing factors**

Macdonald(1889) queried the apparent absence (according to his colleagues’ responses to his questionnaire) of infection in the Maori population:

> It is curious that the disease is apparently unknown amongst the Maoris, several practitioners stating that they have never heard of it occurring in that favoured race. This is not as one would expect, for they are reputedly very fond of dogs, and rear them in large numbers. They are also stated not to be careful in the feeding of their dogs, or, indeed, attaining to a high standard of hygiene. The conditions, therefore, are favourable for hydatid growth, yet it is stated they are not found among the Maoris.³⁰

It is unlikely that Maoris were indeed free of the disease in Macdonald’s time. Gemmell, writing in 1990, attributed the lack of notified cases of hydatid disease among Maori prior to 1900 to “substandard medical services for the Maori community”. “In reality,” said Gemmell, “the Maori population would have been greatly affected, as were the Aborigines”.³¹ He was probably right, although we cannot verify this.

Until the mid-twentieth century Maori health statistics remained tentative. As Maclean pointed out in his history of public health in New Zealand, *Challenge for Health*, (1964), Maori were reluctant to seek conventional medical treatment or enter a European hospital. Many still believed that “disease was caused by evil spirits - it was futile to cure it, a mere waste of time”.³² Turbott is reported to have found in a 1933 investigation of tuberculosis among Maori that: “60.8% had received no medical treatment whatever, although it was available if sought”.³³ It is likely that the majority of cases of hydatid disease in Maori were similarly untreated.

A report in the same year by two senior medical students, Tulloch and Campbell, proved revealing. Describing conditions in a Maori community in the Manawatu in 1932, they mentioned how these people often confused hydatid disease with tuberculosis: “The father of a Maori girl we visited said he thought it [a lung cyst] was

³⁰Macdonald, p. 89.
³³Ibid., p.211.
consumption, a disease about which the natives are so apprehensive". The report continued:

The Pah is a breeding ground for hydatid infection. Most of the men are employed on nearby sheep farms, returning to the Pah every evening. A great number of dogs are roaming free among them. Native visitors, usually with dogs, come especially on weekends, or when meetings are held. Dogs, on arrival at the Pah, are seldom tied up. They are frequently found lying in sunny patches which may later be occupied by natives. Playing with strange dogs is a natural practice of the Pah children. The people don't wash their hands before eating, and they often take their food on the ground. Inside, conditions are similar to early Iceland farmhouses - poor ventilation, overcrowding, personal and domestic uncleanliness. Plates are licked clean by the dogs.34

Two American research veterinarians, Burridge and Schwabe, later pointed out in the *New Zealand Medical Journal* that the incidence in Maoris in the first half of the century was purely speculative, since the ethnic grouping of hydatid patients was not recorded in New Zealand before 1950.35 By the late 1950s evidence showed that infection was six times as high in Maoris as in non-Maoris. Burridge and Schwabe attributed this to cultural and behavioral factors specific to Maoris. Marginal farming methods, poverty, overcrowded housing conditions and poor dog control also exposed the rural Maori community to a high risk of infection from hydatid disease.36

In his 1888 survey Macdonald sought a relationship between prevalence of the disease and occupation. Surprisingly, he concluded that:

> Occupation had little or nothing to do with its occurrence, nor was a person's state of health at the time of infection of any apparent significance. Given two persons, the one a strong and robust man, the other a weak or sickly one, both are equally liable to contract the disease, provided they swallow parasites of the same vitality. The question of age or health or sex influences the matter very little, provided the same precautions be taken in the different conditions'.37

Barnett, however, disagreed. He observed that: "the disease was noted as fairly frequent among shepherds and others whose habits of life exposed them to contamination with the ova of the *Taenia Echinococcus* [E.granulosus]".38

More accurate statistics eventually indicated that occupation, gender, race, age, socio-economic and geographic factors were all related to risk of infection. A small-scale study of hospital admissions in the East Coast and Poverty Bay region from 1927-1937

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34A.K.Tulloch and W.N.Campbell, A health survey in the Kairanga County with special reference to hydatid disease. Unpublished 5th year Medical Students' dissertation for Social and Preventive Medicine, Medical Library, University of Otago, Dunedin, 1933, p. 95.
36Ibid.
37Macdonald, p. 142.
38Barnett, 1897, p. 222.
showed that 82% of reported cases were farmers, 72% of them were male, 62% were Maori, and the average age at which symptoms had developed was thirty-five. Rural dwellers (82%) far outnumbered urban dwellers (18%).

**Early attempts at prevention**

In summary, the situation in New Zealand by the early 1930s was this: The life cycle of *E. granulosus* and its potential hazard to humans was well understood by the medical and veterinary professions, but probably not by the majority of lay people. The importance of hydatid disease was often stressed in the medical literature, as were suggested methods by which its control might be achieved. But no official action was taken by agricultural or health authorities. Those who showed most apparent concern continued to be members of the medical profession. Both Barnett and Macdonald attempted to convince the New Zealand public that hydatid disease was preventable. Indeed Barnett, who was widely acknowledged as the prime mover in efforts to control the disease, is reported to have written thirty-six articles on the subject in scientific journals and the lay press between 1896-1945.

In 1897 Barnett criticised local authorities for allowing city water supplies to be contaminated by hydatid eggs, saying: “Such facts as these should be brought prominently before the health authorities, and they should be urged to circulate amongst the people the very simple means of prevention that are known to us.” Barnett urged the health authorities to warn the public about the danger of feeding dogs on cyst-infested liver, and to stress the importance of drinking only filtered or boiled water. He added: “I consider that the various stock inspectors should be instructed to see that dogs in the country districts are regularly dosed with some powerful anthelmintic.” Several decades were to pass before Barnett’s proposals for dog dosing became mandatory.

I have already referred to the article by Macdonald published in the *NZMJ* in 1889. In this he recommended several preventive measures. He urged the authorities to ban home killing, and to build public abattoirs where all meat should be inspected. Where hydatids were observed, he said, the parts should be destroyed. Dogs must be prevented from eating the diseased parts of carcasses. “This is doubtless the secret of the absence of the disease in Great Britain. There, meat is expensive, and dogs rarely taste raw flesh.” Macdonald felt that legislative measures were needed in New Zealand to control dogs:

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40 Burridge and Schwabe, p. 173.

41 F.S. Maclean, p. 11.

42 Barnett, 1897, p.223.
It is impossible to instruct or convince every one regarding those facts, and there will be people who, from carelessness or otherwise, endanger their own lives and those of the community by neglecting them, hence some general law should be passed to inspect dogs and destroy all wanderers.”

A Hawke’s Bay medical practitioner, Wilson, also criticised the lack of action by public health authorities. In an article in the NZMJ in 1909, Wilson, too, urged for stricter legislation concerning dogs:

The increase of hydatid disease in this country ought certainly to stimulate the health authorities to have legislation carried that dogs should be fed on cooked meats only. I suppose it is another case whereby educating the farmer and showing him the disease in many of his sheep’s lungs, that good would ensue... The sacrifice of some big man in the land is needed to centralise people’s attention on the disease, and to suggest how to avoid it.

Individual medical practitioners such as Macdonald, Wilson and Barnett clearly knew how the disease could be prevented, but they themselves were not in a position to implement preventive measures. This required the legislative powers and funding resources of a government agency - almost certainly the agricultural authority - possibly working in co-operation with the public health authorities.

The New Zealand Department of Agriculture was established in 1892 to supervise farming practices in this country. One of the earliest functions of the Department was to monitor and improve the quality of agricultural exports through its educational and inspectorial duties. Farmers needed practical instruction from well trained advisers in how to apply the new technological practices. As Nightingale observed: “Experts were needed to translate scientific discoveries with the potential to increase production into practical advice to farmers. Vets were needed to identify diseases and recommend remedial action, and microbiologists to give attention to hygiene”.

The first Secretary of Agriculture, J.D.Ritchie, was directed by Premier John Ballance: “to collect and distribute information on subjects connected with agriculture among the settlers by means of lectures and pamphlets, and generally to study and promote the welfare of the farming community.” From its beginning the new department had a role in disease prevention. By 1893 a complex system of livestock inspection and quarantine had been established. The Slaughtering and Inspection Act of 1900 provided for the inspection of all stock by government veterinarians and inspectors before and after slaughter.

43Macdonald, p. 146.
46Ibid., p.37.
Plate 3. At the killing site - hungry dogs eat liver while cysts are being counted. 

Source: Begg et al., "NZMJ, (1957), 56, pp.84-98.
Both the Department of Agriculture’s Fifth and Sixth Reports, as I have already mentioned, made specific reference to the hydatids problem. The Sixth Report (1898) gave dog owners official advice for the first time on dosing their dogs with “some efficient vermifuge once or twice yearly.” It recommended a mixture of powdered areca-nut and male shield fern, “well shaken together in a small quantity of milk and followed by a good dose of castor-oil.” The same report referred to new legislation requiring the registration of slaughterhouses, the establishment of abattoirs, and the inspection of meat for export.\textsuperscript{47}

The Stock Act, 1908, represented the first serious legislative attempt to stamp out hydatid disease. The Act made it illegal to throw animal carcasses into streams or ponds. The penalty for doing so, or for wilfully leaving a carcass anywhere within half a mile of any highway, was a fine not exceeding fifty pounds. But the Act was ineffective. It did not address the root of the problem by forbidding the feeding of raw offal to dogs, nor did it tighten up regulations on dog registration. Stray dogs continued to roam through the New Zealand countryside.

Meanwhile the New Zealand Department of Public Health had been established by the Public Health Act, 1900. The first action taken by the Department against hydatids was to issue a list of recommended precautions against the disease in 1907:

\begin{itemize}
\item No unboiled offal or meat should be fed to dogs
\item Dogs should not be allowed to wander through killing places
\item Faeces of all dogs should be destroyed, preferably by burning
\item Dogs should not lie on the ground’s surface, allowing eggs to drop into drinking water or onto vegetables growing nearby
\item Dogs should not be permitted to lick children
\item Dogs’ dishes should be scalded or otherwise cleaned
\item Dogs should be kept away from the drinking water supply or tank
\item All vegetables, especially if uncooked, should be carefully washed\textsuperscript{48}
\end{itemize}

It is significant that the health authorities adopted a persuasive, educational approach to dog owners. Had enforceable compulsory measures been introduced at this early stage, the hydatids problem might have been resolved more quickly.

The government of the day was probably unwilling to take stronger action for at least two reasons. First, parliament was anxious not to antagonise the politically powerful farming community if ways could be found to gain its voluntary co-operation. And secondly, officials feared that alarmist press reports of this dangerous parasitic disease could seriously damage the country’s meat export industry. There was a common misconception both in New Zealand and overseas that human health was threatened by hydatid-infested meat products. Barnett acknowledged this, writing in 1909: “There are large numbers of people who might in their ignorance conclude that the meat exported from New Zealand was unwholesome if they knew that hydatid disease was prevalent amongst the flocks of this country”. For the sake of the meat export industry, the less

\textsuperscript{47} Reakes, p. 96.
\textsuperscript{48} AJHR (1907), H-31, P. iii.
publicity given to the hydatids problem the better. Political leaders were evidently well aware of the dilemma, as Barnett observed:

I know from correspondence and conversations I have had with members of the Cabinet, including Sir Joseph Ward, and with the chiefs of the Veterinary Department, that the fear of a scare in regard to hydatid disease has been a bar to the publication of the facts necessary to a proper understanding of the subject.\textsuperscript{49}

Government authorities and the medical profession agreed that an educational programme must attempt to “enlighten the public, control the disease, and do good rather than harm to the meat industry.” Barnett repeatedly stressed the need for a better informed public: “Ignorance, and ignorance alone is responsible for the spread of this malady.” Again, in 1909 he wrote: “The public, in particular those members of the community chiefly interested in agricultural and pastoral pursuits, should have their attention repeatedly and forcibly drawn to the danger of hydatid infection and the way to avoid it.” But he added a cautionary reminder. “Care should be taken to avoid publishing such details concerning the prevalence of hydatids in animals as might tend to prejudice the frozen meat industry.”\textsuperscript{50}

Barnett proposed an educational programme that had the combined support of the New Zealand Veterinary Department, the Government, and the New Zealand Medical Association. He believed the public should be made aware of the increasing prevalence of hydatid disease in humans and stock animals, the life history of \textit{E. granulosus} and the nature of hydatid disease, and of practical steps for its prevention. More controversially, Barnett wrote: “Kill off all unregistered and useless dogs. The Government authorities should see to this.”\textsuperscript{51} Iceland authorities in the previous century had introduced this extreme measure, but the New Zealand government was highly unlikely to do so in a country where British sentiment concerning dogs was still widespread.

Despite Barnett’s efforts, little official action was taken during his lifetime to introduce preventive measures against hydatids. Funding was scarce in the first half of the twentieth century, and the hydatid problem was regarded as relatively minor in comparison with others for which health and agricultural authorities were responsible. Public money was not allocated on a regular basis for medical research until the establishment of the Medical Research Council in 1937. Funds for the maintenance of a department of hydatid research and prevention at the Otago Medical School from 1934 depended mainly on private donations rather than government support.\textsuperscript{52}

\textsuperscript{49} Barnett, 1909, p. 9.
\textsuperscript{50} Ibid., p.11.
\textsuperscript{51} Ibid., p.15.
\textsuperscript{52} Chief Health Officer to Minister of Public Health, Hospitals and Charitable Aid, 13/6/1919, unpublished letters, National Archives, H1, 131/8, Hydatids, 1914-36.
Public action may have been slow to gather momentum, but more and more requests for information about hydatids began to reach the Department of Health from about 1926. In that year health officials for the first time exhibited a display on hydatids at the Dunedin and South Seas Exhibition. Displays featuring the danger of hydatids were afterwards shown by the Health Department with increasing frequency at A. and P. shows throughout the country.\textsuperscript{53}

In the late 1920s the Departments of Health and Agriculture agreed to collaborate in issuing information on hydatids to the public. Jointly written articles on the subject appeared from time to time in the \textit{New Zealand Journal of Agriculture}, and a jointly prepared bulletin, ‘Prevention of Hydatid Disease in Man and Animals’ was widely distributed, being reprinted four times between 1929 and 1946.\textsuperscript{54} But none of these efforts were on the scale Barnett would have liked.

Dunlop, a medical student, reported in 1933 that lectures on hydatids were being given in country schools in the Tapanui district, and that discussions and lectures were regular occurrences in local Farmers’ Union meetings. Dunlop noticed “an increasing awareness of hygienic living” in the rural community.\textsuperscript{55}

Commenting in 1934 on farmers’ knowledge of hydatids, Begg and Riley, also medical students, observed that large run owners they interviewed in Central Otago were widely read. All knew something of the hydatid worm, but none were at all clear about its life cycle. In contrast, small farm owners in the same district “rarely thought of hydatid disease, which for them was merely a name.” Shepherds and cow-hands seemed to suffer from “profound ignorance”.\textsuperscript{56}

Public action was not entirely absent in the period up to 1934. Anti-hydatid education was admittedly low-key, and no attempts were made to assess its effectiveness, but some concerned individuals laid the foundations of a national awareness during this period. More literate farmers on large holdings were showing some interest, but the message had not reached less educated farmers on smaller properties, whose practices remained largely unchanged. On the vast majority of New Zealand farms raw offal continued to be fed as a matter of course to the dogs, and not surprisingly, the incidence of human hydatid disease showed no signs of decreasing.\textsuperscript{57}

\textsuperscript{55}Dunlop, 1933, p. 47.
\textsuperscript{56}Begg and Riley, 1934, p. 125.
\textsuperscript{57}L.E. Barnett, Aug. 1936, p.215.
Chapter Three

An “Extensive and expensive campaign of education and persuasion”
1934-1956

In the mid-1930s there seemed to be no immediate prospect of finding a solution to New Zealand’s hydatid problem. Despite almost forty years of effort on the part of a few individuals to educate the public about the need to eradicate the parasite, little seemed to have been achieved. The incidence of the disease in humans had not fallen in the years between 1900-1936; people continued to be “almost universally ignorant”; and successive governments did not seem prepared to fund research into the problem. Yet New Zealand already possessed the knowledge and the means to eradicate the disease. The preventive measures recommended by Barnett and others were not at fault. Why, then, did eradication prove so hard to achieve?¹

In this chapter I examine four issues fundamental to the impasse between 1934-56. First, I attempt to assess the extent of the hydatids problem at this time in terms of human suffering and economic loss. Second, I describe attempted control measures, initially educational and persuasive, later legislative and coercive, which were introduced in this period. Thirdly, (and crucial to the argument of my thesis,) I discuss the obstacles that hindered a speedier resolution, and finally I ask the question: what, if anything, had been achieved by 1956?

Costs of the disease: Human suffering and Economic loss
It is obviously difficult to assess the true costs of any disease in terms of human suffering. We cannot measure the full effects on a patient’s family, nor its impact on an individual’s career and quality of life. Hydatid cysts often manifested themselves in the form of gruesome clinical symptoms, which were no doubt very distressing to everyone concerned. Several writers have noted that the few farmers who at this time regarded the risks of hydatids seriously, and themselves practised preventive measures, had frequently had direct experience of the disease, either within their own family or in that of a near neighbour. A farmer’s fear of health risks either to himself or his close family provided strong motivation to take action.²

²E. Velvin, ‘Preventive aspects of Hydatid Disease’, Unpublished 5th Year Medical Student’s dissertation for Social and Preventive Medicine, Medical Library, University of Otago, Dunedin, 1940, p.25.
Remembering that official statistics persistently underestimated the incidence of the
disease, the figures in Table 3 provide only a very conservative estimate of the extent of
human suffering caused by hydatid cysts in the fifty-year period prior to 1940:

TABLE 3
Number of notified hydatid cases in New Zealand public hospitals

<table>
<thead>
<tr>
<th>Period 1891-1940</th>
<th>3,669 Hydatid cases in all NZ public hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>346 Hydatid deaths in hospital</td>
</tr>
<tr>
<td></td>
<td>639 Hydatid deaths in all New Zealand</td>
</tr>
</tbody>
</table>

(Adapted from Barnett, 1941)³

Every year during this period well over one hundred New Zealand families had the
traumatic experience of seeing a husband, wife, parent or child admitted to hospital with
hydatid cysts. Some 16% of patients never returned home - they died in hospital. The
incidence in two typical years is shown in Table 4 below:

TABLE 4
Number of cases and deaths from hydatid disease in New Zealand public hospitals in years 1939 and 1954

<table>
<thead>
<tr>
<th>Year</th>
<th>Hydatid cases in all Public Hospitals</th>
<th>Deaths in all Public Hospitals</th>
<th>Deaths in all NZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>1939</td>
<td>115</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>1954</td>
<td>143</td>
<td>5</td>
<td>13</td>
</tr>
</tbody>
</table>

(Adapted from McCarthy, 1957)⁴

The incidence rates shown in Tables 4 and 5 suggest that the total number of cases
remained relatively unchanged in New Zealand between 1935 and 1956. A slight
reduction in the number of deaths probably resulted from improved medical services by
the end of the period.

The incidence rates per 100,000 of population shown in Table 5 suggest a slight overall reduction in hydatid infection per head of population during this period. However, it should be remembered that post-World War II emigration from Europe in the late 1940s and throughout the 1950s led to rapid growth in New Zealand’s population, and to increasing urbanisation. City dwellers were less likely than country people to be infected with hydatids. Statistics for the nation as a whole thus masked the rising prevalence of the disease until the late 1950s in rural communities.6

Tables 5 and 6 show that members of farming families were almost ten times as likely to contract the disease as was the general population.

The recorded incidence rate of hydatid disease was higher per head of population in New Zealand than in any other English speaking country at this time, according to F.H.Foster of the Health Department’s Medical Statistics Branch. In an article in the New Zealand Medical Journal in 1958 Foster wrote: “On a population basis it is

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probable that hydatid disease is more common in New Zealand than it is in the people of any other country in the world.” However Foster’s statistics, upon which Table 7 is based, did not include figures for under-developed countries where hospital records were not published, and where hydatid disease was known in some instances to be a major problem.

| TABLE 7  |
|-----------------|-----------------|-----------------|-----------------|
| **The Prevalence of recorded human hydatid disease in five English-speaking countries. Years 1952-1956** |
| Country        | Years       | Average annual deaths | Rate per million population |
| New Zealand    | 1952-56    | 13.2                  | 6.23                      |
| Australia      | 1951-55    | 19.6                  | 2.22                      |
| England & Wales| 1951-55    | 13.6                  | 0.31                      |
| Scotland       | 1952-56    | 0.4                   | 0.08                      |
| USA            | 1953-55    | 8.0                   | 0.05                      |

(Adapted from Foster, 1958)

Foster emphasised that probably less than half of the country’s hydatid cases were notified to the New Zealand health authorities. He noted that of 242 cases reported in 1954-56, 56% were male; for every patient living in a city there were proportionately twice as many from country areas, and nearly four times as many from small towns and boroughs; more patients were in the 10-19 year age-group than in any other; and the disease occurred six times as frequently in Maori males as in European males, and four times as frequently in Maori females as European females. More than three-quarters of all reported cases gave their occupation as farmer, farm worker or labourer. The mortality rate was about 16%. For those who recovered, the average time spent in hospital was eight weeks, often followed by a long period of disablement - months or even years. Human hydatid disease was clearly costly to both New Zealand’s public health system and to the families it affected directly.

