A HISTORY OF FOOD TECHNOLOGY AT MASSEY UNIVERSITY

The First 10 Years

Version 2.1

FOREWORD

This booklet has been compiled for two reasons. Firstly, to counter many of the errors and omissions which appeared in the official but brief 2014 Massey University 'history' celebrating 50 years of food technology, and secondly, to place on record the names and details of the staff and students who were involved in the first 10 years. While this is not an official history or indeed a professional history, it should provide valuable background for whoever writes the history of 100 years of food technology at Massey, an event in which I will, regrettably, be unable to participate.

In writing this unofficial history, I have only covered the first 10 years of graduates (i.e., those who graduated from 1963 to 1972) and have attempted to include all those who graduated during this period. It was obviously not possible to include biographical details for everyone since I do not have many contact details. Rather, I have focussed on the staff members from that time plus the course content. In addition, I have included details of post-graduate qualifications obtained by those early graduates, regardless of the university at which they later studied, and reminiscences from four early graduates.

As far as possible, I have tried to simply state the facts and largely refrained from including opinions or comments. This has resulted in a less than racy text but at least (as far as I know) it is accurate. Of course, any readers who detect errors are asked to contact me so that corrections can be made. By including details of the papers and their prescriptions that made up the degree courses in initially dairy science/technology and then food technology, it is possible to appreciate the development of the food technology degree over its first decade and the key topics thought at the time to be essential for the education of food technologists. These details may also serve to remind graduates what they studied and cause many to wonder why they have so little recollection today of the subject names and their contents. Such a reaction would confirm the truism attributed to US psychologist B.F. Skinner that *"Education is what survives when what has been learned has been forgotten."* (*New Scientist*, May 21, 1964).

The development and success of the food technology degree at Massey owes much to four exceptional men: William Riddet, Jack Andrews, Alan Stewart and Kelvin Scott. Without their foresight, vision and determination, what was achieved would not have been possible. Therefore, considerable space in this booklet has been devoted to their lives. Of course, many others played important roles but the contribution of these four was essential.

I have gathered material from a multitude of sources and the major ones are listed in the Bibliography. I have not connected passages in the booklet with their source as this is not intended to be a formal publication. I am reminded of Kelvin Scott's quotation to our Food Engineering Design class of a so-called French proverb that *"To copy from one book is cheating; to copy from two books – ah that is research."* This booklet can therefore be classed as research. It appears that the full quotation is *"If you copy anything out of one book, it is plagiarism. If you copy it out of two books, it is research. If you copy it out of six books, you are a professor."*

I am indebted to many people who have assisted me by providing documents. Unlike the present digital age, cameras were relatively rare in the 1960s and sadly very few photographs appear to have been taken or survived from that period. I have had to rely on scanned photos from magazines and newspapers which means that the quality is pretty lousy but better than nothing.

Among those who deserve special thanks are Tom Robertson and his librarian wife Dawn McKenzie; the Official Archivist at Massey Louis Changuion; Judy Thomas; Jim Andrews; Catherine Andrews; Euan Cant; Fiona Conway; Dianne & Jim Fraser; Buncha Ooraikul; Tipvanna (Jim) Ngarmsak, Dick & Mary Earle; Graeme Latimer; Dave Pooch; Richard Archer; Evan Morch; Brian Maley; Dick Inwood; Alan Griffin, Malcolm Reeves; Janis Swan; Peter Nixon; Bret Morris and Roger MacBean.

A recent (2015) book by Raghu Karnad (*Furthest Field: An Indian Story of the Second World War*) contained a very apposite paragraph: *"People have two deaths, the first at the end of their lives, when they go away, and the second at the end of the memory of their lives, when all who remember them are gone. Then a person quits the world completely."* This booklet is an attempt to record the history of food technology at Massey University up until the end of 1971, and in particular, record the contributions of those most closely involved before all who remember them are gone.

A copy of this booklet has been housed in the Massey Archives.

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June 2016
Revised February 2023

PROLOGUE

The degree course in food technology did not appear 'out of the blue' in the 1960s but was a natural development and successor to a degree course in dairy technology that had been taught at Massey Agricultural College (MAC) since shortly after its founding in 1927. Therefore, any history of food technology at Massey must begin with a review of the establishment and development of MAC and the key role that dairy science and technology played from the very beginning.

