
Royce Elliott – From empiricism to science-based policy in New Zealand agriculture

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Royce Elliott retired as Deputy Director-General of the Ministry of Agriculture and Fisheries in 1993, concluding a career which began in veterinary practice, proceeded through scientific enquiry and finished in the ‘soft end’ of politics. In many ways Elliott’s career provides a reflection of the changing nature of New Zealand agricultural policy development during the second half of the 20th century. This period witnessed a ‘changing of the guard’ in terms of policy decision-making. The traditional, empirically based policy of ‘apprentices’, trained in the dairy factories and on the fisheries protection vessels was challenged (and eventually overcome) by the rise of science. Elliott’s role in these changes was as both a scientist and a manager.

Elliott originally qualified as a Bachelor of Veterinary Science from the University of Sydney in 1956. His decision to enter veterinary science was the result of a compromise, satisfying (in a sense) his father’s desire for his son to be a doctor and Elliott’s preference for the honesty of animals and love of the farming life. At the time, the veterinary school in Sydney was the only one of its kind in Australasia. Access was gained through scholarships assigned to all of Australia’s states and New Zealand. In Elliott’s case, as for all New Zealand applicants, an intermediate year of medical school at a New Zealand University was followed by an invitation to Sydney if grades warranted. New Zealand students were able to undertake the practical experience part of their course in New Zealand. This practical section consisted of a two-week period of introduction to key animal health problems at the Wallaceville Animal Research Station and a further three weeks in the field with a practising veterinarian. Elliott undertook his practical experience at Ruawai by Hokianga Harbour and began his first post there in 1957 before moving to Kaitaia two years later. At the time he was one of only eleven vets in the Northland region.

Veterinary work in the late 1950s was difficult, seasonal work, nowhere more so than in the far north, where access, transport and remoteness shaped the provision of vet services. Veterinarians were in many senses teachers, impressing upon farmers their role in monitoring herd health and administering treatment. As such, time was divided between calving and lambing in spring, mass vaccinations in summer, and ongoing advice and teaching throughout the year. Elliott’s approach to his

early veterinary practice was typical of his pragmatic approach to problem solving. From the beginning his philosophy was honesty, and he was happy to tell a farmer that he didn’t know the answer to the problem and then go and study his books to try and find a solution. This approach earned him grudging respect, but ultimately led him to discover his incompatibility with practice, which was summed up by Wally Te Punga, a fellow veterinarian and Wallaceville researcher who informed the young Elliott: ‘You’ll have to go into science lad, whether you like it or not. You’re becoming obsessed with what you don’t know and not comfortable with what you do know’. Elliott initially dismissed this advice, but, three weeks later, he was on his way to Wallaceville to begin his scientific inquiry.

Elliott chose dairy cattle and microbiology as his subject of inquiry when he arrived at Wallaceville, specifically the incidence of staphylococcus in mastitis. Finding that staphylococci were ubiquitous in the udder and therefore not an indication of causation, Elliott was brought face-to-face with cell-mediated immunity and the alteration of the host/parasite relationship. There were four principal organisms involved in such relationships: tuberculosis, salmonella, listeria, and brucella. At Wallaceville, it was decided that he should study brucella rather than staphylococcus, as the former was seen as a ‘dark cloud’ hanging over New Zealand agriculture. Elliott was then sent to Manchester where he completed a Diploma in Microbiology, becoming, as he puts it, ‘intellectually fit’.

No sooner had Elliott returned to New Zealand and commenced his research than he was granted a Harkness Scholarship which saw him spend several years during the late 60s and early 70s at the Trudeau Medical Research Institute at Saranac Lake in upstate New York. His time at Trudeau was spent investigating the cell-mediated immunity he had begun to study at Wallaceville, eventually writing a book titled: *Brucellosis: A veterinarian’s guide to the literature*.^{*} This guide was intended to impress upon veterinarians the challenges that brucellosis presented. In particular, the book addressed the different epidemiological approach required to manage the disease.

^{*}Elliott, R.E.W.; Christiansen, K.H. (Eds)1977. *Brucellosis: A veterinarian’s guide to the literature*. Animal Health Division, Ministry of Agriculture and Fisheries, Wellington.



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Elliot later expanded on this change in approach in a second book for veterinarians, written with Jean Tattersfield, a statistician with the Department of Agriculture, titled *Investigating Animal Disease Status*.^{*} While at Trudeau, Elliott also became interested in, and was instructed to investigate, two fields which would come to play important roles in his professional development. The first of these covered techniques of the American Management Association, which ran a Management Internship Programme at Saranac Lake, and the second was the organisation of laboratory and diagnostic stations and epidemiology.