But the costs did not end there. The high rate of condemned export livers caused serious economic loss to the nation. Farmers were not penalised for sending cyst-ridden livers to the abattoirs, but the freezing works bore the costs of mounting annual losses from the rejection of diseased carcasses for the export market. Barnett commented in 1941: “We are wasting some £300,000 per year, not to speak of human lives, through the ravages of a malady that could with the exercise of a little trouble and common sense be surely prevented.” By 1956 “the loss of annual export earnings had increased to

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9Ibid., p.569.
almost one and a half million pounds,” wrote Ellis Dick, “as British veterinary authorities inspecting livers from New Zealand found many infested with hydatid cysts”.11

Burridge and Schwabe wrote in the *Journal of Hygiene, Cambridge*, (1977), of the serious implications of hydatid disease for New Zealand’s economy:

In addition to public health considerations, financial losses from liver condemnations due to hydatid cysts were increasing rapidly [by 1956], throwing suspicion on the whole of New Zealand’s meat inspection procedures. It was obvious that echinococcosis posed major public health and economic problems to New Zealand and that, if not brought under effective control, it could have drastic consequences for a country largely dependent for its high standard of living and economic stability on an export market in agricultural produce.12

Clearly, hydatids continued to be a serious national problem throughout the first half of the twentieth century. But the lives of the vast majority of New Zealand farmers were untouched by the disease, and its prevention did not interest them.

**Efforts to control through education and persuasion**

By the mid-thirties Barnett became convinced that a more active and systematic approach to control was essential. In 1934, largely through his initiative, a Department for Hydatid Research and Prevention was established at the Otago Medical School. But inadequate funding remained a constant problem. Both the Government and the University of Otago were sympathetic, but in the Depression years neither was prepared to offer financial support for such a project.

The new research department was financed initially by donations resulting from a public appeal organised by Barnett, who wrote in the *Otago Daily Times* in November, 1934: “My objective at the moment is to try and raise a little money - a few hundred pounds would suffice, for laboratory research in the subject of hydatid disease”.13 Barnett’s own name headed the list of subscribers. Grants in aid were later made by the Health Department, the Agricultural Department and the New Zealand Meat Producers’ Board. Altogether over £1,000 was raised.

The University appointed a Committee of Management for the new department, consisting of Sir Louis Barnett (Chairman) and Professors Hercus and D’Ath, all of them staff of the Medical School.14 In 1938, however, the Government placed the

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HYDATID DISEASE IS A MENACE TO YOU - YOUR CHILDREN - YOUR STOCK

Over 1000 Cases in last Ten Years in New Zealand Public Hospitals

Dogs eating raw plucks containing Cysts (Water Bladders)

These Cysts produce Hydatid Tape Worms in dogs' intestines

Millions of minute Hydatid Eggs are passed in the Dogs' Droppings which are trampled and scattered with dust. If these eggs are swallowed by human beings or stock animals they produce HYDATID CYSTS.

PRECAUTIONS.--Give worm-destroying medicine regularly to country dogs. Do not let dogs eat raw offal. Remember the risk of conveying Hydatid Eggs to the mouth by contaminated hands, food, water, or salads.

Plate 4, This is probably the first educational poster produced by Barnett & Hercus in 1934-35, at Otago Medical School, "displayed at railway stations, post offices, schools, county council meeting rooms, abattoirs, shearing sheds and so on". (Barnett, 1935)

Source: Coloured original from Gemmell's private collection.
Hydatid Research Unit, as it came to be known, under the supervision of the newly-created New Zealand Medical Research Council, which became responsible for funding hydatid research. The HRU welcomed MRC patronage on the understanding that the Unit would retain its autonomy. Its original management Committee members noted in their 1938 Annual Report: "It will no longer be necessary for the chairman [Barnett] to beg, cap in hand, every year for the money required to carry on this work".15

The functions of the newly created department in 1934 were research and public education; soon, however, anti-hydatid education became its first priority. Barnett described this educational work in the *New Zealand Medical Journal* in 1935:

> For the purpose of educating the people about the dangers of Hydatid Disease, a large coloured poster, accompanied by a folder giving fuller information has been produced and copies are now being widely distributed for display at post offices, schools, county council and borough meeting rooms, abattoirs, shearing sheds and so on. The folders will also be issued with each dog licence.16

Barnett referred in 1941 to the involvement of the Departments of Health and Agriculture in the extensive educational programme:

> For years past the Research and Preventive Medicine Department of the Medical School, with the co-operation of the Government Departments of Health and Agriculture, have carried out an extensive, intensive and expensive campaign of education and persuasion. No other hydatid country in the world has attempted this effort on such a scale. We have distributed illustrated posters, folders, pamphlets, and leaflets in thousands throughout the countryside. We have published, again and again, articles in the newspapers, in the School and Agricultural Journals, we have given lectureettes to farmers' and other such unions, senior and junior, male and female. We have arranged for radio talks, museum exhibits, and for practical demonstrations at the various important Agricultural Shows.17

The already low-key research activities of the Unit temporarily ceased in 1939. Its sole Research Officer, Dr E.W. Bennett, then became responsible for operating a one-man travelling education campaign which exhibited anti-hydatid propaganda at agricultural shows up and down New Zealand. Often working alone, Bennett travelled extensively for the next four years, giving talks and demonstrations of dog dosing, showing films, distributing written information and speaking to farmers' groups and to classes in schools. Maclean wrote of Bennett's work:

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There is no doubt that Bennett’s work reached a high standard. He brought a knowledge of the problem to a great many farmers. He noted in 1941 a great improvement in the awareness of farmers to the need for hydatid eradication, and suggested possibly 90% of dog owners [in the Hawke’s Bay area] were using arecoline [to dose their dogs.] But town populations there, as elsewhere, were antagonistic.18

Bennett’s travel expenses were met by the Departments of Health and Agriculture, whose field officers assisted him as required. The monthly travel claims he submitted to the Department of Health are historically interesting documents, revealing the problems he faced in his solitary mission as he continually struggled to carry out a difficult task with inadequate funds. For the month of February, 1939, for example, Bennett claimed a few shillings for: “Expenses for dressings, on the advice of Dr. Cook, for dermatitis resulting from demonstrating the dosing of dogs.” On the same claim he requested reimbursement from the Health authorities for a journey he had made from New Plymouth to Auckland by air, rather than by road: “The Whangarei Show followed so closely after New Plymouth that the hydatid exhibit had to travel by train, and I myself by air. Strictly speaking it was not absolutely essential for me to travel in this way, but in the unusual circumstances it seemed the most workable plan.” At first Departmental officials refused to reimburse him for air travel. It was only after prolonged correspondence over seven months, and finally through the intervention of the Director General of Health, that the sum of three pounds was approved for “Aeroplane travel by Mr E.W.Bennett on 23 June, 1939, on Union Airways of New Zealand Ltd. from New Plymouth to Auckland.”19 Bennett threatened more than once to resign because of the difficulties of his dual role, but each time he was temporarily persuaded to carry on.20

In 1943 the HRU’s Management Committee decided to release its educational role to the Department of Health, and to concentrate its limited resources for the next few years on research activities.21 These require only a brief mention in the present context.

The Research Unit at first focussed its efforts on a study of the dog-dosing medicine, arecoline bromide, which was supplied to all dog owners by law from 1 January 1939. The Unit investigated the efficiency, safety, and best methods of administering arecoline. It also issued an instruction card for distribution to dog owners together with the tablets.22

But the work of the small unit was constantly hampered by inadequate facilities for animal research. For some years a pack of twelve hydatid-infected dogs was kept on

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19Files of Dept. of Health, National Archives, Wellington, H1, 131/8, Hydatids, 1914-36, February 1939.
20Ibid., 8 April, 1941.
21Maclean, p.13.
the roof of the medical school, despite mounting objections from staff on lower floors. In 1942 Elizabeth Batham, who succeeded Bennett as Research Officer, expressed her doubts to the Committee concerning the wisdom of retaining the Unit:

On its present basis, [the Unit] is extremely unlikely to produce any serious research work worthy of the name, and the funds, space and energy...would be better employed on some more promising line of work. ...Arrangements both for keeping infected dogs and handling infective faeces are not satisfactory, and many doubt whether the risks of giving hydatids to people at the Medical School is justified by the results being obtained.23

One of the most imaginative research projects supported jointly by the Hydatid Research Unit and the Department of Agriculture was initiated in 1943 with the help of a leading local farmer, Neil Aitken. Known as the Styx field trial it continued for more than 30 years, involving 48 farms and at least 300 working dogs in an isolated valley on the Maniototo Plain in the South Island. The study aimed to establish the feasibility of eradicating hydatid disease. Using an isolated rural region, it attempted to assess the combined effect of the two most commonly accepted preventative measures - namely, periodic dosing of every dog in the area with arecoline, and ensuring that none had access to raw offal.24 Within eight years the percentage of infected sheep and lambs in the area had dropped dramatically, but not enough to convince the Federated Farmers’ organisation, which claimed that the results of the Styx field trials were “inconclusive”. Gemmell argued that the perceived failure of the experiment may even have delayed a concerted national eradication campaign by several years.25

The Hydatid Research Unit went into recess in 1951 due to funding difficulties. Despite its re-establishment in 1958, Gemmell, (who then became its director), claimed that the lack of continuity in research was to have serious repercussions on progress for at least the following decade.26

From the early 1940s the Department of Health gradually took over full responsibility for hydatids education. The Department’s first leaflet was printed and published in 1942. It was followed by a series of posters, booklets and leaflets, newspaper advertisements, films, radio broadcasts, health exhibitions, lectures and group talks, all directed mainly to dog owners. But the Department’s activities were constantly hampered by a limited budget. Hydatids education did not rank highly on the

Facts for Farmers about HYDATIDS

Your faithful friend cannot help being a danger to you and yours if you feed him on raw offal, and neglect to dose him for worms.

In some districts up to 70 per cent of older sheep are infected; cattle and pigs also. The hydatid cysts (fluid bladders) form usually in liver and lungs. Dogs fed on offal are liable to become infected.

Dogs act as carriers. They do not have cysts but carry the worms, whose eggs are distributed in droppings. This dries and crumbles into dust which is easily picked up on coats of animals.

Hydatid eggs get into human body from hands that have touched animal coats, or food polluted with dust. Bloodstream takes eggs to liver, lungs, etc., where they may lodge and grow into large cysts.

Never throw raw offal to dogs. Cut into slices and boil for 10 minutes first, otherwise burn or bury. Children, and all who handle animals, should never put hand to mouth without washing.

N.Z. is losing about £150,000 a year through meat liver rejected because of infection. Stock infect dogs, but dogs reinfest stock. Take precautions. Above all, use arecoline tablets to dose your dogs.

Dose your dogs regularly
Never feed them on raw offal

Department's list of priorities, and in the years 1939-1945 wartime paper shortages and reduced staff numbers constantly hindered its work.27

Meanwhile the Department of Agriculture also contributed to the national education campaign. Articles on hydatid prevention appeared regularly in the *Journal of Agriculture*. Two articles were reissued as bulletins, to be reprinted several times and distributed widely in the farming community. Most farmers at the time were considered to be regular readers of the *Journal*, but its articles generally failed to motivate them into action. O'Brien noted in 1948 a tendency for farmers to be sceptical of information issued by the Departments of Agriculture or of Health. "The farmer has an innate distrust of pronouncements on farming matters by non-farmers, particularly by government departments. He looks at his healthy children and ceases to worry."28

Departmental Field Officers maintained close contact with farmers, giving practical instruction in dog dosing and offal disposal.29 A.D. Laing, the Assistant Director of the Livestock Division of the Department of Agriculture, was convinced that the disease could be beaten, urging farmers who read the *Journal of Agriculture* to: "Persuade your fellow farmers to change their ways. Shame 'lazy' farmers into co-operation by asking anyone who brings dogs onto your farm: 'Are they free from hydatids, because my dogs are, and my farm is'.”30

Whether or not instruction on hydatids was given in schools depended at the time on the interest of individual teachers. Harvey, a medical student who visited Napier Boys High School in the summer of 1940, reported that: “All students got one lecture on helminths (including hydatids) in biology classes. The agricultural master was very interested in my subject and well informed. He had taken the trouble to prepare some good wall diagrams showing the hydatid life-cycle. He suggested I talk to Forms III and IV agricultural classes, which I did.” However, Harvey was disappointed later to find that the school possessed three unregistered and undosed dogs. “This anomalous situation was typical of the inconsistencies I encountered on the farms I visited”, he said.31 Hydatid prevention was evidently preached widely, but practised rarely.

Every New Zealand child should be taught about hydatids in both primary and secondary schools, commented O'Brien in 1948. He described a school he had visited in South Otago where no talk on hydatids had been given in the previous four years, (a situation he suspected was not unusual).32 In the opinion of several medical students

27Maclean, pp 18-19.
29Ibid., p.21.
31N.D.M.Harvey, 'Hydatids in Hawkes Bay', Unpublished Fifth Year Medical Student's dissertation, Social and Preventive Medicine, Medical Library, University of Otago, Dunedin, 1940, p.27.
the subject should have been included in the health education curriculum of all schools and teacher training colleges. Rolleston and Tripp argued that more visiting speakers should give instruction on hydatids in schools: "Most school children would make a receptive audience for a simple lecture, as they would be glad to get away from the monotony of arithmetic, English and French".

In hindsight it is easy to suggest how the educational campaign might have been improved. Influential groups such as the Women's Division of the Farmers' Union and young farmers should have been targeted earlier, according to Blain and Windle (1940):

If every young country woman who approached matrimony did so armed with the knowledge and realisation of the dangers of hydatid disease those diseases would automatically be considerably reduced. When the health of her children is at stake, and she realises the fact, a woman may be depended on to see that it is adequately protected.

There were only two agricultural colleges in the country at this time, and only a very small minority of young farmers received any formal agricultural training. Those who had attended courses at Lincoln or Massey appeared to have more knowledge of hydatids than other farmers, according to medical students Cumming and Macgregor, (1937), "Young men have some definite knowledge from Massey College, but the importance of human infection is obviously neglected. Animal infection is taught, but they knew of no other effect except a slight malnutrition in dogs. Most were indifferent to the subject. It was a problem of lesser importance, particularly to older farmers".

Allan Leslie, a veterinarian on the staff of Canterbury Agricultural College, said of the instruction on hydatids given to Lincoln students in 1933: "The usual prophylactic measures are taught to the 12-20 students who pass through the College each year."

Rather more detailed coverage seems to have been offered at Massey to the 50-60 students who annually attended its courses leading to the Bachelor of Agricultural Science degree or to diplomas in sheep and dairy farming. "The importance of control

33 M. Blain & H. E. Windle, 'A survey of hydatid disease in Southland and North Canterbury', Unpublished 5th Year Medical Students' dissertation for Social & Preventive Medicine, Medical Library, University of Otago, Dunedin, 1940, p. 32.
34 G. L. Rolleston & P. M. Tripp, 'Hydatid disease in the Geraldine District of S. Canterbury', Unpublished 5th Year Medical Students' dissertation for Social & Preventive Medicine, Medical Library, University of Otago, Dunedin, 1939, p. 50.
36 D. G. Cumming & K. L. Macgregor, 'Epidemiology of hydatid disease, Hawke's Bay,' Unpublished 5th Year Medical Students' dissertation, Social and Preventive Medicine, Medical Library, University of Otago, Dunedin, 1937, p.18.
37 Personal Correspondence from A. Leslie to W. N. Campbell, 27 September, 1933. In A. K. Tulloch & W. N. Campbell, 1933, p.98.
of *Echinococcus granulosus* from a human point of view is stressed," wrote a Massey staff member.38

The two agricultural colleges should probably have played a more active role in hydatid prevention. There is no evidence of any co-operative effort between them and the Otago Medical School, where so much of the initiative for eradication was taken at the time. But we should remember that New Zealand was without a veterinary school until 1964. Nevertheless, hydatids were a very relevant topic for aspiring young farmers. Agricultural students might have related more easily than medical students to the farming community had they been given similar assignments involving field research during the summer vacation.

It is debatable how much farmers' knowledge improved as a result of the transitory contact some had with visiting medical students. The Dean of the Otago Medical School, Professor Hercus, assigned senior students to carry out field work and research on a variety of public health topics as part of their practical course in Social and Preventive Medicine. Over fifty senior students elected between 1933-66 to study hydatid disease, its prevalence and its prevention in a practical setting. During the summer vacation these students visited a number of farms, usually in their home region. The students' role was to give advice and practical instruction to farm workers on the dosing and testing of dogs, to survey existing farm practices, and to educate farmers and their families on hygiene and the life-cycle and transmission of the hydatid parasite.39 Afterwards they were required to submit a dissertation to the Medical School.

In many cases it seems likely that these students handled their role on the farms well. But the typical farmer probably resented being told by 'townies', and particularly by young medical students, how to feed his dogs and dispose of his sheep offal. One pair of medical students noted in farmers "an ingrained dislike of and antagonism against the medical profession."40 Friction must have been difficult to avoid. Students in their early twenties, often from a city background, were unlikely to have acquired sufficient tact to advise farmers on their own ground without causing resentment. One pair, for instance, revealingly reported afterwards to the Dean: "At the conclusion of our visit we summarised our policy and left the farmer, we hope, a wiser man and with our advice ringing in his ears".41 Such unintended patronising behaviour may well have antagonised farmers to the extent that they deliberately resisted anti-hydatids propaganda as a matter of principle.

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38 Personal Correspondence from J.T.Dexley to A.K.Tulloch, 7 October, 1933. In Tulloch & Campbell, 1933, p.97.
40 Rolleston & Tripp, 1939, p.16.
41 Ibid., p.17.
Yet despite its limitations, the educational campaign in its initial stages was a bold and innovative attempt to persuade New Zealanders to rid the country of a readily preventable disease. It was a bitter disappointment to those who had initiated the campaign that so little seemed to have been achieved in these years. Perhaps, as Maclean has suggested, the magnitude of the problem had not been fully realised. Barnett was clearly disheartened when he wrote in 1937: "We have to contend with a vast amount of apathy, ignorance, and stupidity, and much of this laborious and expensive effort is absolutely wasted...It has been reported to us that our leaflets are not only left unread, but sometimes are condemned to ignoble use."  

Four years later, in 1941, Barnett said with his usual frankness: "We claim that our campaign of education and persuasion has been thorough, but has it been effective? That is the important question, and the answer, I regret to confess it, is 'Not yet'". Barnett’s doubts about the campaign increased with time, and in his last years he pressed for legislation as the only realistic means of controlling the hydatids problem. A few months before his death in 1946 he wrote:

Progress is disappointingly slow, and without exception all those who by experience and research have become reliable judges are of the opinion that educational and persuasive methods have to a large extent failed in their objectives. To ensure a speedy and successful control of the hydatid menace compulsory regulations regarding dog dosing and dog feeding must be introduced and rigidly enforced.  

The crucial question remained unanswered: Why had such ‘an extensive and intensive’ educational programme failed? Farmers’ attitudes and lack of interest in hydatids have often been held responsible. Physical isolation, conservatism and parochialism characterised the New Zealand farming community of this period. So did a rugged individualism, a relatively high literacy rate, and a reluctance to accept advice from ‘outsiders’. As O’Brien observed in 1948: “There is probably no class of the community more jealous of its independence and more opposed to regimentation than farmers.”

Accustomed to being in charge and to making all the day-to-day decisions on their own property, New Zealand farmers were reluctant to change their farming practices on the advice of the medical profession or government officials unless there were adequate incentives. On the contrary, anti-hydatid measures seemed likely to involve the farmer in extra work and expense. Some thought the health risks from hydatids were

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42Maclean, p. 13.
44Barnett, 1941, p.277.
46O’Brien, 1948, p.22.
exaggerated, and that it was in any case hopeless to attempt to get rid of the parasite. Rolleston and Tripp noted such attitudes amongst South Canterbury farmers in 1939:

The farmer, a practical worker, saw no hope of eradicating the disease by his isolated and incomplete methods. The problem of stray dogs raises insurmountable obstacles. Even if they dose all their dogs regularly, strays would contaminate their pastures. Farmers could see no financial rewards for dosing. Incidence of the disease seemed to them to be ridiculously low. Any preventive measures were neither worth the money nor the effort.47

Similar observations were made by Armitage and Barber following their summer experiences on North Auckland farms:

The general knowledge of farmers on the subject of hydatids was, without exception, very poor in the districts we visited. Several people were quite apathetic, while some were definitely antagonistic to any attempts to gain control over the condition of hydatidosis. A good example of the attitude of the average farmer was found in Mr L. of Ohaewai. He listened to our introduction and diplomatic propaganda with a cynical smile. Afterwards he refused to let us treat his dogs.48

While medical students readily described farmers’ knowledge of hydatids as ‘vague’ or ‘abysmal’, few attempted to analyse the problem in any depth. One who did so was Velvin, who surveyed farms in the Palmerston North area in 1940. He discovered that ‘knowledge’ was a far more complex variable than most of his colleagues’ dissertations implied.

<table>
<thead>
<tr>
<th>TABLE 8</th>
<th>Farmers’ knowledge of hydatids and farmers’ action</th>
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<tbody>
<tr>
<td></td>
<td>Palmerston North area, 1940</td>
</tr>
<tr>
<td>Well informed, actively adopting preventive measures</td>
<td>10%</td>
</tr>
<tr>
<td>Well informed, doing nothing</td>
<td>25%</td>
</tr>
<tr>
<td>Little knowledge, willing to learn and practise improvements</td>
<td>50%</td>
</tr>
<tr>
<td>Little or no knowledge. No interest at all</td>
<td>15%</td>
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Velvin observed, as Table 8 illustrates, that ‘farmer knowledge’ did not guarantee ‘farmer action’. Velvin reported that while one in every three farmers he interviewed was ‘well informed’ about hydatids, only one in ten actively co-operated in the hydatid

47 Rolleston & Tripp, 1939, p. 16.
49 E. Velvin, ‘Preventive aspects of Hydatid Disease (Palmerston North),’ Unpublished 5th Year Medical Students’ dissertation in Social & Preventive Medicine, Medical Library, University of Otago, Dunedin, 1940, P.26.
prevention campaign. The problem, then, for health educators, was farmers’ lack of motivation rather than their ignorance.50

Factors which affected farmers’ willingness to co-operate do not seem to have received much attention at the time. Psychology was in its infancy, and motivation was not as well understood as it is today. Alldred and Scorgie showed insight when they wrote of farmers in 1940: “They still maintained an attitude of supreme indifference [to hydatids] and said they would take no active steps unless their neighbour did likewise.”51 [The emphasis is mine].

In an article in the *New Zealand Geographer* John Harre helped to throw some light on farmers’ behaviour. Under the title: ‘Resistance to Innovation in New Zealand Farming’, Harre attempted to identify the ‘opinion-formers’ and lines of communication operating in the farming community. His research findings suggested that informal networks amongst neighbours and kinsfolk were the most powerful influences on farmers. “Information derived from formal communication channels such as books, radio and clubs is minimally utilised by farmers. The farmer relies greatly on the ideas that he has seen put into practice by his father, neighbour or other kinsman or friend”. Harre concluded that: “The network of social relationships which surround each individual [farmer] and his perception of resulting pay-offs are the most important factors in determining his acceptance or otherwise of innovation”.52

The basic question health educators faced at the time was not so much how to increase farmers’ knowledge, as how to persuade them to apply their knowledge in a practical way. How could rural families and neighbourhood communities be persuaded that it was in their own interests to rid their farms - and New Zealand - of the parasite? It was apparent by the early 1940s that bombarding the rural community with posters, pamphlets and persuasive literature was not going to eradicate hydatids. The only alternative, in the view of Barnett and others, was to resort to legislation and enforcement.53

**Efforts to control through legislation and compulsion**

Compulsory measures to control the hydatid scourge were introduced with some misgivings by the New Zealand Government. Senior officials of the Agricultural Department opposed the introduction of legal measures which they feared: “would be difficult and expensive to establish - they would be flouted, laughed to scorn indeed by the country workers, and the law would be brought into contempt.” Barnett was well

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50Ibid.


aware of these objections, but in 1937 he urged the government to introduce at least two compulsory methods without further delay:

1. Prohibition of the feeding of dogs with unsterilised offal.
2. The insistence on regular administration of arecoline hydrobromide to all country dogs.\(^{54}\)

Officials and ‘men of note in the sheep industry’ initially advised against Barnett’s first proposal, (to prohibit dog owners from feeding their dogs with raw offal), which they thought would be too difficult to enforce. But they agreed with his second proposal regarding dog dosing, and the Government in 1937 approved an Act to amend the Dogs Registration Act of 1908. In effect the new regulations required government officials annually to distribute worm-expelling medicine in the form of arecoline tablets, with full instructions for their use, to every dog owner at the time of dog registration. Dog owners were compelled to pay an extra registration fee of one shilling to cover the cost of the tablets. But as Barnett pointed out: “There is no law compelling them to dose their dogs, and a very large number neglect to do so”.\(^{55}\)

Dosing remained unpopular with many farmers. Welch,\(^{56}\)(1943), suggested several reasons for this. Farmers, he claimed, were ignorant of the necessity for three-monthly dosing; they were lazy; and they feared arecoline would have serious effects on their dogs’ health.\(^{56}\) Blain and Windle (1940) described the situation on a Southland farm:

On asking the farmer if he had any arecoline, he would rummage around in various odd corners and finally produce some dusty phials of tablets which had obviously remained untouched since the day they were issued. “Why haven’t you used these to dose your dogs?” we would ask. “I couldn’t be bothered” or “I haven’t been able to spare the time”, or “I didn’t want to kill my dogs” was their invariable reply. One farmer said he would throw the stuff away rather than give “dope” to his dogs.\(^{57}\)

Another report described how 55% of the dog owners questioned in Otago had failed to use the tablets. “It was the painful experience of more than one investigator to discover a hoard of tablets behind the clock on the kitchen mantelshelf”.\(^{58}\)

At least 40% of dogs were estimated to be unregistered, which meant that insufficient arecoline was issued to enable all dogs to be dosed.\(^{59}\) Owners should have been required to dose their dogs under supervision, or better still, compulsory dosing by

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\(^{54}\) Barnett, 1937, p.113.


\(^{56}\) G.K. Welch, ‘Hydatids in the Wairarapa District’, Unpublished 5th Year Medical Student’s dissertation for Social & Preventive Medicine, Medical Library, University of Otago, Dunedin, 1943, p.27.

\(^{57}\) Blain & Windle, 1940, p.17.

\(^{58}\) Allred & Scorgie, 1940, p. 9.

\(^{59}\) Ibid.
experts should have been carried out. An article in the *Christchurch Press* of 10 March 1939 headed 'Complaints about treatment' said: "Dosing ought to be in the hands of the Department of Health, the Department of Agriculture, or the Society for the Prevention of Cruelty to Animals. Farmers are under no obligation to use these tablets. The instructions given with issue of the drug are insufficient, and many do not administer them correctly".60

Numerous complaints were made about dog dosing to Agricultural officials, local authorities and animal welfare organisations.61 The issue of arecoline at registration was an ill-conceived procedure that had little effect on the prevalence of hydatid disease in New Zealand. Even if regular dosing had been made compulsory by law, enforcement would have been virtually impossible since so many dogs were unregistered.

Enforcement difficulties also hindered a second legislative measure adopted by the Government three years later. The Meat Regulations of 1940 made it illegal to feed dogs on raw offal. But few members of the rural community knew of the offence. It was impossible to monitor farmers’ practices on their own land. Farmers continued to feed their dogs principally on discarded livers, and no prosecutions were recorded.62 As Maclean observed, "No government at that time would have considered enforcement of compulsory measures on such an important and influential section of the community. The 1940 Meat Regulations achieved nothing beyond showing that the Government disapproved of the practice."63 Legislative measures proved to be futile, and control remained voluntary until 1959.64

**Mobilising the farming community**

Sir Louis Barnett died in 1946. In his later years he must have felt very disappointed at the apparent failure of his efforts over more than fifty years to rid New Zealand of hydatids. Had he lived a few months longer he would have witnessed an event in 1947 which was to be the first indication that the long range education programme he had instigated in 1934 had finally started to have an effect.65

The breakthrough became apparent in December 1947, when the first farmers’ hydatid eradication committee was formed voluntarily by a group of 99 dog owners in Southern Hawke’s Bay. The group was supported by its local branch of Federated Farmers, by the local stock inspector and by the local inspector of health. Each of the

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61 Ibid.
62 Department of Health files, National Archives, Wellington, H1, 131/8, Hydatids, 1939-41.
65 Maclean, 1964, p. 22.
sixteen elected 'key men' was required to make personal contact with six or seven farmers to ensure their co-operation. Three-monthly group dog dosing dates were publicised to all members, and recommendations circulated concerning the boiling or destruction of offal. A government grant of £50 was approved to cover the group's essential expenditure, and this was renewed annually for several years.66

Here at last was a self-motivated community network, a voluntarily formed group of relatives and friends with whom the farmer could communicate and share ideas on an equal footing. The scheme was sound in that it promoted preventive measures amongst its members, it provided education for farmers and their families, and it checked on the effect of educational work as seen in the co-operation of dog owners. Within a year it was reported that more than 90% of dog owners in the group were co-operating fully with the scheme's precepts.67

As news of the scheme spread through the rural community during the next few years, other farmers spontaneously formed their own eradication groups, receiving small grants-in-aid from the Minister of Agriculture. The formation of these local organisations was important, as Maclean pointed out, not because of what they actually achieved in hydatid eradication, but because "it showed clearly that a knowledge of the problem was spreading widely among farmers, together with a desire to take some effective action".68 Localised group efforts were admittedly fragmented and individualistic, but they represented the accumulated result of a prolonged educational campaign initiated in 1934 by Barnett's Department of Research and Prevention, and taken up later by the Departments of Health and Agriculture.69

The state of progress, 1956

In the opinion of clinicians such as Sir Charles Hercus, Dean of the Otago Medical School, the hydatid problem in New Zealand in 1956 continued to be menacing. "Over the years 1945-54 there has been no significant change in either the deaths from hydatid disease or in admissions to public hospitals of patients suffering from the disease".70

Hydatid disease, by its insidious nature, did not alarm the New Zealand public as outbreaks of cholera or tuberculosis had done in the past. Symptoms often did not develop until ten to twenty years after infection. Patients admitted to hospital with hydatid cysts in the 1950s could have contracted the parasite from a dog even before the educational campaign of the mid-1930s got underway. The benefits of an eradication campaign might conceivably not be felt for a whole generation.

66Ibid.
67O'Brien, 1948, p.29.
68Maclean, 1964, p. 25.
69Ibid.
Farmer co-operation was clearly essential to successful eradication of the parasite. It was slow to develop because the average farmer had no financial incentive to change his practices. If farmers could have been penalised for sending infected stock to the abattoirs, the disease would probably have been stamped out far more quickly. But the necessary legislation was not introduced, perhaps because of its controversial nature.

Finally the lengthy public education programme seems to have paid off. Maclean observed in 1964:

It is apparent now that a long period devoted to the education of those concerned was an essential preliminary to more effective measures. A gradual awareness of the need for hydatid eradication, and a knowledge of how this might be done, became apparent among farmers' groups, women's organisations, and local authorities, and this was accompanied by more and more frequent references to the hydatid problem in the daily press.  

By 1956 the unnecessary costs of human hydatid disease had finally been acknowledged by most New Zealanders. The time had come for united action.

71 Maclean, 1964, p.21.
The year 1957 has often been referred to as a turning point in the history of the eradication of hydatid disease from New Zealand. Not only had many individual farmers recently become more knowledgeable of the life cycle of *Echinococcus granulosus* and more committed to ridding their farms of the parasite, but farmers’ groups, young farmers’ and women’s organisations, the Plunket Society, the New Zealand Kennel Club and other community organisations were showing signs of interest and concern.¹

The three-man Committee of Inquiry into Hydatids Eradication which reported to the New Zealand Parliament in June 1967 had this to say of the remarkable change in the public attitude towards the hydatid problem from about 1957:

The eradication campaign in its present form arose out of the efforts made many years ago by a few medical and veterinary scientists to control hydatid disease in humans. For many years they fought an uphill battle against public apathy and farming antipathy, and progress was slow. In about 1957 their scheme received a boost when the farming community and the country as a whole began to appreciate the magnitude of financial loss from condemned livers, an amount probably overestimated at $5 million.²

But New Zealanders’ growing unease about hydatids and their cost to the country involved more than vague economic concerns. The present chapter examines a range of underlying reasons for the surge of public interest in eradicating the parasite at about this time. It aims, too, to describe some bold new attempts from about 1957 to resolve the problem, and it attempts to show how the combined effect of such measures succeeded in dramatically reducing the incidence of human hydatid disease in New Zealand within the next two decades.

**Farmers’ views on hindrances to eradication prior to 1957**

Several medical students discussed the reasons farmers gave for the slow progress of hydatids eradication. Stokes, for instance, asked 134 farmers what they thought had hindered control. Some blamed their neighbours for failing to carry out recommended

preventive measures. Others argued for stronger legislation against feeding dogs with raw offal, and for harsher penalties for failing to register or dose dogs. A few suggested penalising farmers who sent diseased livers to the meat works, or giving a bonus to owners of healthy stock. Some said the government should have enforced dosing by employing trained officials to dose dogs on the farms, rather than expecting dog owners themselves to do it.\textsuperscript{3} Clearly farmers were now showing more awareness of the complexity of the problem.

Ram, another student, concluded that the ignorance and apathy of all New Zealanders had delayed eradication.\textsuperscript{4} A third student, Watson, reported that a Hydatid Control Officer he had interviewed blamed the slow rate of progress on poor dog control, persistence on the part of some ignorant farmers in feeding their dogs on raw offal, and the failure of some farmers to dispose adequately of diseased sheep carcasses. The HCO also blamed general carelessness, and insufficient hydatids education in some sectors of the rural population. Another student, Beck, reported that farmers were often heard to say: "If the Government wants to remove hydatids then it is up to them".\textsuperscript{5} Until the late 1950s, reports indicate that farmers commonly denied personal responsibility for the hydatid problem.\textsuperscript{6}

The impetus for stronger public action

At the beginning of 1957 it seemed unlikely that human hydatid disease would be eradicated from New Zealand in the foreseeable future. Statistics from the Department of Health indicated that the number of notified human cases was rising year by year, reaching its highest-ever level in 1961. Dedicated men such as Dr. Neil Begg, the Medical Director of the New Zealand Plunket Society, were incensed at the high incidence of the disease in children. Begg repeatedly drew the public's attention to the fact that the age group most severely affected at the time was pre-school children under the age of five.\textsuperscript{7} Sir Charles Hercus, the Dean of the Otago Medical School, demanded stronger government action. He wrote in the \textit{New Zealand Medical Journal} in April, 1957: "The evidence points to a deterioration rather than an improvement in the situation despite the fact that the life cycle of the parasite has been known for over a hundred

\textsuperscript{3}G.J. Stokes, 'A survey of the existing methods of hydatid disease control', Unpublished 5th Year Medical Student's dissertation for Social & Preventive Medicine, Medical Library, University of Otago, Dunedin, 1957, p.12.


\textsuperscript{5}A.D. Beck, 'Hydatids, a survey carried out in the Waitotara County', Unpublished 5th Year Medical Student's dissertation for Social & Preventive Medicine, Medical Library, University of Otago, Dunedin, 1957, p.17.

\textsuperscript{6}G.D. Watson, 'Hydatid Eradication and Prevention in New Zealand', Unpublished 5th Year Medical Student's dissertation for Social & Preventive Medicine, Medical Library, University of Otago, Dunedin, 1966, p.37.

\textsuperscript{7}New Zealand Department of Health papers, in Neil Begg collection, Item 95-205, Hocken Library, University of Otago, Dunedin, 1980.
years. The methods of prevention appear simple and completely susceptible to human control".8

J.R.McKinnon, a medical student, analysed the costs of human hydatid disease to the New Zealand public health system. He reported that in 1958, 85 patients suffering from hydatid cysts were admitted to public hospitals. Their average stay in hospital was 54 days. He deducted that hydatids patients permanently occupied 15 public hospital beds. Each hospital bed at the time cost the taxpayer approximately £7 per day, so the total annual cost of treating hydatids patients must have amounted to at least £35,000. Nor did this figure take into account the salaries of nursing and medical staff, of whom there was a national shortage at the time.9

Meanwhile reports from abattoirs throughout the country showed an upsurge of cystic infection in slaughtered farm stock. Inspectors claimed that practically 100% of ewes’ and 80% of all lambs’ livers examined at the works showed signs of parasitic infection.10 The financial cost to the country’s export market of rejected sheep livers and lungs was climbing year by year to a figure approaching £2 million per annum.11

From late in 1955 farmers whose stock was found by works’ inspectors to be infected with hydatids were notified of this by a special red “sticker” attached to the routine killing sheets regularly returned to them. The red sticker carried this warning message:

HYDATID DISEASE was found in this line by Government Meat Inspectors. Dogs eating carcasses and offal of infected stock can infect other livestock and humans.

"PROTECT YOUR CHILDREN."12

The stickers were first suggested by a supervising Meat Inspector at an Invercargill freezing works, and all freezing companies agreed to use them. They were a clever and inexpensive device to alert farming families who needed to change their ways. The names and addresses of those farmers whose stock was found to be infected were then referred to livestock inspectors, who subsequently made follow-up visits to those farms. As J.E.McIlwaine, Director of the Animal Industrial Division of the Department of Agriculture, observed on 4 November 1955 in correspondence with the Livestock Superintendent in Dunedin:

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9J.R.McKinnon, 'Hydatids and its control: a survey of farmer knowledge and opinion', Unpublished 5th Year Medical Student’s dissertation for Social & Preventive Medicine, Medical Library, University of Otago, Dunedin, 1964.
10F.S.Maclean, 1964, p. 27.
12J.E.McIlwaine, Correspondence, 4 November 1955, N.Z.Dept. of Agriculture Papers, AG1, 66/5/2, Hydatid Control pt.2, 1952-58, National Archives, Dunedin.
A notice of this type passed to the farmer when he can read it in his own home and where very probably his wife and family will see it, will have a good effect in bringing home the risks of infection and inducing him to try and do something about hydatid control.\textsuperscript{13}

In 1958 Dr. Kennedy of the Department of Health wrote to a friend in Wales expressing his concerns about condemned export livers, and the need to step up anti-hydatid education in New Zealand:

The Department of Health has really focussed on this problem after the export of livers stopped completely under the Customs Export Prohibition order in 1957. The Department has been plodding away [at public education] since before the war, but now our programme is being reinforced by extreme activity on the part of the Department of Agriculture, which has appointed a Senior Veterinary Officer full time to direct the programme. Federated Farmers and the Plunket Society are all pitching in.\textsuperscript{14}

A resolution by the Hamilton Livestock Instructor passed on 29 May 1957 by the Waikato Provincial Conference of Federated Farmers provided further evidence of urgency:

Many farmers believe it is simply common sense to expend money in these prosperous times in the total elimination of hydatids, so as to save a much greater sum in just a few years. Departmental officers urgently need to “keep the ball rolling” despite pressure of other duties. We would be wise to give priority to this aspect of extension work in order to encourage the radical and progressive lead now being given by the two largest provincial sections of New Zealand Federated Farmers - the Auckland and the Waikato Branches.\textsuperscript{15}

Substantial evidence suggests that New Zealanders now had a far better understanding than previously of how humans contracted the disease. Increasingly the public had come to resent the unnecessary costs of the parasite to the country’s economy as well as to its public health system. Very significantly, the penny-pinching days of the Depression were now over. These were prosperous times when voters felt the country could afford to embark on new public health projects. Action should not be delayed, in the opinion of leading government officials, since if wool prices fell, farmers “might not be so keen on systematic action as they are now”.\textsuperscript{16}

**Farmers’ knowledge and readiness to co-operate**

Maclean commented on farmers’ growing understanding of the disease: “By the middle of 1956 a knowledge of the cause of hydatid disease, and of the measures necessary for

\textsuperscript{13}Ibid.
\textsuperscript{14}D.P. Kennedy, Personal correspondence, 23 December 1958, Department of Health files, H1, 34/28 Hydatids Publicity 1942-59, National Archives, Wellington.
\textsuperscript{15}New Zealand Dept. of Health Papers, 29 May 1957, National Archives, Wellington, H1, 34/28, Hydatids Publicity, 1942-59.
\textsuperscript{16}Ibid.
its eradication, had become fairly widespread among the farming community, and conditions were such that given the necessary stimulus a great forward move might be expected".17