Having made a contribution to the literature and become heavily involved in his area of expertise, Elliott was faced with a choice of specialising in research, or returning to breadth, representing as it did epidemiology and the management of disease in animal populations. Recognising his increasing involvement in the organisation of the Research Division, including his involvement in the editorial, library and building committees, and his assessment that he couldn't see himself becoming adequately specialised so as to contribute significantly to his discipline, he acquiesced to being transferred from the Research Division to the Ministry's Animal Health Division. Elliott didn't make this move lightly, believing that it would be interpreted by his research colleagues as 'selling out to the dark side', a belief which reflected the emerging battle lines in MAF, drawn as they were between the increasing power of science and the waning influence of empirically-based decision-making. Elliott, however, saw himself as representing a 'middle way', recognising the importance of empirical learning while asserting the primacy of science in decision-making.

Elliott was put to work in the Animal Health Division organising a scientific process for the national Bovine Brucellosis Eradication Programme (BBEP). Rather than using the non-specific tests available at the time, the BBEP aimed to find and implement the best test available as the primary testing mechanism for New Zealand dairy herds. Using the Automated Complement Fixation Test (developed by Wally Te Punga and the Research Division), and aided by his systems management training with the American Management Association, Elliott set up a Central Brucellosis Laboratory (CBL). He redesigned an existing laboratory, removing partitions and developing a workflow throughout. The completed laboratory included 39 machines, capable of completing 15 000 tests per day. As a measure of the success of this scientific testing strategy, at the conclusion of his nine years in the Animal Health Division, brucellosis had been eradicated from New Zealand.

Elliott was next appointed Director of the Dairy Division. The Dairy Division also reflected the contemporary conflict between scientists and empiricists (or 'apprentices' as Elliott referred to them). Elliott's appointment was seen as a way of confusing these protagonists, in essence giving them a common enemy. His appointment was met by universal resistance: appealed by the Division's Assistant Directors and fought legally by the 'apprentices' through a universal monetary donation of some 100 pounds. The welcome to his new post was complete when he was swiftly sent to Washington to explain to US authorities the recently discovered incidence (some 17% of tests returned positive results) of salmonella infection in New Zealand government-assured casein. The understandably furi-

ous Americans questioned what store New Zealand placed in the international agreements it signed, what knowledge they had of salmonella, what training and education was available in New Zealand, and whether the country was offloading their worst produce on the USA. Elliott managed to placate the assembled delegates partly as a result of his being new to the job, partly because he understood salmonella well, and partly because his time at Trudeau had given him an appreciation of the US scientific system. This incident inspired one of Elliott's most important contributions to New Zealand agricultural science: quality assurance.

Identifying the source of the salmonella infection reflected Elliott's pragmatic approach. The obvious place to look for infection was the dairy factories where the casein was produced. Casein was dried on a Bates drier, which forced hot air through several lineal belts to produce a semi-moist curd which could then be placed in drying cylinders. The hot air used in this process escaped the confines of the dairy factory through a simple chimney on the roof, topped with a conical cover. It was discovered that casein fines were also escaping through the chimney, coming to rest on the roof, and providing an attractive meal for gulls. The result was vast amounts of salmonella-infected gull faeces festering on the roofs. Down-pipes from the roofs were often directed onto the pavements leading into the factories to avoid gouging holes in soft ground thus completing the cycle of introducing salmonella into the casein manufacture process. The structure of the factories exacerbated the problem, particularly during heavy rain, when the salmonella-infected faeces overflowed the guttering and ran down (and inside) the walls.

Elliott and his team diagnosed the combination of the key conditions (heat, moisture, and food) required to produce salmonella (or some other bug), as an 'industrial abscess'. Understandably, there was resistance to this concept in the dairy industry, principally because of the connotations of the term 'abscess'. The solution was found to be equally unpalatable, consisting as it did of a complete rebuilding and reorganisation of the dairy factories: roofs had to be replaced, and drainage needed to be improved; access to drying rooms needed to be restricted to trained personnel, dressed in protective clothing and footwear which could be washed; signage was required to signal these restrictions; and management staff needed to be physically separated from the manufacture process. The total cost of these procedures also caused many to balk, but the strength of the evidence and the support of the increasingly powerful Dairy Board saw them implemented.

Elliott was ushering in a new era of the dairy industry. As he noted: 'the DSIR was building at pace; the scientific acumen was being transferred back to the dairy factories; the Ministry (of Agriculture and Fisheries) was concentrating on quality and not upon acting God in all aspects of dairy production.' What was equally clear to Elliott was MAF's role in this new era: the certification of quality. As such, the development of testing procedures for dairy products became important. The Government's Dairy Laboratories, which had been established to independently test and certify produce for export, eventually couldn't keep up with the workload from around the country. The Dairy Division therefore had to establish a new testing process, where the dairy companies would test their own produce, and the Dairy Division would act as a regulator, testing the testers. By asserting that staff in these new labs required either a chemistry or microbiology degree, the regulations also

^{*}Elliott, R.E.W.; Tattersfield, J.G. 1979. *Investigating Animal Disease Status*. Animal Health Division, Ministry of Agriculture and Fisheries, Wellington.

impressed upon universities the need for more suitably qualified graduates. A complete quality assurance framework for the New Zealand dairy industry had been developed, whereby a defect would be found, the alarm would be raised, the product removed from circulation, the manufacture process searched to find the cause, a solution found, and production resumed.