In contrast, the writer of an editorial in the *New Zealand Farmer* in May 1957 could see very little change in farmers' attitudes:

> Every now and again somebody sounds an alarm about the disease of Hydatids and points to the danger of material losses and also loss of human life. And every now and again a few individual farmers become a little uneasy about the position. But that, generally speaking, is as far as the farmers themselves have got to dealing with the position.18

Medical opinion tended to share this somewhat pessimistic view. The Medical Officer of Health in Nelson, for instance, wrote in 1957 to the Director General of Health:

> Educational campaigns of the past twenty years, based on “Don’t feed raw offal” and “dose every three months” have proved to be a miserable failure. Very few people in this district have ever heard of Sir Charles Hercus or his research programme. I believe that arecoline, if used correctly, is a satisfactory method of control, but how are we to get this across to the farmer?19

Similar letters expressing discouragement were written to the Director General by regional staff. The Medical Officer of Health for the Wellington area, for example, wrote in June 1957:

> We have been engaged in anti-hydatid education for more than twenty years, and in that time seen no improvement in incidence,...People are willing to learn the life-cycle of the worm, but few are willing to practice control measures; indeed a large number of people in key positions such as drovers, shepherds and farmers could not care less. I have known a college educated farmer who always fed his diseased livers to their dogs.20

The Director General replied that health education should be intensified.21

E.D. Anderson reported striking differences in 1960 in the attitudes and responses to hydatid control amongst South Canterbury residents. The best informed and most cooperative were high-country farmers, whom Anderson described as almost universally “hydatid conscious”. Low-country farmers ranked second for their knowledge and willingness to dose their dogs; their knowledge varied from very good to very poor. Town dog owners held strong and often uninformed views, resenting compulsion to

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17Maclean, 1964, p.27.
19Department of Health Papers, 10 June 1957, National Archives, Wellington, H1, 34/28, Hydatids Publicity 1942-59.
20Ibid., 11 June 1957.
21Ibid., 19 June 1957.
dose their dogs, and arguing for tighter restrictions on farmers, whom they saw as careless and largely to blame for the problem. And finally town non-dog owners were apathetic; they had little interest in hydatids, possessed poor factual knowledge, and wanted authorities to use compulsory measures to ensure compliance by dog owners.\(^{22}\)

Anderson concluded that further hydatids education in its present form was unlikely to be effective. He noted marked antagonism between the four groups he studied. He argued for stricter regulations, the imposition of progressively larger fines, and follow-up farm inspections where dogs or stock were found to be repeatedly infected. Anderson’s findings showed marked divisions in the attitudes of the New Zealand public towards the hydatid problem. Dog owners thought differently from non-dog owners, townspeople thought differently from country people, and even farmers disagreed amongst themselves.\(^{23}\)

Politicians of the day faced the dilemma of conflicting interests within their electorates. The Government was often accused of not adopting sufficiently strong measures to combat hydatids, but until 1958 no political party was prepared to risk the coercive approach that had proved to be so successful in Iceland. By the late 1950s, however, the New Zealand public seemed ready to accept stricter regulations. Indeed, most people wanted to see offenders brought to order.\(^{24}\) The long-term educational campaign was at last showing some effect.

Some enlightened farmers could see that change was imminent. Tom McCristell, a leading South Otago farmer who later played a prominent role in the national eradication campaign, described the attitude of the rural community before 1957 as one of “apathy and hopelessness fed on confused thinking, stories of failure, avoidance of personal responsibility”. But as McCristell observed, attitudes suddenly seemed to change at about this time: “We saw a dramatic upsurge in interest. For the first time farmers worked individually to eliminate hydatid disease from their own farms.”\(^{25}\)

However Dr. Neil Begg, who collaborated with McCristell in promoting local farmer eradication committees in rural Otago and Southland, noted farmers’ evident reluctance to apply their knowledge of prevention methods:

At some of these early meetings [in 1957] I remember being surprised that most farmers were quite well-informed about the life-cycle of the hydatid parasite and knew of the prevention methods - and to this extent preventive health education had been successful. What was lacking was the will and determination to apply

\(^{22}\) E.D. Anderson, ‘Hydatids in the community. An enquiry into the general population of South Canterbury’s present day knowledge of and interest in hydatid disease and its control’, Unpublished 5th Year Medical Student’s dissertation for Social & Preventive Medicine, Medical Library, University of Otago, Dunedin, 1960, pp.33-34.
\(^{23}\) Ibid., p.34.
\(^{24}\) Ibid., p.35.
their knowledge. It was this motivation which was the primary and most important task of the hydatids committees.26

**Educational activities are intensified**

In March, 1957, hydatid eradication was the main topic of a national conference of Medical Officers of Health. Delegates agreed that all Medical Officers of Health should intensify their educational activities in this field. At this time the Department of Health was well equipped to carry out a vigorous campaign of health education. Its field staff included medical officers, district nurses, and inspectors of health. A full-time health education officer was attached to each of its larger district offices. As Maclean observed: "All were accustomed, as part of their normal duties, to provide education on a great variety of topics concerning health, and during the period concerned a very large proportion of their total educational activities were directed towards the problem of hydatid education".27

The Plunket Society gave its full support to the new educational campaign. Women who visited their local Plunket Rooms were given a small 'pep talk' by the Nurse on the dangers of hydatids, and took home a Health Department pamphlet urging women to help in the campaign: "It would not be the first time that the women of New Zealand have led the way in practising the techniques of preventive medicine". Farmers' wives, in particular, were urged to note that “No dog should have access to raw offal”.28

An Auckland campaign in 1957 also aimed to involve farmers’ wives in prevention:

[It aims] to reach farmers’ consciences though their wives, for their children’s sake. To its shame, New Zealand has probably the highest incidence of hydatids in the world with the possible exception of Uruguay and Argentina. It threatens thousands of farm children with the possibility of horrible (sometimes death-dealing) internal growths later in life. For more than a generation efforts have been made to induce farmers to take preventive measures, but results have been negligible.29

The Medical Officer of Health in Whangarei sent a letter on 21 June 1957 to all farmers’ wives in his area, stressing the dangers of hydatids to members of their households, particularly children, and suggesting how mothers could help in getting fathers to take more precautions on the farm.30

Health officials did not soften their message when they addressed women’s groups, as the Auckland MOH indicated in a letter on 19 June 1957 to the Director General:

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27Maclean, 1964, p.28.


30NZ. Dept. of Health Papers, 21 June 1957, National Archives, Wellington, H1, 34/8.
This afternoon I am addressing a Women’s Division in Wellsford on hydatids, complete with pickled specimens of lungs and livers provided by the Agriculture Department and pickled by the Auckland Hospital. This I hope will be the first of many such lectures given by members of this office.31

There were instances where the women stepped in and took the initiative when their menfolk refused to take action. Maclean described how in one area where nothing was being done the Women’s Division of Federated Farmers organised a meeting and took their husbands along. A film was shown, and a panel consisting of members of an active nearby committee answered questions. Before the meeting ended the local farmers took charge, and formed their own committee for action.32

Neither was the importance of educating young farmers overlooked. The Medical Officer of Health in Dunedin noted in a letter to the Director General:

The keenest men in hydatid prevention work are the younger farmers who have been exposed, over the last twenty years or so, to hydatid information and propaganda, commencing in their school days, rather than the older age group of farmers. The value of past work has had a significant effect, and the best response is amongst younger men.33

The Hamilton Livestock Inspector emphasised the importance of the right approach to farmer education. Farmers should be given the opportunity to discuss the subject, and to become personally involved, he wrote: “To merely show a film, answer questions, and appeal to dog owners re offal treatment yields little of value. Better results are obtained by exhibiting a film, (preferably “This Dog is Dangerous”), giving the bare, ugly facts in a brief talk, and then inviting farmers to state their views, and evolve a plan of what they think should be done”.34

Veterinarians, livestock instructors of the Department of Agriculture, local authorities, Jaycee groups, and interested rural women’s and farmers’ groups all contributed to public education.35 In Dunedin, for example, involved groups included the Association of Veterinarians, the Kennel Club, Young Farmers’ Clubs in surrounding rural areas, and the Junior Chamber of Commerce. The latter printed and distributed its own posters and pamphlets.36

But the wave of public enthusiasm did not meet with universal approval. “Many are wanting to climb onto this bandwagon,” the Director General of Health, Dr Turbott, warned his staff in a circular on 16 May 1957. “Agricultural and Health authorities must get onto this task if you have not done so already. If you fail to act promptly, the

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31Ibid., 19 June 1957.
33N.Z.Dept. of Health Papers, 17 September 1959.
34Ibid., 29 May 1957.
35Maclean, 1964, p.28.
36Ram, 1960, p. 7.
Dr Turbott added that the Medical Research Council feared the education campaign was getting out of hand: “Apart from Plunket, Rotary etc. beginning to take a hand in districts, Agriculture and Health are undertaking the health education needed in liaison”. Although eager volunteers may have interpreted the views of officialdom as ‘sour grapes’, Turbott raised an important point. A degree of central control is desirable in any major public health campaign to avoid duplication and fragmentation.

**Voluntary eradication committees**

The significance of the neighbourhood voluntary control movement lay not so much in any direct effect the groups had on eradication, as in the signal they gave that farmers were at last ready to accept responsibility and to participate directly in prevention.

From a small beginning in Southern Hawke’s Bay in 1947, as Chapter Three described, local groups of enthusiastic farmers throughout the country during the next decade organised themselves, with the help of the Federated Farmers’ organisation, into autonomous eradication committees. These varied in size from fifty to over one hundred dog owners. The committees aimed for neighbours to provide mutual co-operation in three-monthly dog dosing and in sharing knowledge about hydatid prevention. The Government indicated its support for the groups when in September, 1957, it offered to pay a setting-up grant of £50 to every approved committee representing no less than fifty farms.

Given such encouragement, the voluntary groups expanded very rapidly during 1957-58. By 1960 as many as 500 local groups had been formed. Regional, provincial, and North and South Island committees were established to co-ordinate the work. The extent of national support for the movement was expressed in an article in the *New Zealand Journal of Agriculture* in 1959 by A.D.M.G. Laing: “By the enterprise, initiative and keenness of progressive farmers throughout the country an excellent and most promising start has been made in the difficult task of eliminating hydatid disease in New Zealand”.

An article in the *Otago Daily Times* on 29 June 1957 reflected local pride in the success of the movement:

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37 New Zealand Department of Health Circular, From H. Turbott to all MOHs, 16 May 1957, National Archives, Wellington, H1, 34/28, Hydatids Publicity 1942-59.
38 Maclean, 1964, p.31.
39 Ibid.
Never in the past hundred years have farmers done so much as they are now doing in the South to eradicate hydatids. The work done in West Otago, South Otago, Strath Taieri, Lawrence and other centres augurs well for complete success of a campaign whose momentum has been proved by Federated Farmers’ branches and such enthusiasts as Dr. Neil Begg, and Department of Agriculture vets and livestock inspectors. Every week new centres are coming into line.\textsuperscript{42}

Whilst support for the voluntary committees was nationwide, some groups performed far better than others. The quality of local leadership generally proved a critical factor in their survival. Some committees stood out in being better organised and more efficient than others. A notable example was the Hydatids Committee of the Otago Branch of Federated Farmers. Its secretary and organiser, Dr. Neil Begg, generated a great deal of enthusiasm for hydatid eradication in the southern part of the country during 1957 and 1958.\textsuperscript{43} In contrast, however, the Manawatu region reported disappointing results in June, 1957: “We have very little to show for the amount of work put into such committees. The Health and Agriculture Departments’ inspectors usually do most of the work”.\textsuperscript{44}

There were limitations to how much the voluntary committees could achieve. They worked in isolation, on limited means, and they had no power of compulsion over the inevitable small minority of farmers who were indifferent or even hostile to their aims. They had no facilities for checking on their own progress, there were no laboratory services available to examine dogs’ faecal specimens, nor were reports from freezing works either sufficiently reliable or specific to be of any value.\textsuperscript{45}

By 1958 it was clear that total eradication could never be achieved until the activities of the many voluntary committees were co-ordinated. Responsibility for this was assigned to Mr A.D.M.G. Laing of the Department of Agriculture, who became New Zealand’s first Superintendent of Hydatid Control. His appointment marked the first major step towards the centralisation of hydatid eradication under a single national authority.\textsuperscript{46}

**Re-establishment of the Hydatids Research Unit**

In the meantime members of the medical profession demanded far more vigorous research into hydatids prevention. The Dean of the Otago Medical School, Sir Charles Hercus, publicly expressed his alarm at the rising incidence of the disease in humans. Acting on his advice, the Medical Research Council decided in 1956 to reconstitute the

\textsuperscript{42}’Hydatid Campaign’, \textit{Otago Daily Times}, 29 June 1957.
\textsuperscript{43}Maclean, 1964, p.24.
\textsuperscript{44}N.Z. Dept. of Health Papers, 11 June 1957.
\textsuperscript{45}Maclean, 1964, p.25.
\textsuperscript{46}Friis, Sayers & McLean, 1967, p. 30.
Hydatid Research Committee. The role of this Committee was to re-establish the Hydatid Research Unit, which had closed down in 1951.47

The Hydatid Research Committee was instructed to: “review the whole problem, to carry out further research [through the Unit], and to advise the Government on an amended programme for control of hydatid disease in New Zealand”.48 One of the Committee’s initial functions was to “...find out the reasons for the present apathy and lack of public support of the present control methods.”49

From a very early stage disagreements were reported amongst the Committee’s members. The Secretary of the MRC wrote to the Chairman of the reconstituted Hydatids Research Committee on 21 November 1956: “The representative of the Department of Health has indicated to me that he is not in agreement that the Committee should proceed with the proposal to plan a control programme.”50

Disagreements between scientific and lay members of the Hydatid Research Committee were a constant hindrance to research in the years that followed, as Gemmell observed: “The conceptual difference between the lay and scientific members continued in its various forms throughout the life-time of the HRC. Indeed, it became more acute as time passed.”51 Lay members tended to be interested only in rapid eradication, while the scientists pleaded for time to carry out thorough long-term research into control methods.

The Chairman of the HRC (Sir Charles Hercus) wrote in June 1958 to the Scientific Advisor of the Wool Board: “We discussed the whole question of this wave of enthusiasm with regard to hydatid eradication. While this is particularly gratifying after so many years of apathy and ignorance, there is real danger that they are moving too quickly and without sound proved basis of control method”.52

In 1957 the Government and the Producer Boards jointly granted the sum of £133,058 for a five-year hydatid research programme. The re-established Hydatid Research Unit was to carry out this programme, under the direction of the Hydatid Research Committee. Mr M.A.Gemmell, a veterinary scientist from the University of Sydney, became Director of the new Research Unit on 1 January 1958. Within the next few months four additional professional staff joined the Unit. They included a parasitologist, a veterinary pathologist, and two veterinary research officers. Over the

48C.Hercus, Letter to Secretary, MRC, 10 October 1956, Item 92-044,Hocken Library, University of Otago, Dunedin.
49Anon, NZMJ, Apr. 1957, p. 139.
50Letter from MRC Secretary to Chairman of HRC, 21 November 1956, In Gemmell, 1981, P.14, Hocken Library, University of Otago, Dunedin,
next five years the number of staff grew to ten, forming a team of veterinary scientists, a chemist, a microbiologist, and two part-time medical advisers.53

The research carried out by the Hydatid Research Unit in the years that followed was never as comprehensive as the Hydatid Research Committee had intended at the time of the Unit’s re-establishment. Useful work was done on epidemiological, pharmacological and immunological aspects of the disease, but more could have been achieved by a larger staff and more generous government support. The research programme originally proposed in 1956 turned out to be too broadly based, and quite unrealistic in terms of the available facilities and funding.

Difficulties described later by Gemmell affected the Unit’s research programme from the very beginning. In Gemmell’s opinion the Unit’s structure was unsuitable for the longer term research programme required to identify and solve the very complex problem of hydatid control. The fact that funding had only been guaranteed for the first five years inevitably created difficulties with staff recruitment and retention. The Committee’s terms of reference failed to provide for the career structure or job security of the Unit’s staff. Most of the original staff came from overseas, and some left to return home after only a brief period.54

The Unit worked in cramped conditions in the Dunedin Medical School until more suitable accommodation became available. Staff must have felt some relief when the closure of the airforce base at Taieri airport enabled them to shift to this more spacious site near Mosgiel. The Chairman of the Research Committee wrote on 11 April 1957 to the Registrar of the University of Otago: “I am pleased to advise that Cabinet has approved of one half of a hangar with office accommodation on the eastern side being made available for the purpose of the research station.”55

From 1958-1970 the Unit’s laboratories and animal quarters were located in the aircraft hangar near Invermay Agricultural Research Centre. There were both advantages and disadvantages to the new location. It was convenient to be able to rear experimental sheep under cover without the risk of their possible infection from environmental sources. Also high security dog accommodation built inside the hangar permitted keeping 100 artificially infected dogs in conditions which were considerably safer than had been the case on the roof of the Medical School.56 Some of the Unit’s staff members, however, experienced anxiety about the proximity of their tea room to

52Annual Report of the NZ MRC, Year ended 31 December 1957, p.10.
54M.A.Gemmell, 'The Hydatid Research Unit, its administration and contributions to the control of hydatidosis and cysticercosis from 1934-1979 and its direction through the 1980s in New Zealand', Unpublished papers, Hydatid Research Unit Vol.1, Hocken Library, University of Otago, Dunedin, 1981, p. 16.
Plate 6. Technicians examining samples at the National Hydatids Testing Station on the Taieri Plain, 1961. Over 500,000 dog faecal samples were examined there annually.

the dogs' quarters. However, there have been no known cases of staff developing hydatid cysts in the ensuing years.

Isolation of the scientists on the out-of-town research site on the Taieri Plain soon worked to the disadvantage of the Unit. Separation from the University and the Medical School in Dunedin meant fewer opportunities for an exchange of ideas on a day-by-day basis. Scientists working on hydatid control in New Zealand also suffered in the early years from international isolation. But this was largely rectified in 1961 when a consultant from World Health Organization, C.W. Schwabe, (an international authority on hydatidosis), visited the Taieri site. Gemmell noted the importance of this event:

This started a most fruitful field of co-operation between the Unit, not only with WHO, but also through that organization with workers in many countries. Over the years, this has assisted New Zealand in directing its own research effort just as much as it has helped the Unit in contributing to knowledge to assist other countries with similar problems from hydatidosis.

In its first two years the Unit concentrated its efforts on two priority projects. The first was to develop essential diagnostic techniques for detecting the hydatid tapeworm in dog faeces following dosing with arecoline hydrobromide. The second was to measure the current prevalence of the hydatid tapeworm in New Zealand domestic animals, particularly in sheep and dogs. This base-line information was essential to the assessment of whatever control methods might be introduced in future years.

In 1959, less than two years after its formation, the Research Unit faced the challenge of becoming the National Testing Station, to which more than 2000 dog faecal samples were soon to be sent daily by Hydatid Control Officers from all over the country. Some of these specimens were found to be heavily infected with *E. granulosus* ova, and unless handled with great care, and securely packed in special containers approved for air freight, they could have constituted a serious health hazard. New diagnostic apparatus developed by Gemmell and his team for the mechanical processing of dog purges permitted large numbers of specimens to be examined for hydatids at high speed by technicians trained specifically for the job. An increase in the dog registration fee funded the work.

In piloting this valuable service the Unit provided a firm foundation for the evolving national eradication campaign. It enabled an accurate check to be maintained for the first

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57 In conversation with G.F. Laws, 13 August 1996.
58 Ibid.
time on each of the many thousands of dogs throughout the country.⁶² The object of the exercise was to identify infected dogs so that Hydatid Control Officers could re-treat them, and to provide statistical information regarding the incidence of infection in dogs.⁶³

**Formation of the National Hydatids Council**

In 1959 the Government agreed to support a more co-ordinated approach to the hydatid problem. Until now this had been lacking. The voluntary committees on their own would never achieve full control, claimed the Chairman of the Wairarapa Control Council, Mr L.A. Cameron, in a letter to the *Otago Daily Times*: “Many men who are enthusiastically trying very hard to persuade their neighbours to actively fight the disease would welcome a conference at a central point to formulate a scheme which could be universally adopted”.⁶⁴ Similar views were expressed by the Livestock Instructor at Kurow, who wrote to the Livestock Superintendent, Dunedin, on 29 September 1957: “The problem should be attacked on a national scale with perhaps a lead from the Agricultural Department, and not left to Local committees. We are rapidly losing any headway we made”.⁶⁵

The Hamilton Health Education Officer agreed on the need for central control:

> At each meeting, farmers revealed their limitations in carrying out the remedy, and openly admitted failure. They all felt it needed drastic measures to eliminate the disease absolutely. Co-operative, educational, group schemes may attain a degree of success, but without a national independent body to organise, control and employ men more frequently and regularly to dose dogs, complete eradication would never be accomplished.⁶⁶

Finally the almost simultaneous action of two influential rural organisations forced parliament to take action. Delegates at the Annual Conference of the N.Z. Counties’ Association, many of them farmers, unanimously resolved in June, 1958: “That county councils accept responsibility for the administration of the control and eradication of hydatids when a nationally approved scheme is evolved.” A month later the Dominion Conference of Federated Farmers passed a resolution stating the urgent need for a national hydatid control authority. Federated Farmers also voted in favour of a special tax on all its members of £1 per dog per annum expressly for hydatid control. This amounted to an offer to the Government equivalent to NZ$600,000 every year as a

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⁶²Maclean, 1964, p. 35-6.
⁶³Friis et al., 1967, p.33.
⁶⁵New Zealand Dept. of Agriculture Files, 26 September 1957, National Archives, Dunedin, AG1, 66/5/2.
⁶⁶New Zealand Dept. of Health Files, 14 June 1957, National Archives, Wellington, H1, 34/28.
contribution to an official campaign - a substantial sum in a small country in 1958, and an offer no government could refuse.\textsuperscript{67}

The Government took action without delay. In little more than twelve months the necessary legislation (the Hydatids Act 1959) had been drafted and enacted; a central authority, the National Hydatids Council, was established; technical officers were trained, and a pilot national testing station was set up, as I have already mentioned, as part of the Hydatid Research Unit on the Taieri site.\textsuperscript{68}

The passing of the Hydatids Act 1959 laid the foundation for an organised national scheme of hydatid action. The Act provided the official basis for effective action which previously had been lacking. It ensured adequate funding for the campaign, and it created a structure for effective central and regional control. Above all, it introduced tougher penalties for dog owners who persisted in feeding or allowing their dogs access to raw offal. Hydatid Control Officers now had the authority to quote the Act to the small number of dog owners who were still hostile or indifferent to the regulations.\textsuperscript{69}

What the Act failed to do was give the National Hydatids Council the power to enter abattoirs to inspect sheep carcasses.\textsuperscript{70}

The National Hydatid Council met for the first time on 10 December 1959. Its nominated members were mainly voluntary, and included farmers and representatives of various community groups and official bodies. The Council’s role was to formulate overall policy for the control and eradication of the hydatid parasite, and to delegate the responsibility for day-to-day practical matters to local organisations on a regional basis.\textsuperscript{71}

In its early years the NHC attempted to operate regionally through the existing network of farmers' voluntary committees. But by 1959 the number of these had grown to over 800, some functioning less efficiently than others. Not surprisingly the NHC soon encountered major administrative difficulties in what must have been a bureaucratic nightmare. In 1960 the National Council decided, perhaps unwisely, to disband the voluntary committees, and to entrust its regional operations to the local authorities, who were already responsible for dog registration and dosing. The local authorities agreed, and grouped themselves into 85 Hydatid Control Authority Groups to cover the entire country. This number later increased to ninety-three.\textsuperscript{72}

The NHC ran into difficulties almost immediately by permitting each regional authority to develop its own Hydatid Control Plan. The First Annual Report of the NHC acknowledged the difficulties of dealing with 85 separate organisations, each

\begin{itemize}
\item \textsuperscript{67}Maclean, 1964, p. 34.
\item \textsuperscript{68}Ibid., p.37.
\item \textsuperscript{69}Ibid.
\item \textsuperscript{70}M.A.Gemmell, Interview with the author, 17 February 1997.
\item \textsuperscript{71}Friis et al., 1967, p.84.
\item \textsuperscript{72}Ibid.
\end{itemize}
operating its own local scheme. The National Hydatids Council suffered from a major structural weakness in having no real powers to ensure that its policies were executed locally. Nor was it able to co-ordinate the efforts of the individual regional authorities to whom it delegated its practical responsibilities.

Each local authority employed its own team of specially trained technicians, or Hydatid Control Officers, to dose all dogs over six months of age, usually at central points known as dog dosing strips. HCOs were responsible for collecting individual faecal samples and sending these as described earlier to the National Hydatids Testing Station. There they were examined for evidence of parasitic infection. Positive results were reported to the local Hydatid Control Officer, who re-dosed infected dogs until they showed negative test results. HCOs were also responsible for educating dog owners “by all known means of extension activities”, which included a programme of farm visits and inspections.

In effect Hydatid Control Officers “took over the work of an army of amateur voluntary workers who had initiated the campaign,” as Neil Begg wrote nostalgically in his autobiography, *The Intervening Years*: “Initially we began our campaign [in 1957] without money, or prospect of financial support or government subsidy.” Begg regretted the displacement of the voluntary control movement:

> In 1960 and 1961, many of the voluntary committees, feeling that without real participation they no longer served any useful purpose, went out of existence. There seems little doubt, however, that the health education and the motivation provided by these voluntary committees played an important part in the reduction of the disease in human beings.

It was unfortunate that the eradication campaign lost so much local involvement and goodwill. Many leading New Zealand farmers felt disillusioned and let down by the abrupt disbanding of the voluntary committees, as Beard observed:

> These people had tasted power, they had obtained reform through their own efforts, and they had had expectations of a continuing role and responsibility in a national programme. But with the transition of power to a new statutory authority they were suddenly made to feel redundant. Almost overnight, the status of their contribution was reduced to that of token participation.

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74Friis et al., 1967, p. 84.
75Ibid., p. 33.
77N.C.Begg, *The Intervening Years: A New Zealand account of the years between the last two visits of Halley’s Comet*, Dunedin, 1992, p.104-5.
Evidence of progress

Evidence from the Medical Statistics Branch showed that hydatid disease in humans was less common in 1964 than it had been a decade earlier. The rate of incidence in 1953 was 4.8 per 100,000 of the New Zealand population, but by 1964 the rate had dropped to only 2.4 per 100,000. The reduction was most marked in younger age groups. In children under the age of fifteen there were one-quarter the number of cases reported in 1964 compared with ten years earlier.80

The highest levels of incidence of the human disease were reported at this time in specific areas such as the Rotorua and Gisborne districts.81 Friis and his colleagues reported to Parliament in 1967:

All the evidence suggests that as far as human beings are concerned, hydatid infection is less common than it was. The decrease, as one would expect, is most marked in the younger age groups. Infection is predominantly rural in origin and is relatively much more common among Maoris than among Europeans. Areas where the human infection rate is high can be correlated with areas where canine infection persists at a high level.82

From 1964 a distinct downward trend was reported from most areas in the percentage of infected dogs, for which accurate figures could now be issued as a result of routine diagnostic procedures carried out at the National Testing Station.83

Back in the 1930s the majority of dogs on New Zealand's sheep farms were almost certainly infected with E.granulosus. In the 1950s probably one in three working dogs harboured the parasite on farms where preventive measures were not taken, compared with only one in ten where control was practised. But by 1964 fewer than 2% of all New Zealand dogs were found to be infected, representing remarkable progress for the country overall within a single decade. But in a few impoverished regions where farming profits were marginal, and where a high proportion of the rural population was Maori, little or no progress had been made.84

Such a dramatic reduction of infection in most of the dog population was probably due to the combined effects of improved farm hygiene, the work of the voluntary farmers' committees, the compulsory testing of dogs, and the diagnostic services of the National Testing Station. But Maclean warned in March, 1962, that one dog in eighteen continued to have access to raw offal, and could become infected or reinfected with hydatids at any time.85

82Friis et al., p. 51.
83Ibid., p.56.
84Ibid., p.44.
85Maclean, 1964, p.46.
The rate of infection in New Zealand adult sheep was rather slower to fall than in dogs. In 1958 as many as 80% of adult ewes were infected with parasitic cysts (although some of these were probably harmless to humans). By 1964 this figure had dropped to 46%, and by 1971 to 25%.86

Great strides had been made in a matter of a few years. The majority of farmers were now relatively well acquainted with the hydatids problem, and most were willing to cooperate with control measures. The Hydatid Research Unit had made a very valuable contribution in establishing an efficient national diagnostic and surveillance centre. And a national Control Authority had been established, and was moderately well accepted by most New Zealanders. But eradication would probably have been achieved more rapidly had there been more involvement at this stage by the Department of Agriculture.

Chapter Five

“A policy of drift”: Disenchantment with the National Hydatids Council 1965-1991

The present chapter examines the slow but nonetheless steady progress towards hydatid eradication made in New Zealand during the three decades that followed the establishment in 1959 of the National Hydatids Council. By the early 1990s human hydatid disease was virtually extinct in this country, and the Government decided to abolish the NHC as part of a policy of ‘administrative reform’ which resulted in the close down of a number of older quangos. Following the disestablishment of the NHC in 1991 the Ministry of Agriculture and Fisheries became fully responsible for maintaining control of *E.granulosus* in this country.

Meanwhile, throughout the period 1958-1988 the Hydatid Research Unit on the Taieri Plain performed an important scientific role. The Unit always remained entirely independent of the National Hydatids Council, which was based some distance away in Wellington. It was a curious anomaly of the time that the New Zealand Government decided in 1959 to set up a new administrative body, the NHC, (whose members were mainly lay people) to plan and develop a national hydatid control programme, while a second and quite separate organisation, the Hydatid Research Unit, (consisting mainly of scientists), simultaneously carried out a research programme designed to investigate methods of controlling the same parasite. “Indeed”, Michael Gemmell observed, “research information was rarely used by the Control Authority”, and what is more, “the scientists had no real knowledge of field events. There was very little contact between the professional scientists and the control movement”.1

Had there been better communication and interchange of ideas the hydatid problem might well have been resolved sooner, and at a lower cost. Scientists of the Hydatid Research Unit were aware, for instance, that the introduction by the NHC in 1972 of a six-weekly dosing programme for ‘at risk’ dogs was irrelevant to the eradication of *E.granulosus*. But they were rarely consulted on policy matters by the Council, and the dosing regulations remained unchanged, (apart from the specific drugs used), until 1978.2

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1M.A.Gemmell, ‘Brief summary of the events that led to the establishment of the hydatid research unit and an assessment of its contribution to the national control programme and to world health’, in Hydatid Research in New Zealand, Vol. 5, 1989, p. 3. Hocken Library, University of Otago, Dunedin.
2M.A.Gemmell, In conversation, 17 February 1997.
The latter part of the chapter describes how the Hydatid Research Unit underwent a difficult and prolonged transition period from medical to agricultural administration between 1964 and 1973. Overall control of the Unit was then logically transferred from the Medical Research Council to the Ministry of Agriculture.3

During the 1980s, following its transfer to MAF, the Research Unit gained an international reputation for its innovative work on the transmission dynamics of the hydatid family of parasites. Under the direction of Michael Gemmell, this small group of scientists succeeded in its final decade in bringing together the research work of the previous thirty years, namely work applicable to world health problems associated with the hydatid group of parasites.4 Nevertheless the Unit was disestablished in 1988, a casualty of funding cuts and restructuring within the Ministry of Agriculture.5

**The National Hydatids Council: Thirty years of controversy**

In an earlier chapter I described how a vocal sector of the New Zealand public clamored in the late 1950s for more positive government action to rid the country of hydatids, and how politicians agreed in 1959 to introduce a national eradication campaign. But the Government faced a dilemma. At this time, according to Beard, New Zealanders tended to regard compulsion through legislation as unpalatable, “as an unenforceable relic of the past. The mood of the electorate precluded any take-over by an existing government department - even by such a well-regarded institution as the New Zealand Department of Agriculture”.6

Rather than resorting to potentially unpopular and unenforceable legislation to prevent dog owners from feeding their dogs with raw offal, the Government of the day attempted to gain the goodwill and co-operation of farmers and other dog owners by adopting a softer approach. In line with this, the Government decided to set up a newly conceived, semi-autonomous and largely voluntary Control Authority, the National Hydatids Council, whose function was: “To lead and co-ordinate those engaged in eradicating hydatid disease”.7

At the time this essentially democratic decision may well have been politically prudent, but it probably delayed hydatid eradication by at least a decade, possibly even longer, in the opinion of Gemmell. In contrast, a far more aggressive campaign involving compulsion and legislation succeeded during the 1960s in largely ridding

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5M.A.Gemmell, In conversation, 17 February 1997.
highly infested Tasmania of the disease within little more than ten years. But Beard believes that a more aggressive approach would probably have failed in New Zealand, where a somewhat different philosophical attitude towards bureaucratic intervention prevailed.

Despite the Government’s efforts to placate the New Zealand electorate by establishing the largely autonomous National Hydatids Council, many of the NHC’s original supporters regarded its performance as disappointing by 1965, some going so far as to claim that the national campaign had failed. But perhaps public expectations of the Council were unrealistic. Probably, too, “the national control campaign had been implemented in 1959 without adequate knowledge of the requirements to launch and sustain it”, as Michael Gemmell observed some years later.

Apart from Iceland’s campaign to eradicate hydatids under quite different conditions a century earlier, New Zealand pioneered the first modern programme to control human hydatid disease. In 1959 the newly established National Hydatids Council had no precedents to follow. “Any entirely new bureaucracy,” in Beard’s view, “is incapable of swift action.” Consequently “the momentum of the campaign suffered an unforeseen setback, with a public perception of 12 months of stalemate and anticlimax”. Had the well-regarded, Taieri-based National Hydatids Testing Station not given the NHC some much needed credibility in these early years, Gemmell believes the national campaign would have collapsed.

Looking back some twenty years later, Begg recalled that the transition in the late 1950s from voluntary to national hydatid control had indeed been “painful”. By 1982, however, Begg felt able to write: “the National Hydatids Council has worked effectively against the disease.” Medical statistics did indeed indicate that the number of new cases of human hydatid disease in New Zealand dropped dramatically from about 1960. For the period 1963-1967, the total five year incidence of the disease had halved compared with the period 1953-1957, and the number of new cases continued to decrease in subsequent years.

Such a remarkable improvement could hardly have resulted solely from the efforts of the National Council, which had, after all, been in existence only since 1959. It seems likely that the dramatic reduction in the number of recorded cases of the disease from

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9Ibid., p.7.
12Beard, 1995, p.5.
15Ibid.
the early 1960s was more closely associated with the marked expansion of the local voluntary eradication committees a few years earlier, and with the resulting attitude change towards hydatid control in New Zealand’s rural community.16

Some farmers, however, continued to resent what they perceived as “popular condemnation of the farmer” for his “ignorance” concerning hydatids. This was evident in a letter published by the Otago Daily Times in 1965: “We [farmers] know all we need to know about hydatids, and research could be discontinued”.17 A stinging reply was published by the paper a few days later: “I suggest that ‘we’ visit the Hydatid Research Station and tell the experts there all about it and spare New Zealand much expense. Further, the hydatid research stations in Alaska, the U.S., Lebanon and S.America would welcome a visit from ‘we’, and no doubt the WHO would be interested”.18

The positive attitude to hydatids education revealed by a medical student’s survey of farmers was probably more typical of the times. In 1966 G.D.Watson found that seven out of eight farmers had a “good” knowledge of the hydatid life-cycle and methods of prevention. Indeed some had ‘extensive’ knowledge. Their most popular source of knowledge was the NZ Journal of Agriculture, followed by pamphlets given them at dog dosing and registration, while younger farmers said they had learned about hydatids in school biology classes.19 Another student, B.Teviotdale, at much the same time noted that “all” the farmers he questioned had a good understanding of the effect of hydatids on animals, but nine out of fifteen were uncertain about the human disease. Younger farmers under the age of fifty-five had more knowledge than older ones, saying they had learnt most from their local Dog Dosing Officers.20

No doubt the generally well-respected group of Hydatid Control and Dog Dosing Officers made a significant contribution to farmers’ more positive attitudes from the early 1960s, when HCO’s field work started to give them daily contact with a cross section of dog owners.21 But this occupational group always faced the dilemma that their livelihood depended upon the survival of the hydatid parasite. Eradication had inadvertently become a self-sustaining industry. However sincerely these men may

16T.C.Beard, ‘Evidence that a hydatid cyst is seldom “as old as the patient”’, The Lancet, July 1, 1978, pp.30-32.
17J.R.Davis, Correspondence, Otago Daily Times, 24 February 1965.
18Anon., Correspondence, Otago Daily Times, 1 March 1965.
have believed in the campaign, some must have felt disheartened that success in their work would eventually put them out of their jobs.22

Government officials in 1959 made an unfortunate blunder in under-representing the farming community on the original National Hydatids Council, as Begg observed:

Although the ad hoc committee, itself appointed in 1958 to advise the government on the setting up of a permanent Council, had consisted largely of farmers from Federated Farmers Hydatids Committees or County Councils, its composition changed as it moved through government and parliamentary committees. The Minister of Agriculture eventually welcomed eleven members to the permanent National Hydatids Council, only one of whom was an active farmer. Not surprisingly, rural interest soon began to wane, and the first wave of enthusiasm and goodwill was never fully regained.23

Some of the lost ground was retrieved, however, when the Minister of Agriculture wisely nominated a well-regarded South Otago farmer, Mr Tom McCristell, as Deputy Chairman of the first National Council. McCristell had previously been one of the original Federated Farmers Hydatid Committee members, and a prominent figure for several years alongside Dr. Neil Begg in promoting the voluntary committees movement in the South Island. McCristell’s election in 1962 as Chairman of the NHC ensured that a degree of continuity was re-established. He continued to serve with distinction in this position for almost thirty years, until his retirement in 1988.24

Notwithstanding McCristell’s stabilising influence, many farmers saw the NHC as “out of touch”, according to Neil Aitken, who opposed the Council’s policy of dosing all dogs. He wrote to the Otago Daily Times in 1966:

Mass dog dosing has contributed very little to the reduction of the incidence of hydatids (except for the good psychological effect of showing up defaulting dog owners). It may well be contributing to the dissemination of ova, adding to the health hazards, through the congregation of men and infected dogs on the strips. Control Officers would be better employed in: 1. Finding unregistered dogs, 2. Rounding up strays, 3. Doing farm inspections, particularly of those with persistent hydatid infection, and 4. Intensifying educational propaganda in the care, feeding, and control of dogs.25

The NHC’s non-discriminating dog dosing regulations also aroused the wrath of town dog owners in the 1960s. Maclean suggested several reasons for urban opposition to the new dosing procedures. In the early days of hydatid education the farmer had been the chief target, and town dog owners thought as their dogs did not normally come into close contact with sheep it was unlikely that they would pick up the parasite. Owners of pet dogs were also more likely to be emotionally affected by compulsory

22M.A.Gemmell, 1989, p.2.
24Ibid.
dosing. The greater age and often inferior physical condition of many pet dogs made them more vulnerable to the health hazards of stringent purging. Maclean reported that the hydatid control authorities met with a considerable amount of opposition from urban dog owners at the first round of dog dosing. This opposition intensified after the widely publicised unfortunate deaths in the city of Christchurch of three pet dogs which had been exposed to the sun on a dosing strip for several hours on a hot summer's day.26

But the NHC did have some justification for insisting on universal dosing in the early years of the campaign. At the time, purging dogs with arecoline hydrobromide was considered to be an effective means of ridding infected dogs of hydatids. The limitations of arecoline for either diagnosis or treatment were not recognised until a few years later.27 Town dogs, as Maclean observed, were clearly not exempt from hydatid infection, and indeed could be the means of causing hydatid disease in humans. Unsupervised urban dogs were known to have contracted the parasite by scavenging infected carcasses from butchers' yards or from unfenced city abattoirs.28

In an effort to reconcile the owners of pet dogs to the dosing regulations, the Minister of Agriculture ensured that the New Zealand Kennel Club was represented on the National Hydatids Council. The Kennel Club's support for the eradication campaign gradually changed the attitude of town dog owners, who came to accept their obligation to co-operate with the control authorities.29

A contributor to the *New Zealand Medical Journal* attacked the National Council's policies, describing the dog dosing regulations as "the result of misplaced enthusiasm, reflecting a lack of understanding of the basic problem, namely that hydatid disease, human and animal, is primarily a problem of the farming community".30

Two underlying problems, according to this article, handicapped the National Council, namely its lack of central control and of adequate funding. The writer hinted that members of the NHC were naive in a scientific sense: "Ignorance of the hydatid tapeworm's life-cycle and its implications have led many well-intentioned persons to support the adoption of measures unlikely to eradicate the disease".31 The article agreed with Aitken that universal dog dosing to include city as well as rural dogs was unnecessary, and placed a needless strain on the NHC's limited resources of money and trained personnel. The writer doubted the efficiency of dosing performed by inexperienced Hydatid Control Officers, who were drawn, he claimed, from any

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27 J.N. Aitken, In conversation, 26 September 1996.
29 Ibid.
31 Ibid., p.622.
occupation and given only a brief training. The NHC was weakened, he added, by delegating its powers in the field to local authorities.\textsuperscript{32}

The only solution to the hydatids problem, the article argued, was to break the tradition on New Zealand farms' of home-killing and feeding sheep offal to dogs. The writer held that present NHC policy over-emphasised dog dosing - which had proved to be of very little benefit to long term control of the parasite - rather than concentrating on the prevention of dogs' infestation. The Minister of Agriculture, argued the article, should compel dog owners to feed their dogs on commercially prepared products, although the writer realised this would inevitably raise some opposition.\textsuperscript{33}

The article concluded that more hydatids education was essential within the farming community, and that the blame for the continued high infestation in farm animals still rested on farmers' shoulders. But surely, in 1967, such ideas tended to be out-dated? This article merely repeated what had already been said countless times since hydatid education had first been advocated by Sir Louis Barnett and his colleagues almost half a century earlier.