Elliott spent less than three years in Dairy Division before being appointed to the position of Assistant Director-General with specialisation in Fisheries.

The Marine Department, previously within the Ministry of Transport, had been split off and incorporated as two separate divisions – Fisheries Research and Fisheries Management – within the new Ministry of Agriculture and Fisheries. Elliott saw within these Divisions similar entrenched positions to those in the Dairy Division, namely, scientists and empiricists, although in fisheries these factions worked in different areas: the scientists in the laboratories, the practical empiricists on the boats. Elliott's approach was typical; he re-distributed the scientists throughout the Division as a means of promoting interaction and science-based decision-making.

Elliott's success in instituting these changes is best exemplified in the development of the Quota Management System (QMS). Traditionally fisheries had used empirical devices to prevent the over-exploitation of the resource: size of nets; size of fish; number of boats; the closure of specific areas, etc. Recognising the scientific limitations of delineating and distributing specific areas for protection, the QMS was developed to allocate the resource itself. Recognising the great wealth that distributing quota involved, and wanting to avoid disenfranchising specific fishers, the QMS was allocated according to historical presence in the fishery. Elliott recognised suddenly the limitations of this method in accounting for the now theoretically disenfranchised traditional fishermen, particularly Māori. The realisation witnessed another transformation in Elliott; an awareness of the importance of social science in policy-making. According to Elliott the scientific basis of the QMS was sound, but little had been done to understand the social consequences. Elliott attempted to introduce social science to MAF, but was hampered by the entrenched position that 'social science' was as an oxymoron to rival 'military intelligence'.

Elliott drew back from the oversight of Fisheries to take up his final position as Deputy Director-General with primary responsibility for Policy for a period of three years. This position allowed Elliott to synthesise his beliefs on the best means of organising science-based decision making for agriculture and fisheries. His experience in the development of disease management, quality assurance, fisheries resource management, and replacing a culture of empirical thinking with one of scientific thinking had instilled a belief in the importance of drawing on the widest range of scientific input in policy-making. As a result, despite a long search, he came to admit that there was no 'super-discipline' – rather it was the process of bouncing ideas off fellow researchers and people with practical experience to come up with the best information for politicians. In Elliott's eyes, MAF represented such a framework, where a tremendous array of disciplines was available to call on, where science was the generating and testing mechanism for information, and where presence in the field provided practical input.

Elliott appeared increasingly disenfranchised towards the end of his final year in the Policy Division. Having overseen the transfer of MAF from empirical decision-making to scien-

tific decision-making, he himself was caught in a rapidly changing policy environment. Increasingly his belief in the primacy of science in decision-making came into conflict with what he saw as an emphasis on justifying predetermined conclusions rather than the proving of hypotheses. Policy-making for agriculture was shifting towards the 'science of politics' and the transition was happening rapidly. Crown Research Institutes (CRIs) were replacing Ministry-controlled research departments in a competitive economic environment characterised by scarce research funding. The result of the new policy environment was deterioration in science input for policy. Elliott eventually reconciled himself to this post-reform, market-based science environment, but he retained reservations. In particular, he found it difficult to accept that science, subject to market forces, may not necessarily be equitable, that indeed it may be designed to benefit a particular group.

Royce Elliott retired from the Ministry of Agriculture and Fisheries in 1993. His contribution to the development of scientific agricultural decision-making was brought into focus during the development of the GATT framework, where one of the over-arching foci was the management of risk in trade. Fundamental to his approach was a strong belief in science as a means of informing decision-making. In the increasingly trade-dependent dairy industry of the 1970s and 1980s, Elliott recognised the importance of certifying the quality of the nation's produce through the development of science-based systems for identifying risk and mitigating its effects. Equally, in the fisheries divisions of MAF he attempted to transcend the entrenched positions of management and scientists to promote the interests of the fishery rather than the participants. His philosophy was one of constant learning and application of science to problems facing agriculture. His contribution was changing the organisation of New Zealand's agricultural decision-making processes, of which he says:

'There's a lot of thinking that I'm proud to be part of; and I have some satisfaction in looking back on the orderliness of it. People who can't comprehend how a vet got to do all of these other things, could only be enlightened by taking time to show them how everything is built on everything preceding it, so that, A built on B, built on C, expanded to D, E and F and so on.'

Today, New Zealand's export strength in agriculture and fisheries and other natural resource sectors is widely acknowledged as soundly based and increasingly dependent on informed scientific decision making. Royce Elliott's career illustrates just how recently such approaches have been formalised and perhaps goes at least part-way to explaining the continued 'dynamic tension' in policy making evident in the ongoing debate over the role (and funding) of science and social science in decision making

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