Neil Begg responded to the article, disagreeing strongly with many of the statements and deductions made by the writer. Begg pointed out that efforts had been made in New Zealand from as long ago as 1887 to control hydatids. But legislative measures had always failed, he pointed out. Little progress had been made until 1957, when the farming community had mobilised itself in an effort aimed primarily at reducing the incidence of hydatid disease in children. Begg reminded readers that, within three years, almost 800 voluntary rural committees had been formed, largely by farmers themselves, and that the work had been financed mainly by Federated Farmers. Moreover farmers had themselves made and tested an artificial, treated dog food, and devised ways of destroying offal and carcasses and heat-treating meat used for feeding dogs. Begg was convinced that the majority of farmers had by this time made an attempt to achieve dog control. Many had designed better dog kennels, he argued, and most farmers currently aimed to stop their dogs from eating raw offal.\textsuperscript{34}

Begg described as "unfortunate" the decision made by the Minister of Agriculture in 1960 to disenfranchise the voluntary committees so soon after the establishment of the National Hydatids Council.\textsuperscript{35} Yet he, with many other prominent figures concerned about the human suffering resulting from hydatid disease, had lobbied for central control in the late 1950s. Perhaps he and others had failed to anticipate in 1959 that a national Control Authority would find it difficult to co-exist with the high profile network of enthusiastic local volunteer groups, and would prefer to adopt the more

\textsuperscript{32}Ibid., p.623.
\textsuperscript{33}Ibid.
\textsuperscript{35}Ibid.
bureaucratic approach of delegating practical aspects of the campaign to the paid employees of local authorities.\textsuperscript{36}

"The hydatid battle is failing", claimed an article in the \textit{New Zealand Truth} in March 1965. "The anti-hydatid campaign has bogged down. The time has come for the National Hydatids Council to have a hard look at its campaign and the way it is being waged by local bodies."\textsuperscript{37} The article explained how the NHC set the overall policy of campaign, whilst field operations were the responsibility of local authorities, who collected special hydatid control fees from dog owners, and employed hydatid inspectors. In the writer's view, the NHC should have been expanded to control all operations. \textit{Truth} urged the NHC to have a look at its relationship with farmers and other dog owners in New Zealand. The NHC, it argued, mistakenly gave the impression that mass scale dog dosing would eventually rid the country of hydatids. In reality dosing was merely a diagnostic test to uncover farmers who had been feeding their dogs raw offal or infected meat. "If the law against farmers feeding dogs raw offal was totally enforced by local bodies, hydatids could be eradicated in New Zealand in three years".\textsuperscript{38} But the writer did not suggest how this might be done.

Another critic claimed that "Hydatid dosage of dogs in cities was of little value when many farm dogs were not being dosed, and when the feeding of raw offal to working dogs continued on a number of farms. There was far too much emphasis on dosing, which had often been carried out more efficiently in city areas than in the country".\textsuperscript{39} Another indignant writer claimed that:

It was unfair to charge city dog owners an annual £1 dosing fee for a single yearly dosing, when many farmers were charged only four shillings a year for two or three dosings. Some farmers deliberately did not register all their dogs, and only took some of their dogs to the dosing strip. Yet 98% of people who contracted hydatid disease came from farming areas. Furthermore, city dog owners had been shown to be more liable than rural owners to prosecution for breaches of hydatid regulations.\textsuperscript{40}

In 1963 in the city of Christchurch, where incidence of the disease was low, and where 4,425 dogs were tested, as many as 55 prosecutions were made for failure to present dogs for dosing. But in the same year in rural Southland, where incidence of hydatid disease was high, and where authorities had dosed and tested over 12,000 dogs, (nearly three times as many as in Christchurch), there were no prosecutions.\textsuperscript{41}

Critics claimed that the NHC was weakened by permitting each local authority to operate its own approved individual scheme. In effect, 93 different local schemes were

\textsuperscript{36}J.N.Aitken, In conversation, 26 September 1996.
\textsuperscript{37}Anon, 'Hydatid Battle Failing', \textit{NZ Truth}, 10 March 1965.
\textsuperscript{38}Ibid.
\textsuperscript{39}Anon, 'Dog Owners prepared to face imprisonment', the \textit{Otago Daily Times}, 14 May 1965.
\textsuperscript{40}\textit{NZ Truth}, 10 March 1965.
\textsuperscript{41}Ibid.
eventually in operation throughout the country. Some inevitably functioned less well than others. A standard scheme should probably have applied to all regions.42

A particular scheme in the Nelson region so angered local farmers, the Otago Daily Times reported in May, 1965, that: “Many dog owners in the Waimea County are prepared to go to gaol rather than conform to the requirements of the county council on hydatid strip dosing”. Opposing farmers felt driven to boycott strips, the article continued, but Federated Farmers called a truce to enable the local authorities to carry on with dosing. The Waimea scheme had evidently been approved by the NHC, but some local dog owners opposed it. The Otago Daily Times on this occasion backed the authorities, warning the rebels: “Dog owners must keep in line”.43

In contrast, another report suggested that “most” farmers had no objection to compulsory dosing. Probably this was indeed true of the majority of farmers after they had become accustomed to the new procedures. One commentator in 1964 remarked that farmers “regarded a trip to the dosing strip as a social occasion”. Of twenty farmers surveyed by McKinnon, a fifth year medical student, thirteen said they had no objection to compulsory dosing, while the remaining seven expressed some concern for the effect on the health of their dogs. All preferred dosing to be carried out at a strip rather than on the farm, and all but one favoured prosecution of an owner who either failed to dose, or whose dog was repeatedly found to be infected when tested for infestation.44

Tom Mc Cristell, the Chairman of the NHC, felt that the public generally approved of the campaign, despite some anomalies. He claimed in 1965 that “it had secured the voluntary co-operation of people regarding methods of eradicating the problem.”45

There was concern, however, about the hygiene of dosing strips. An editorial in the Otago Daily Times proposed that: “The siting of dosing strips should be approved by local Medical Officers of Health, and the Ministry of Agriculture should be called in for advice. Some £300,000 per year is being spent on this campaign, and the money is not being spent to best purpose”. The article concluded that a review of the campaign was needed.46 The National Hydatids Council had “a policy of drift”, according to “A visitor from Scotland”, who wrote in the Otago Daily Times of 13 May 1965:

The Department of Health should take a much more responsible attitude to the hygiene of the campaign of the National Hydatids Council. Dosing strips are not always easily recognised, and the sitting and condition of many is unsatisfactory. They should have a concrete base, and be regularly disinfected with flame throwers. One we passed near Nelson had signs of having been used by at least

42Friis et al, 1967, p. 84.
43Otago Daily Times, 14 May 1965.
46Anon, Editorial, the Otago Daily Times, 20 February 1965.
two recent picnic parties, with soft drink and beer bottles left lying around. We counted fifty three sheep carcasses near the roadside while we were driving in the South Island. And we were horrified by the number of unaccompanied dogs in towns, on the edge of towns, and in the countryside.47

The National Hydatids Council was well aware that not everyone was happy about the outcome of the campaign. Some members of the Council were indeed reported in 1964 as admitting that progress so far had been disappointing, and that policy changes should be made. An article in the *New Zealand Journal of Agriculture* expressed members’ concerns:

> After five years organised effort to eliminate hydatids the National Hydatids Council considers that the incidence of the disease is far higher than it should be, and has decided that in future hydatids control authorities will concentrate more on farm inspections and redosing of infected dogs. More emphasis will be placed on giving dog owners a full knowledge of hydatids and of stressing their responsibility to keep their dogs free of infection.48

Some local authorities at about this time introduced several practical steps to improve dog control and management in the vicinity of freezing works. An article in the *New Zealand Journal of Agriculture* described efforts to upgrade the housing of working dogs. In some areas large new kennel units were designed and built to house as many as sixty working dogs. These, it was hoped, would prevent straying and reduce the spread of hydatids.49

Despite indications that some progress had been made, fear of hydatids continued to cause concern throughout the 1960s. The National Hydatids Council’s Chief Veterinary Officer, George Thomson, pleaded with the public “to support and co-operate in a campaign to rid New Zealand of a disease which causes needless suffering and serious economic loss.” He reminded readers that between five and ten people continued to die each year from hydatids, another 100 required hospital admission and surgery, and the meat export industry was losing between one and two million pounds annually as a result of rejected sheep and lamb livers.50 Government statistics supported his message, but it did not reassure critics of the NHC’s policies.

By mid-1965 public dissatisfaction with the handling of the problem was increasing. “The National Hydatids Council’s eradication scheme, which began in 1959, had achieved a considerable measure of success over its first three years,” reported the *Otago Daily Times*. “But it has ‘levelled out’ since 1962. The Council has asked for

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amended legislation to bring unco-operative dog owners into line, and for an increase to £50,000 of its current £35,000 government grant”. Extra funding was needed, claimed the report, to assist local bodies in “difficult” areas. The Meat Producers Board agreed to grant the Council a once-only sum of £10,000, but wanted an assurance that the government would provide additional assistance on an annual basis. Politicians were unenthusiastic. Before any decision could be made to increase government funding, MPs demanded a full parliamentary inquiry into the eradication campaign.51

This suggestion was resented by members of the NHC. Peter Scott, an objecting member, claimed that the proposal to investigate the hydatid campaign amounted to a vote of no-confidence in the Council. “It might create doubts in the minds of dog owners regarding hydatid eradication,” Scott argued. “I say, without hesitation, that it can be eradicated, but it requires the sympathetic help of the Government and local authorities, with the NHC and the research centre at Taieri acting in an advisory capacity.” “The Minister”, Scott added, “has fallen down on the job, not the NHC. He has questioned ove: six years of voluntary work by men of the highest integrity”.52

The controversy continued. But on 29 June 1965 the Minister of Agriculture, the Honourable Brian Talboys, over-rode objections to an inquiry by appointing a three-man committee with the following Order of Reference:

To inquire into the present scheme for the control, prevention, and eradication of hydatids as established in terms of the Hydatid Act 1959, related research, and other relevant matters; and to make appropriate recommendations for any improvement considered desirable and practicable.53

The members appointed were Mr A.L.Friis, a farmer and Member of the New Zealand Dairy Board, Sir EJward Sayers, the Dean of the Otago Medical School, and Professor J.W.McLean, the Head of the Veterinary Department at Lincoln College. During the course of its two year inquiry the Committee consulted a very wide range of individuals and organisations. Its admirable and exceptionally well documented report was finally presented to the House of Representatives in June, 1967. Gemmell described the report in glowing terms:

This report is perhaps the most comprehensive investigation ever undertaken on on-going hydatidosis and cysticercosis control and research programmes. It should serve as a model for other control and research authorities with similar problems of administrative structure, function and funding.54

51Anon, ‘Hydatid Scheme the subject of Inquiry’, Otago Daily Times, 30 June 1965.
52P.Scott, ‘Hydatid Investigation a Vote of No-confidence’, Otago Daily Times, 1 July 1965.
The more important conclusions of the Committee were that the eradication campaign had produced worthwhile results, and that "a continuation of the existing programme, with some modifications, could be expected to maintain a downward trend". But the Committee had some reservations concerning the overall rate of progress, which it believed under the present circumstances was likely to be slow. "It appears highly desirable to introduce changes with regard to both procedure and organisation if the objective of effective control is to be attained in the near future".\textsuperscript{55}

Three somewhat dramatic recommendations were made by the Committee: first, that local authorities should be relieved of their obligations under the Hydatids Act; secondly, that the National Hydatids Council should be disestablished; and thirdly, that the administration of the control campaign should be transferred to the Department of Agriculture, which should become the Central Control Authority. Field aspects of the programme should be operated by the Animal Health Division of the Department.\textsuperscript{56}

The tragedy of the Inquiry in terms of the future of the campaign, wrote Gemmell, was that "these recommendations were completely unacceptable to members of the NHC, some of whom had sufficient political influence to dissuade Parliament from acting on the advice of its own Committee of Inquiry".\textsuperscript{57} It was to be another twenty-four years before either the NHC was finally disbanded or full responsibility for hydatids was handed over to the agricultural authorities.

Legislation passed in both 1968 and 1982 strengthened rather than diminished the powers of the National Hydatids Council. In both Acts passed in these years the Council's general objects, functions, and scope remained largely unaltered. The 1968 Hydatids Act increased the Council's funding to $120,000 per annum; it ordered that a new Hydatid Control Authority be set up in every Hydatid Control District; it increased the penalties for dog owners who failed to comply with the dog regulations, and it required all Hydatid Control Officers to hold a recognised qualification. Both Acts reaffirmed the role of HCOs to inspect, examine, and treat any dog for hydatids. New clauses were added to the effect that any dog owner who fed raw offal to dogs now became liable for a fine of up to $400; any farmer who knowingly left the carcass of an animal lying in the open, or who enabled a dog to have access to raw offal could be fined up to $200; and anyone failing to co-operate with a Hydatid Control Officer or obstructing him in his duties was liable to a fine of up to $100.\textsuperscript{58}

A small minority of farmers continued to disregard the regulations. Some were prosecuted. A striking example was reported in the Wellington \textit{Evening Post} in May, 1974 under the heading: 'Farmer too tired to bury sheep - son infected'. The article

\textsuperscript{56}ibid., p.93-4.
\textsuperscript{57}M.A.Gemmell, Personal correspondence with author, 24 August 1996.
described how the Waikato County Council had prosecuted a local farmer, who was fined $300 by the Court on two charges of leaving sheep carcasses lying in the open. This farmer had “the worst hydatid control record of any in the whole county. On two occasions when a hydatid officer had visited the defendant’s farm after receiving complaints, offal and raw carcasses were found within easy access of dogs”. The article reported that the farmer’s son had recently been admitted to hospital with a hydatid cyst. Yet the farmer tried to excuse himself to the Court, claiming “he was too tired and didn’t have time to bury carcasses”. When a covered hole in the ground had been suggested by the HCO, he had replied “that was a waste of good farm land”.59

In effect the Hydatid Act of 1968 belatedly gave Hydatid Control Officers the powers they had lacked for so many years to enable them to bring the occasional unco-operative dog owner into line. Long overdue legislative measures gave the local authorities an opportunity to curb farm practices which had for so long delayed hydatid control.

But the National Hydatids Council reported in 1973 that its field work was still impaired by lack of sufficient field staff and funding. “At no time has it been possible to get all dogs dosed and tested at the required intervals or after infection has been found, to get the maximum follow-up with inspection of property and facilities and effective dog owner education”.60

Moves were consequently made in 1974 to remedy some of these shortcomings. The NHC’s technical and administrative services were now merged with those of the Head Office of the Ministry of Agriculture and Fisheries in Wellington. MAF technicians now staffed the National Hydatids Testing Station at Invermay, which had been independently operated by the NHC since 1961. The appointment of an additional team of senior Regional Veterinary Officers, one in each of the country’s six main centres, expanded the NHC’s existing Field Advisory Service. Under their direction seven new Field Advisory Officers (Hydatids) were appointed, each with responsibility for a specific region where the prevalence of hydatids was high. They in turn were directed to supervise and support a local team of Hydatid and Dog Control Officers.61

Between the early 1960s and the late ‘80s the number of Hydatid Control Officers employed nationally almost doubled, increasing from 121 in 1962 to 233 by 1989.62 Dr H.B.Turbott spoke on the radio in 1974 of the hydatids campaign as if it were a military operation. “News from the hydatid battlefront in the form of the National Hydatids Council’s annual report for 1973 indicates that the war is still on. There is advance on both city and farm fronts”, Turbott told listeners, “but there is still territory

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61 New Zealand Dept. of Agriculture Papers, 6 December 1974, National Archives, Wellington, AG1. 20354, Vol. 23, Hydatids: General, 1974-76.
to be won. There is therefore to be an all out attack.” In the future, Turbott continued, working dogs would be required to go onto a six-weekly dog treatment programme. The Government was prepared to meet the costs of the drug, but owners would have to pay a standard fee of $1 per dog towards the cost of dosing. In addition to this, dog owners were to become liable for an additional fee of $10 for each dog found to be infected.\footnote{63}

It was no doubt reassuring for town dog owners to hear that dogs classified as city pets were excluded from the stepped-up treatment programmes for working dogs. But city owners of pet dogs were still to be involved in regular once-a-year testing for infection. Turbott added: “This wretched hydatids disease could easily be prevented, but only if everyone will co-operate in controlling the movement of dogs and avoid careless feeding of dogs”.\footnote{64}

But the necessity for such a vigorous dosing programme was questioned by scientists at the Hydatid Research Unit. The Unit’s Director, veterinary trained Michael Gemmell, said of the Council’s policy: “The Control Authority essentially used a sledgehammer to crack a nut”.\footnote{65}

**From human to animal problem: A change in emphasis from 1972**

The NHC argued that it was justified in 1972 in stepping up the dosing programme for dogs ‘at risk’ to hydatid infection. The scope of the Council’s original task had been extended by Act of Parliament in 1968 to include the elimination of a third parasite closely related to the two already named in the Hydatids Act of 1959. The more important of the original pair was, of course, *Echinococcus granulosus*, (sometimes referred to as “true hydatids”), well known for its threat to human health, while the second was a less well-known but troublesome organism, *Taenia hydatigena*, (or “false hydatids”). This second member of the hydatid family is harmless to humans; but it seriously affected the marketability of New Zealand’s meat products, causing visible blemishes in sheep meat which were often confused by inspectors with the dreaded cysts of “true hydatids”. In 1968 a third parasite, *Taenia ovis*, (or sheep measles, similarly harmless to humans but potentially damaging to the country’s meat export industry), was included within the hydatids control campaign.\footnote{66}

Officials at the time thought that a joint campaign to eliminate all three parasites would save money. The three tapeworms appeared to be biologically related. Dogs and sheep were their principal hosts, and all three endangered New Zealand’s meat export

\footnote{64}Ibid.
\footnote{65}M.A.Gemmell, ‘Brief summary of the events that led to the establishment of the Hydatid Research Unit and an assessment of its contribution to the national control programme and to world health’. In *Hydatid Research in New Zealand, Vol 5, 1989*, Hocken Library, University of Otago, Dunedin, p.3.
\footnote{66}Ibid.
industry. Only *E. granulosus*, however, threatened human health. Why not use a single intensified dosing programme, argued government officials, to rid infected dogs simultaneously of all three parasites? But the combined campaign gave rise to unforeseen problems that complicated and probably delayed the control of *E. granulosus*, which at all times remained the NHC’s prime target.\(^67\)

During the 1970s a dramatic reduction did indeed occur in the level of *E. granulosus* infection in both dogs and sheep, and to a lesser extent, of *T. hydatigena*. Even more encouraging were medical statistics indicating a steady decline in the number of cases of human hydatid disease. But it was an unpleasant surprise to find that the prevalence of *T. ovis* concurrently increased in sheep through that time. The intensified dog dosing programme, whilst reducing *E. granulosus* and stabilising *T. hydatigena*, unexpectedly had the effect of increasing the prevalence in farm stock of sheep measles.\(^68\) In 1990 the programme was separated, each organism from that time being treated independently. Gemmell wrote of the ill-conceived three-way control programme

A unique control programme was introduced into New Zealand to control simultaneously three metazoan parasites, one affecting human health and the others only of economic concern to the meat industry. Research has shown that they have different transmission dynamics. These differences explain their disparate responses to control. The control programme against *E. granulosus* was entered into in almost complete ignorance of these facts, and its success occurred more by chance than by design. If our present knowledge had been available at the beginning of the programme, it is almost certain that control of *T. ovis* and probably *T. hydatigena* would never have been initiated. If this information on cost-effectiveness had been available prior to the introduction of control, a more orthodox approach to the control of *E. granulosus* through the Department of Agriculture using its own resources should have taken place. This would have markedly shortened the attack phase of control and reduced costs to the dog owner by many millions of dollars.\(^69\)

Under Gemmell’s directorship the Hydatid Research Unit gave maximum priority from 1958-1964 to so-called ‘base-line surveys’ measuring the incidence of *E. granulosus* in dogs, sheep and other New Zealand animals. It was clearly essential to quantify the extent of the hydatid problem before a national control campaign could be effectively operated. Base-line surveys provided a means of comparing parasitic incidence before and after control measures were introduced, thus enabling the evaluation of a national campaign.

The Unit’s second priority was a seven-year research programme into the identification of *E. granulosus* in dog faecal samples induced by arecoline purging. The findings of this study were essential to the establishment in 1961 by the NHC of a permanent National Hydatids Testing Station in the old Air Force buildings at Taieri Airport. Known colloquially as the “Watchdog” of the National Hydatids Council, the

\(^{67}\)M.A. Gemmell, 1970, p. 11.  
\(^{68}\)Ibid., p.12.  
\(^{69}\)M.A. Gemmell, 1989, p.4.
Testing Station’s monitoring role was to test faecal samples sent in from dosing strips and farms throughout New Zealand. Information from the Station, via Hydatid Control Officers, told owners if their dog was free of hydatids. Dogs found to be infected or re-infected were dosed again, and re-tested, until they were found to be clear. The Testing Station’s diagnostic services thus provided a reliable means of evaluating the national campaign.\(^70\)

In its early years the Research Unit also investigated the life-cycle and transmission of the three hydatid parasites, the role played by immunity in dogs and sheep in the regulation of parasitic populations, and the evaluation of arecoline and alternative anthelmintics in the treatment and diagnosis of tapeworm infections. The Parliamentary Committee of Inquiry commended the Unit’s work, reporting in 1967:

\[\text{[We] are favourably impressed by the research and investigational work already done, much of which has been carried out by the Hydatid Research Unit, and would like to commend all those who have contributed so effectively, both in the laboratory and in the field, towards the solution of the many problems that have arisen during the course of the campaign.}\] \(^71\)

To Gemmell’s regret, however, the system of funding for the Unit made long-term research planning impossible. In 1958 the MRC made an initial grant to the Unit for a five-year period only. After much uncertainty a further five-year grant was approved to cover the period 1963-67, followed by an extension of two years to include 1968-69. Consequently research undertaken throughout this time lacked a single objective and tended to be disconnected, as Gemmell freely admitted. Later he noted: “Not surprisingly such a system was unworkable and unsatisfactory. It perpetuated lack of tenure for staff who were working on long-term research. By 1967-69 the Unit’s staff were losing confidence”. Recruitment and retention were two of the Unit’s perennial problems.\(^72\)

The rising incidence of \textit{Taenia ovis}, or sheep measles, finally persuaded the Government in 1973 to transfer the Hydatid Research Unit to the Department of Agriculture. The Medical Research Council readily agreed to relinquish the Unit, believing that medical research funds should now be allocated to more pressing public health problems. The Unit’s transfer was an official acknowledgement that hydatids were now regarded as a veterinary rather than a human health problem.\(^73\)

For staff of the Unit the transfer to Agriculture came as a relief after years of uncertainty. From 1973, wrote Gemmell, “the Ministry of Agriculture and Fisheries

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\(^70\)B.G.Joyce, ‘Diagnostic Station near Dunedin is NZ Watchdog against disease’, \textit{NZ Journal of Agriculture}, October 1968, p.462.


\(^72\)M.A.Gemmell, 1981, p.29.

\(^73\)M.A.Gemmell, 1989, p.2.
provided almost ideal facilities for the expansion of basic research programmes in biology, immuno-diagnosis and immunization at Wallaceville Animal Research Centre. Rosemary Sutton, a veterinary scientist on Gemmell's staff, recalls how the HRU's staff at Mosgiel were interviewed separately by senior MAF officials in an effort to persuade them to accept positions at the Animal Health Division's Research station at Wallaceville. Since none agreed, the Unit remained in Dunedin. Laboratories and animal accommodation were relocated once more to the Medical School, while a few staff continued to work at a field station near Invermay.

Throughout the 1970s the Unit's research concentrated mainly on drugs used in the campaign, on the examination of suitable alternative dog food, and on the potential of vaccines to protect sheep from infection. At all times strong links were maintained with MAF's nearby Invermay Agriculture Research Centre as well as with the Biometrics Section at Wallaceville, with whom relationships were said to be cordial.

In April, 1979, scientists from MAF and the HRU jointly set up a much needed "traceback" system, later known as the Otago/Southland Regional Surveillance Programme. This major initiative involved 10,000 farms and 18 million sheep throughout Otago and Southland. Its purpose was to identify farms with hydatid control problems. For these farms it provided a follow-up service aimed towards a whole farm approach to control, and the scheme gave feedback to local authorities. Data on the percentage of hydatid-infected sheep sent to the freezing works were used to compile infection histories for individual farms. Negligent farmers were then investigated and targeted for an extensive and intensive education programme.

This important programme served as a model for future surveillance centres throughout New Zealand and even internationally. It effectively identified specific problems requiring urgent research. A further valuable feature of the surveillance programme was the widespread opportunities it gave for effective teamwork. Individual farmers made regular contact with Freezing Companies' management and staff, with local authorities and their staff, with MAF-employed Vets, Meat Inspectors and Livestock Officers, with Federated Farmers, and occasionally with scientists and technicians of MAF's Research Division.

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75 R. Sutton, In conversation with author, 23 September 1996.
77 M.A. Gemmell, 1989, p.2.
80 Ibid.
The Surveillance Programme required the resources and legislative powers of MAF, which the National Hydatids Council lacked. "[Surveillance] was not designed to be a control measure, but a monitoring device to identify the progress and shortcomings in a control programme". On the whole it was very successful, but it was not without its problems. When stock arrived at the abattoir from a number of different farms, it was not always possible to trace the source of infected carcasses. Another shortcoming of the scheme was that home killing was still widely practised. Farmers were legally permitted to sell non-inspected viscera privately to butchers or their neighbours, or to consume it in their own homes.

Tom McCristell, Chairman of the NHC, spoke in July 1979 of the Council’s concerns that hydatid infection rates in lambs were again rising after a steady drop in previous years, and that an upsurge was reported in the number of previously clean dogs showing infection. Several possible causes were suggested by correspondents to the Otago Daily Times. Some thought dog owners were placing too much reliance on the effectiveness of 6-weekly Droncit dosing, without realising that drugs alone were not enough to eliminate hydatids permanently. They argued that the first line of defence was still to stop dogs having access to raw offal. Others blamed a rise in killing costs at freezing works for the resumption of home killing, often with inadequate facilities for offal disposal. One correspondent knew of farmers who continued to use woolsheds as killing sites, rather than constructing the fully dog proof killing enclosures recommended by the NHC. This writer suggested that MAF inspectors should be more vigilant, and infected properties should be quarantined as in Tasmania.

During the following three years few changes were made, according to Lawson and Gemmell, who reported that in 1982 only about 6% of farms had satisfactory home slaughter sites or dog control facilities. A survey in that year compared farms where dogs were infected with farms free of hydatids. The results indicated that the two most important causes of breakdown in control were, first, incorrect dog feeding, and secondly, wandering dogs, particularly near urban areas. Burridge and Schwabe reported, as already mentioned, that the incidence of human hydatid disease was higher amongst Maori than Pakeha, probably because of Maori farmers’ lack of incentive and financial resources to build adequate killing facilities on their properties, and because Maori-owned dogs were often poorly controlled and permitted to eat raw offal.

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Figure 4. Race-specific incidence rates of human hydatid disease in New Zealand from 1951-1972.

Source: Burridge & Schwabe, NZMJ, (1977), 85, p. 175.
Positive progress was, however, reported from most parts of the country. In November 1982 the NHC issued a special News Bulletin evaluating the impact of its policies over the previous seven years. Only five new cases of human hydatidosis had been reported in 1981, compared with as many as seventy in 1957. No new cases had been reported in pre-school children for more than ten years. In 1981-82 only one in forty-six dogs was found to be infected, compared with one dog in three in 1957. And in contrast to the total banning in 1957 of sheep livers for export, clean livers in 1981 added $144 million to New Zealand’s overseas earnings. The Council was bold enough to claim in 1982 that: “Progress towards the eradication of Echinococcus granulosus has been very satisfactory and policy has been set to achieve virtual eradication within three to five years”.

To prevent a recurrence, the NHC introduced some relatively minor modifications to its policy for the following five years, 1982-87. The 6-weekly treatment of dogs with Droncit was to continue, but dosing was to be confined to “at risk” dogs through a “Special Owner policy” to be operated by Hydatid Control Officers. The “Traceback system” identifying infected sheep with their farm of origin was also to continue. The Dog Control and Hydatids Regulations of 1985 strengthened control measures by restricting the movement of dogs outside their home district, unless they had been treated for hydatids within the previous six weeks. Owners were required to carry a certificate of treatment.

An article in the Dominion on 14 November 1985 observed that opportunities for dogs and stock to get infected with hydatids were becoming rare. “For the first time since records have been available in New Zealand mainland dogs are now free of hydatids”, the Chairman of the National Hydatids Council reported to Parliament in 1985. “The end of hydatids is assured within the next few years if there is no recycling of the disease”.

By 1991 the NHC reported: “The task to eradicate hydatids is all but complete”. Health statistics indicated that no new cases in the under twenty-five-year-age group had been reported after 1988. Only five new cases in all age groups were reported during the 1986-88 period. Medical authorities assumed that most infections in older people had been contracted some years ago, when hydatid infection in dogs was still relatively widespread and common.

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88 Ibid., p.4.
90 Anon., The Dominion, 14 November 1985.
On 30 July 1991 the Government disestablished the National Hydatids Council as part of an extensive cost-cutting exercise. The NHC’s monitoring functions were transferred to the Director General of Agriculture and Fisheries, with instructions to ensure that resurgence of the parasite did not occur. MAF was directed to carry out three specific tasks:

- To provide meat inspection services at freezing works.
- To trace any remaining infected stock
- To introduce quarantine procedures for imported livestock from countries where hydatids are endemic.92

An extract from the minutes of the last meeting of the NHC held in the West Plaza Hotel, Wellington, on 28 August 1991 is of historic interest:

The National Hydatids Council, in recognition that its assignment to eradicate hydatids is substantially complete and further that the Government, in its 1991 Budget has abolished the NHC by statutory amendment, ceases its existence forthwith and assigns remaining hydatids functions to the Director General of Agricultural and Fisheries.93

The retiring National Hydatids Council warned New Zealanders in its final report: “The abolishment of the NHC should not be taken to indicate that hydatids have completely gone. Dog owners should continue to take all steps to prevent hydatids in their dogs until hydatids are declared to no longer exist in New Zealand”.94

Thus ended an era of almost thirty-two years in New Zealand’s history. By a slow process of trial and error, the National Hydatids Council largely succeeded in achieving its objective of ridding the country of human hydatid disease. The Council had both strengths and weaknesses. Amongst its strengths, it had the support of the majority of New Zealanders in its early years. It had assured funding through dog licence fees, it had a stable administration, and it had a close relationship with influential members of the Government. For most of its time it enjoyed stability under the Chairmanship of Tom McCristell, who understood the views of the farming community.95 It also had the advantage of being closely linked with a network of local authorities having access to dog registration fees and local taxes. The NHC was able to train Hydatid Control Officers, and to deploy them through the County Councils.96

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92Ibid., p.3.
93Ibid., p.24.
94Ibid.
95N.C.Begg, 1982, p.3.
But a number of factors weakened the NHC. Without the authority of a fully established government department it lacked the power to inspect farm stock received at freezing works, or to quarantine farms known to be infected with hydatids. It may even have had too much autonomy. It should have been more accountable, in Gemmell's view, in how it spent its funds. It was not adequately representative of the farming community, nor did its members, most of whom were lay people, have sufficient scientific understanding of the requirements needed to launch and sustain the campaign they were directed to plan and administer. Under the circumstances, the NHC did well to achieve as much as it did, but an earlier transfer to MAF would probably have speeded up eradication by as much as two or three decades.

Figure 5: Changes in the prevalence of *Echinococcus granulosus* in humans, sheep & dogs during the first twenty years of the national control campaign in New Zealand.

Chapter Six

"The parasite is almost beaten"
1991-1997

By the mid-1990s the incidence of *E. granulosus* in New Zealand had been reduced from one of the highest in the world to an almost insignificant level. True hydatids had become so rare in New Zealand livestock that two isolated outbreaks within a four year period in the early 1990s were regarded as major events. In 1991 investigators found a few infected ewes on three North Otago farms, and four years later MAF found a single infected sheep from remote Arapawa Island in the Marlborough Sounds. On both occasions MAF officials, now with full responsibility for control, contained infection by imposing local stock movement restrictions and mandatory dog dosing on the affected and adjacent properties.1

Health statistics indicated that no new cases of hydatid disease had been diagnosed in young people since the early 1980s. For at least a decade only a very small number of new cases had been reported, all in middle-aged or elderly people who had probably contracted the disease prior to the introduction of national control measures in 1959. Just four new cases were recorded during 1992, all in older people, and no new cases from any age group were diagnosed in 1993 or 1994. Striking progress against human hydatid disease had clearly been made since 1950, when 363 new cases had been reported in a single and not atypical year.2

Between 1993 and the end of 1995 meat inspectors found no hydatid cysts in at least 30 million sheep and lambs slaughtered and inspected in each of these years in New Zealand abattoirs. “This is a far cry from the situation at the beginning of the control programme in 1959, when up to 80% of sheep from certain parts of New Zealand were found to have hydatid cysts at slaughter”, reported MAF’s official publication, *Sentinel*, on 15 June 1996. The report added: “The absence of cysts provides strong assurance that the parasite is almost beaten.”3 Another official agricultural publication proclaimed: “that the number of dogs infected at any one time must be extremely low”.4

Despite such encouraging evidence of progress, the Ministry of Agriculture faced some difficult questions when it took over responsibility for hydatids control from the

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National Hydatids Council in 1991. MAF officials had to ask themselves whether it was realistic, for example, for the campaign to aim for "total eradication"? Rachel Carson, in *Silent Spring* (1962), defined eradication as an almost unattainable state: "complete and final extinction and extermination of a species throughout its range."

Most of those involved in the New Zealand campaign, however, preferred to regard eradication as: "permanent, effective and economic control", which seemed a more realistic goal for the final phase of the national campaign.5

MAF officials had to consider, too, whether the campaign’s benefits to the country in the 1990s continued to justify its cost to taxpayers and dog owners. Now that the human health risk of hydatids was almost negligible, should not control measures be modified? Surely, as Gemmell suggested in his writings, the costly "attack" strategies involving universal dog treatment were long overdue for replacement by less expensive "control-maintenance" measures?6 MAF officials in the early '90s recognised that some aspects of the programme could now be safely discontinued, but with caution. Officials agreed that an active but modified control programme should be maintained indefinitely, to counter the risk of either accidental "breaks" in control, or the re-introduction from imported stock of infection into New Zealand's highly susceptible animal population.7

MAF made no immediate changes to hydatid policy after taking over control from the NHC in 1991. The existing control programme had to comply, however, with the Biosecurity Act of 1993. This Act required the Ministry of Agriculture, in conjunction with the Ministry of Health, to develop a revised "national pest management strategy" for true hydatids. Agricultural and Health officials were instructed to develop "a technically sound programme that is likely to capture benefits in excess of the cost of the programme and not limit the rights of individuals any more than is necessary to achieve the objective of the programme".8

On 1 July 1996 the revised management strategy should have superseded both the Dog Control and Hydatids Act of 1982, and the 1985 Dog Control and Hydatids Regulations. But delays in the passage of the amended regulations through Parliament left a gap in the legislation. On 30 June 1996 the Government repealed existing hydatids regulations, ending the statutory role of territorial authorities in hydatids control after more than thirty years. Regional as well as national aspects of the hydatids programme have since been handled solely by MAF staff, while local authorities have remained responsible for the registration and control of dogs.9

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7 Friis et al., 1967, p.38.
9 N. Sullivan, In personal correspondence, 26 September 1996.
These changes have lowered the costs of the present hydatids control programme, and MAF recently made further substantial savings by phasing out compulsory dog dosing. Howard Pharo, the National Adviser to MAF's Agricultural Security and Animal Health Division, explained in the *Evening Post* on 21 May 1996 why compulsory six-weekly dog dosing was no longer necessary except in special “risk” areas:

Given the very low prevalence of true hydatids in New Zealand, MAF and the Ministry of Health (MOH) believe it is no longer necessary or cost effective to require all dogs to be treated regularly for hydatids. With the disease almost eradicated, and with good evidence that most of New Zealand is clear of the disease, it would be inappropriate to continue all control measures unchanged, at considerable cost to dog owners all over the country.\(^\text{10}\)

In 1996 MAF decided to terminate regular visits by its field staff to all New Zealand dog owners and livestock farmers. This component of the old control programme alone had cost over ten million dollars annually. The anticipated total cost of the entire modified programme amounted to no more than one million dollars for the first year, dropping to $900,000 in subsequent years.\(^\text{11}\)

Agricultural and Health officials recently confirmed that basic control measures are to continue indefinitely, giving priority at all times to any area where infection is identified. MAF retains its responsibility for meat inspection and traceback procedures, the investigation of suspect cases, quarantine of stock in areas with infection, and detailed data analysis and reporting of prevalence in stock. The public health care authorities continue to be responsible for reporting cases of the human disease. MAF’s Chief Veterinary Officer is to supervise the administration of the revised control programme, which will continue for a number of years after the last confirmed case of the disease.\(^\text{12}\)

Not everybody agreed with the termination of compulsory dosing in 1996. An article in the *Otago Southland Farmer* entitled: “Hydatids fears rise as law wiped” warned that too many changes were being made too quickly:

Fears are that once the compulsory requirements to present dogs for blood testing or dosing treatment are removed decades of prevention work will soon be undone. Eradication has not been achieved but the compulsory requirements kept the lid tightly on the problem. Hydatids is a health issue which many feel involves a risk not worth taking, and which is why so much importance was placed on a hydatids eradication programme in the first place. The removal of local authority involvement in dog testing means detection of hydatids will be more difficult.\(^\text{13}\)

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\(^{12}\)Ibid., pp.4-5.

\(^{13}\)Otago Southland Farmer, (Balclutha), 3 May 1996, p.1.
John Stirling expressed similar concerns in the *Otago Daily Times* on 14 June 1996, questioning the reduction of hydatids controls. He pointed out the demoralising effect on some local authority employees of terminating the dog dosing programme. It had been a “soul-destroying” time, he wrote, “for all Hydatid Control Officers when the Government disbanded the National Hydatids Council in 1991, and put a sunset clause on the Hydatids and Dog Control Act”:

> The writing was on the wall. At first HCOs refused to believe the meat and farming industries would dump an operation still essential to retain the “clean” part of the “clean, green” image. Most accepted all hope had gone. For the past two years those remaining operated in a “twilight zone”. Like programmed robots they kept doing the work, still believing their efforts were worthwhile.\(^{14}\)

MAF staff evidently sympathised with Hydatid Control Officers, whose plight *Sentinel* acknowledged on 15 June 1996 when it noted: “Change is always difficult for those directly affected”. But *Sentinel* pointed out that the time had come to separate three distinct issues, namely true hydatids control, sheep measles control, and dog control, so that each could be dealt with individually and appropriately. Indeed, the article claimed, such a change was probably long overdue, but it had not been possible while the National Hydatids Council held control. Acknowledging the past achievements of HCOs, *Sentinel* observed:

> It is unfortunate for the many hydatids and dog control officers employed by district and city councils that the disease aspect of their work will disappear as the new Dog Control Act deals only with dogs as public nuisances. Indeed, many councils might decide that certain staff are no longer needed, and it is understandable that some officers are distressed about their personal situation. Dog control and hydatids officers can be proud of the work that they have carried out over the past 35 years to ensure that hydatids no longer poses a significant threat to New Zealanders, and the public can be sure that the Ministry of Agriculture will continue appropriate control efforts with utmost vigilance until complete eradication of hydatids is achieved.\(^{15}\)

A dilemma faced MAF officials on 1 July 1996 when new legislation had not been enacted to replace the hydatids regulations repealed on the previous day. As a temporary stop-gap MAF issued a special notice in the *Gazette* on 22 August 1996 declaring the whole of New Zealand (except for Arapawa Island in the Marlborough Sounds) to be a “controlled area to enable the limitation of the spread of true hydatids”.\(^{16}\) They excluded Arapawa Island, the site of the most recent finding of infected stock, because the island had already been declared a controlled area some months previously. The emergency declaration gave MAF the authority it needed to

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\(^{15}\) *Sentinel*, MAF, Wellington, 15 June 1996, p.3.

maintain existing control measures until new strategies are approved by Parliament in due course.\textsuperscript{17}

\textbf{Summary and Conclusions}

Human hydatid disease is an unpleasant and dangerous condition. The victim in New Zealand has often been a child or some other innocent bystander. The disease is characterised by the growth of cysts in the liver, lungs, brain, or elsewhere in the body. The severity of the symptoms depends upon the size and location of these cysts. Major and often hazardous surgery remained the only effective treatment until the early 1980s, when chemotherapy became the preferred option in certain cases.\textsuperscript{18} The disease is invariably caused by human carelessness or ignorance. Humans and sheep in New Zealand are infected only by dogs, and infection of a dog occurs only through its owner's neglect to control or feed it correctly.

Preventing the disease should in theory be simple, since all it requires is the co-operation of every dog owner. But it is very difficult to gain the one hundred percent co-operation of dog owners, as most affected countries have discovered. Until now Iceland is the only country to have achieved complete eradication of \textit{Echinococcus granulosus}. The last human case was reported there in 1973. But climatic and farming conditions in Iceland differ in many respects from New Zealand.

Because sheep are the parasite's main intermediate host, hydatid disease tends to occur wherever dogs and sheep exist in close association with man, as happens in sheep farming communities. Countries with a high incidence of the disease during some part of the present century have included New Zealand, Australia, Iceland, Latin America, and pastoral regions in Africa, Asia, and the eastern Mediterranean. Successful control campaigns, some assisted recently by the World Health Organisation, have almost eradicated the parasite from a number of these countries within the past thirty years.

Much human suffering and economic loss could have been avoided if sheep infected by \textit{Echinococcus granulosus} had not been imported into New Zealand by European settlers early in the nineteenth century. But the parasite's introduction into the colony at some point was almost inevitable. Increasing numbers of breeding sheep, (potential carriers of the disease), were imported in the second half of the nineteenth century when the colony's wool and meat export industry underwent rapid expansion. New Zealand's mild climate, its lush pastures, and the high ratio of sheep to its human population provided an almost ideal environment for the establishment of the parasite.

\textsuperscript{17} \textit{Otago Daily Times}, (Dunedin), 23 August 1996, p.2.
The country’s first cases of human hydatid disease were reported from Dunedin in 1862. Further cases were soon reported throughout the colony, and the disease was made notifiable in 1873. Macdonald made the earliest mention in New Zealand’s medical literature of the health hazards of hydatids, in 1889 describing the disease and its prevention in the *New Zealand Medical Journal*.¹⁹ His recommendations on control are as valid today as they were in the 1890s. He advised the building of public abattoirs, the inspection of all meat, the prevention of dogs from eating “diseased parts”, and the introduction of laws enforcing the inspection of dogs and the destruction of strays. These recommendations were largely ignored, perhaps because medical journals have a restricted readership. It is unlikely that Macdonald’s message reached farmers or the general public.

The first real step towards controlling the disease was taken in 1934 by another medical practitioner, Sir Louis Barnett, whose initiative led to the establishment of the Department of Hydatid Research and Prevention at the University of Otago Medical School. Also largely through Barnett’s influence the government introduced the first legislation to deal directly with hydatids control. The Dogs Registration Amendment Act 1937 ordered local authorities to supply dog owners with arecoline tablets at registration. But the regulations left it to dog owners to administer the tablets, and many failed to do so. A second piece of legislation, the Meat Act 1940, made it illegal to feed raw offal to dogs. In neither case were these regulations enforceable. Weak legislation was probably worse than no legislation, in that it brought the law into disrepute and invited the defiance of farmers who were already inclined to be sceptical about hydatids control measures.²⁰

Efforts to educate several generations of New Zealanders using conventional publicity about the danger of hydatids had no apparent effect on the prevalence of the disease. The number of hospitalised cases continued to increase until 1960. Farmers seemed to take little notice of anti-hydatids pamphlets in their mailboxes, or of posters liberally displayed in townships and on every railway station in New Zealand.

Farmers’ apathy at the time was understandable. Hydatid disease was relatively rare, and few farmers had any personal experience of the condition amongst their family or neighbours. Rural workers in sheep-raising districts appeared to build up a remarkable immunity to the disease, and rarely contracted it themselves.²¹ Some farmers thought the risks were exaggerated, and argued that control measures were unnecessarily troublesome and costly. Farmers were not penalised for sending infected sheep to the

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abattoir, nor were they rewarded for submitting clean carcasses. Very significantly, there was no financial incentive for them to take preventive action.

Individual farmers were said to feel powerless towards the parasite, and powerless to control the actions of careless neighbours. They were sceptical about the possibility of eradication. Some no doubt resisted advice from the medical profession concerning the care of their dogs. It was different when such advice later came from within their own community - from the neighbourhood voluntary committee, or the local Hydatid Control Officer. These were people to whom the farmer could relate, and whose knowledge and experience he was likely to respect - people who could make practical rather than theoretical suggestions regarding alternative dog food or the disposal of offal. What would doctors or medical students know about such matters?

A number of practical problems hampered effective control. Many farmers lacked dog-proof killing facilities, but continued to slaughter their stock at home. Offal disposal techniques were often unsatisfactory and resulted in the re-infection of dogs. For several decades unregistered and stray dogs remained a perennial problem. The law proved weak, prosecutions occurred rarely, and a shortage of local body funds prevented regular farm inspections.

Until about the mid-1950s most farmers had little knowledge of the parasite or its transmission. Many put too much faith in arlocine dosing, while continuing to feed raw offal to their dogs. This was common particularly amongst farmers struggling to make a living from small, economically unproductive units. Such farmers were often unwilling to destroy offal, the traditional food of New Zealand farm dogs, or to buy expensive commercially prepared dog food. The eradication campaign was notably slow to take effect, according to Burridge and Schwabe, in the East Cape region of the North Island, where marginal farming prevailed, and where socio-cultural factors also probably hindered progress. The incidence of human infection in that region remained higher than in any other part of New Zealand between 1951-1971.22

But standards of dog care gradually improved as New Zealand farmers became more knowledgeable, more prosperous, and more committed to control measures in the late 1950s and '60s. The majority now readily co-operated with dog registration, dog control, and with safe dog feeding.23 Neighbourhood participation in hydatid control had gradually won the co-operation of almost the whole of the farming community. Finally pressure from the powerful Federated Farmers movement in 1959 persuaded the Government into taking national action.

But officials constantly under-estimated the complexity of the problem, and the time it would take to eradicate the parasite. Members of the National Hydatids Council predicted in 1982 that the parasite would be “virtually non-existent within three to five years.”24 Yet thirteen years later, in 1995, the outbreak I have already mentioned on a property in the Marlborough Sounds made headline news. Officials are currently optimistic that this most recent finding will prove to have been the last pocket of infection in New Zealand.25

Many factors besides farmer apathy hindered eradication over the years. For several decades successive governments were reluctant to become involved in the issue. Before World War II New Zealand was still a developing country, and a shortage of public funds was compounded by the depression of the 1930s. The war years 1939-45 brought their own problems. Throughout the first half of the century the costs of many public health projects stretched the resources of the Department of Health to the limit. Hydatid disease, with a relatively low prevalence, almost certainly had less funding priority than epidemic diseases such as tuberculosis, diphtheria or smallpox. New Zealand health statistics showed that tuberculosis caused fifty times as many deaths as hydatid disease in the period 1949-54.26

Seen in this way hydatids prevention was not a vote-catcher. For several decades the disease tended to be overlooked by the public as well as by politicians. Cases were sporadic, they were slow to develop, and they were not always correctly diagnosed. Notorious under-reporting meant that the real prevalence of the disease was not revealed to the public or to health officials. For several generations “the menace of hydatids did not seem to penetrate the national consciousness.”27

For many years efforts to control the parasite in New Zealand were led by a few dedicated individuals. Programmes tended to be fragmented and to lack a common objective. In the mid-1930s the medical profession established a combined hydatid research and educational programme. But poor communication between scientists and lay people delayed progress on many occasions. Members of the National Hydatids Council showed little interest in the work of the Hydatid Research Unit, and relationships between administrators, scientists, local authority employees and dog owners were often strained. 28

26D.C.Warnock, ‘Hydatid Disease in North Otago’, Unpublished 5th Year Medical Student’s dissertation for Social and Preventive Medicine, Medical Library, University of Otago, Dunedin, 1956, p.13.
28Ibid.
Prevention of hydatid disease is a unique and complex public health issue requiring a range of skills. An effective national control programme required veterinary, agricultural and educational expertise, but collaboration across such a range of portfolios is difficult to initiate, as has been found in both Australia and New Zealand.29

New Zealand had no precedents to follow when the Government finally agreed to introduce a national eradication campaign in 1959. At the time it seemed politically appropriate to set up an autonomous, semi-governmental organisation, (the National Hydatids Council), to organise the campaign. But the NHC was hampered by its two-tier structure, and by its responsibility for the control of not one but three parasites. Its most serious weakness, however, lay in its inability to legislate. Surveillance and stock movement control were outside the powers of the NHC, yet ultimately proved essential for eradication. These measures could only be introduced after the Government had transferred the responsibility for hydatid eradication to MAF in 1991.

The Government almost certainly made the wrong decision in retaining the NHC after 1967, despite the recommendations of the Parliamentary Committee of Inquiry into Hydatids Eradication. This Committee, as previously mentioned, advised the Government to terminate the involvement of both the NHC and local authorities in the hydatid programme, and to transfer full responsibility for the campaign to the Animal Health Division of the Department of Agriculture. But the Government delayed doing so for a further twenty-four years.

Gemmell argues that the creation of the National Hydatids Council in 1959 actually delayed eradication. Had the full resources of the Departments of Agriculture and Health instead been co-ordinated in a government sponsored campaign led by Agriculture, eradication should, in Gemmell’s view, have been achieved by the mid-1970s.30

Nonetheless, some important lessons may be learned from New Zealand’s hydatids eradication campaign, which Gemmell recently claimed “should be regarded as a very valuable pioneering model”.31 In comparing New Zealand’s and Tasmania’s eradication campaigns Dr. Trevor Beard recently said of New Zealand: “A pioneer must be free to make mistakes in working out a new protocol”. Countries such as Tasmania, where hydatid control measures were introduced more recently than in New Zealand, have probably benefitted more from observing this country’s mistakes than its successes, Beard observed.32

29Ibid.
30M.A.Gemmell, Interview with the author, 17 February 1997.
31M.A.Gemmell, Personal correspondence with author, 24 August 1996.
32T.C.Beard, Taped interview with the author, February 1997.
Uruguay is the only other country to have set up a non-governmental control authority similar in structure to the NHC. Gemmell reports that the campaign in that country has failed. But local conditions such as political instability, economic difficulties, and poorer dog control than in New Zealand have no doubt affected the campaign in Uruguay. Since the introduction of control measures there twenty-five years ago very little impact has been made on the high incidence of *E. granulosus*, and Gemmell doubts that Uruguay will ever achieve absolute eradication.\(^{33}\)

In contrast, the establishment of a government-based control structure in Tasmania, Cyprus, Chile, Argentina and the Falkland Islands, has led without exception to rapid progress in reducing hydatid disease during the past three decades. For Chile, which suffers like Uruguay from political instability and economic difficulties, this has been a significant achievement. In each of these countries, hydatids control was entrusted from the start to the Ministry or Department of Agriculture, which had the back-up of normal animal health services and legislation.

The Department of Agriculture in Tasmania, for example, became responsible not only for hydatids policy but also for administration and field control. The incidence of the disease in that country declined so dramatically that within twelve years Tasmania replaced a costly dog dosing programme with much less expensive control maintenance measures such as surveillance and quarantine. In contrast, New Zealand took two to three times as long to reach this milestone. The limited powers of the NHC may have been partly to blame. But eradication was also more difficult for New Zealand with a greater land area than Tasmania, and a much larger sheep population.

The New Zealand Government complicated the issue of eradication by including *T. ovis* and *T. hydatigena* in the true hydatids programme. Other countries avoided this mistake. Tasmania adopted a simple, clear campaign policy with the single objective of breaking the life-cycle of *E. granulosus*, and made excellent progress within ten to twelve years.\(^{34}\)

In other respects, however, the New Zealand campaign has been regarded internationally in a very positive light. The success of community participation in rural New Zealand made a strong impression in the early 1960s on a visitor from Tasmania, Dr Trevor Beard, who described the farmers’ meetings he attended with Sir Neil Begg as “a wonderfully effective and democratic way to spread the message”. Beard returned home convinced that voluntary involvement was the best way to gain farmers’ cooperation, and he soon showed that this same approach could be as effective in Tasmania as in New Zealand. Voluntary committees proved so important because they had a powerful effect on public opinion. In both countries the resulting wave of public

\(^{33}\)Gemmell, Correspondence, 1996.

\(^{34}\)Joe Bramble, Taped interview with the author, 26 October 1996.
Cases of Hydatid Disease Notified in Years 1951-1980
(NZ Dept. of Health)

Figure 6. Cases of Human Hydatid Disease notified in years 1951-1980.
Source: NZ Dept. of Health Statistics, In Begg's Papers (95-205), Hocken Library, University of Otago, Dunedin.
pressure forced the government to recognise and support a full-scale control programme.\textsuperscript{35}

The history of the New Zealand eradication campaign raises some important questions for public health officials. Did mass-scale public education, for instance, play an important role in the campaign, or was it totally ineffective, as some have claimed? Several decades of widespread anti-hydatid propaganda in this country in the first half of the century appeared at the time to have no effect on the prevalence of the human disease. Yet the Tasmania campaign had rapid results, despite minimal expenditure on public health materials.\textsuperscript{36} Can we conclude that “pushing pamphlets past passive people” is a waste of time and money? This, I believe, would be too sweeping. In the context of New Zealand’s democratic climate, anti-hydatid education may indeed have played a quiet role over the years in promoting farmers’ gradual acceptance of the need for a national scheme requiring some legislative backing. Proceeding slowly proved necessary to gaining the co-operation of farmers and other dog owners.\textsuperscript{37}

In the late 1950s almost universal motivation and commitment finally replaced the old attitudes. Begg was one of the first to recognise that: “it was individual farmers and their wives who were the agents of change, not the doctors or the health educators, not the research workers or the departmental officials.”\textsuperscript{38}

The importance of involving rural women was largely overlooked until the 1950s. Both women’s and young farmers’ groups started at about that time to make an important contribution to the campaign. Their involvement then rather than earlier reflected an era of increasing national prosperity, better communications, and improved transport and other facilities, all of which gave country women in post-war New Zealand the opportunity to reassert themselves somewhat, and to play a more active part in community affairs.

Given that the prevalence in New Zealand of human hydatid disease was relatively low in comparison with a number of other diseases, could the launching in 1959 of a national control campaign be justified? At that particular time there were, indeed, good reasons for the government to give the campaign its support. The number of cases of hydatid disease notified in New Zealand peaked between 1959-60\textsuperscript{39}, yet government knew the disease was preventable. Condemned sheep livers were costing the country a substantial sum each year in lost export earnings. Public opinion demanded government action, and above all, funding was not an obstacle. Farmers were even prepared to fund


\textsuperscript{37}Ibid.

\textsuperscript{38}N.C. Begg, The Intervening Years, 1992, p. 104.

\textsuperscript{39}NZ Dept. of Health Statistics, 1951-1980, In Begg’s Papers, Hocken Library, University of Otago, Dunedin, Item 95-205.
a national campaign themselves by paying an additional dog tax. The Government would have been foolish to ignore their offer. The eradication campaign was thus well timed and amply justified.

Finally, should the New Zealand government have placed more emphasis on coercion rather than co-operation in its handling of the hydatids problem? I believe that it should. It lost an ideal opportunity to introduce stronger legislation in 1959 at a time when public feeling about the hydatids menace ran high, and the nation seemed likely to give its full support to firm leadership. But for fear of appearing undemocratic the New Zealand government chose to set up an autonomous control authority, which lacked the legislative powers to bring about prompt results.

New Zealand has developed rapidly within the past one hundred years, largely as a result of the resourcefulness and individualism of its people. Compulsion is commonly regarded as an infringement of personal liberty and a return to nineteenth century authoritarianism. But in life-threatening situations, compulsion may be essential for the common good. Democratic ideals should be upheld in the right context. But there is obviously a place for coercive legislation when this may prevent death and human suffering. Successful legislation, however, requires the support of public opinion. The great New Zealand pioneer of the farmers’ voluntary co-operative movement, Sir Neil Begg, stressed this point to a meeting of Otago farmers on a winter’s evening in June 1957: “What you do about hydatids is a matter of the individual conscience of everyone who deals with dogs and sheep. No amount of legislation or guidance can be of much use if it is ahead of public opinion.”

Despite many unexpected difficulties, New Zealand has finally succeeded in controlling human hydatid disease. This is no small achievement for a young country whose mild climate and flourishing sheep farming industry provided the ideal environment for the spread of the parasite *Echinococcus granulosus*. New Zealand had a more extensive land area and a larger sheep population than either Iceland or Tasmania. Its rugged terrain of high mountains and deep valleys often resulted in the isolation of farmers, particularly in the pioneering years. All of these factors compounded the difficulties of eradicating the hydatid parasite. But the determination to do so, at first by a few dedicated individuals and later by a united community, eventually led to the elimination of an exceptionally unpleasant human disease. Although we must try to understand why it took so long to eradicate this menace, New Zealanders may feel justifiably proud of resolving such a difficult and complex problem.

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Appendix
HYDATIDS

As an Hydatid Control Officer, I found plenty of opportunities to put pen to paper. Here are some -

COUNCIL'S PROBLEM
They can't employ a person
To do a dosing round
Unless he's duly qualified
To handle any hound.

So there's a little problem in
This infected dog campaign
They part time employ our "Pink Pants"
But the 'heads' have made it plain

Tho' this man's been dosing dogs
For eleven years or more
And never lost a single dog
And carried out the law

He really is not qualified
He's neither A nor B
And, say it very quietly,
He is not even C.

To get around this problem
And not leave them in the lurch
They told the National Council
He's borrowed from Research.

But National did not favour this
A precedent it could be
So they presented "Pink Pants"
With a certificate for C.

Hydatids

Hydatids is an awful curse
Causing both death and pain
If all combine to fight this thing,
It won't be seen again.

In hospital I saw a boy
I asked why he was there
Hydatids cysts, his fourth time in,
But did that boy despair?

No, he was happy as a king,
He'd worked it out you see,
This Xmas he'd be home a while,
With fun and family.

I've thought a lot about that boy,
So game, so young and fair,
'T was someone's B— carelessness
Poor kid, that put him there.

"Those dogs at night," said Bill to me,
"I'd shoot the B's" he said
"Soon learn to tie the mongrels up
If some of them were dead."

Well, that didn't seem quite fair to me,
It's not the dog's B— fault,
I'd shoot the man, and then this scourge
Would soon come to a halt.

Bit drastic? Well I suppose it is,
Good fellows, everyone,
Be missed by friends and neighbours,
When they are dead and gone.

But think of all the lives we'd save
The pain and the despair.
I'm quite sure, on balance,
We'd come out more than square.

Source: Jim Matheson, Rhymes, Yarns and Old Times, Hamilton.
BY THE DOG-DOSING STRIP AT DUNSANDEL
By Ken Avery

By the dog-dosing strip at Dunsandel, I fell in love with you
My dog was a bit hard to handle, And yours was a bit that way too.
I brought in me terrier to get him fixed up,
And the more was the merrier when you brought your pup.

By the same little strip at Dunsandel, The dogs were so romantic too.
I knew at a glance it was canine romance, When my terrier’s breath came in short pants.
By the dog-dosing strip at Dunsandel, I fell in love with you.

By the dog-dosing strip at Dunsandel, I’m goin’ to make you mine,
By the dog-dosing strip at Dunsandel, We’ll be tasting the sweet red in wine
Cause the dog gave a lead just for you and me, When they both started singing a chained melody,
By the dog-dosing strip at Dunsandel, your pedigree was true and I fell in love with you, and I fell in love with you, and I fell in love with you (repeat and fade...)