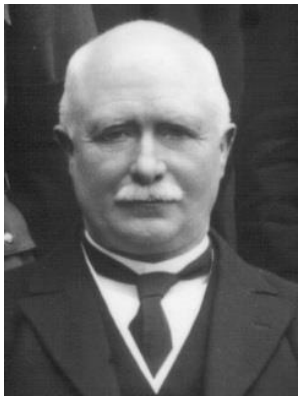
Lincoln College, established in 1880, had been providing agricultural courses strongly biased toward practical agricultural work. In the early 1920s, a three-year course leading to the degree BAgr was being offered, but few students availed themselves of it. At this time, certain departments of state, including Agriculture and Education, and some farming leaders and other public men, were becoming increasingly aware of the need for a greater number of more adequately trained agriculturalists to serve the rapidly expanding primary industries of New Zealand. The Board of Agriculture Commission (1925) and the Royal Commission on University Education in New Zealand (1925) agreed on the inadequacies of the Lincoln degree course, but differed in the remedial action recommended.

In 1924, Scottish-born Sir Walter Buchanan (1838-1924), a wealthy and significant Wairarapa farmer-politician with a particular interest in agricultural education, bequeathed £10,000 to Victoria University College (VUC) in Wellington to establish a "School" of Agriculture. English-born Professor Geoffrey Peren (1892-1980) was appointed to the Chair of Agriculture and he subsequently became the first Principal of MAC in 1927 until his retirement in 1958.

Meanwhile at Auckland University College (AUC), Scottish-born Professor William Riddet (1896-1958) was appointed to the Chair of Agriculture, set up in 1925 with £20,000 bequeathed by Scottish-born Sir John Logan Campbell (1817-1912), a successful businessman and Mayor of Auckland.

The Royal Commission contended that any attempt to maintain three University SchooIs of AgricuIture would doom each to "anaemic mediocrity" and recommended the establishment of an Agricultural College in association with the Universities in some suitable locality in the North Island by a combination of the Auckland and Wellington Schools. The New Zealand Agricultural College was born in September, 1926.

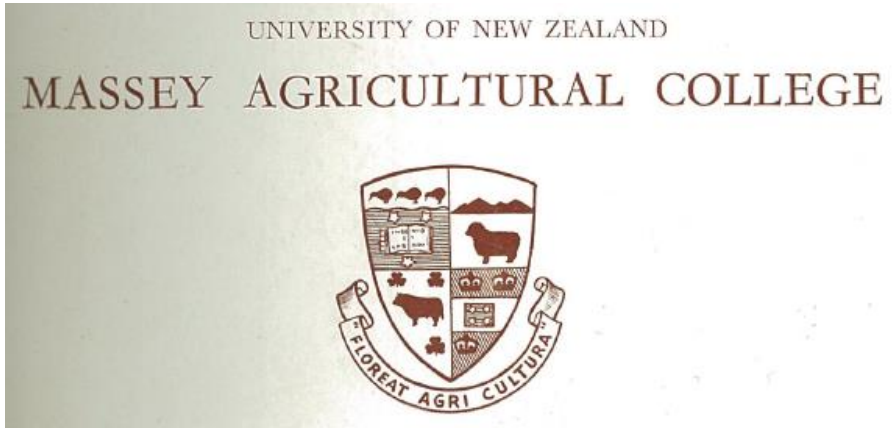
The Massey Agricultural College Act of 29 July 1927 renamed the new College after the late Northern Ireland-born William Ferguson Massey (1856-1925), Prime Minister of New Zealand from 1912 to 1925, who had been a champion of New Zealand's agricultural interests and was often known as Bill Massey or "Farmer Bill".



The Act also made the College part of Victoria or Auckland University Colleges for the granting of degrees, although it could independently award diplomas, and vested all lands and property in the hands of the College Council. Professors Peren and Riddet were released from their respective University Colleges, and Peren was appointed acting Principal.

The two founding Professors Geoffrey Peren (left) and William Riddet shown here in 1926 when they were investigating possible sites for the Agricultural College

Professor Riddet was initially appointed as Logan Campbell Professor of Agriculture while Professor Peren was appointed as Walter Buchanan Professor of Agriculture. In 1927 Riddet was also appointed Director of the newly established Dairy Research Institute (DRI), a unit of the Department of Scientific and Industrial Research (DSIR). In the early 1930s he was listed in the Calendar as Dean of Dairying, Director of the Dairy Research Institute and Logan Campbell Professor of Agriculture. The DRI became incorporated in 1947 with full control given to its own board and Riddet remained as Director until his death in December 1958 when he was succeeded by Dr Hugh R. Whitehead. By 1941 his title was Professor of Dairying, and in 1949 he had the additional title of Vice-Principal. In the 1958 Calendar Riddet was listed as Logan Campbell Professor of Agriculture.



Massey Agricultural College opened for students on 2 March 1928, offering the degrees of BAgrSc and MAgrSc of the University of New Zealand, as well as certificate courses and a Diploma of Associateship in Dairy Manufactures, the latter being taught in blocks during the winter off-seasons over three years. It was later renamed the Diploma in Dairying, and in 1964 the Diploma in Dairy Technology. The programme continued for many years, providing a foundation

education in dairy science and technology for the dairy industry. Declining student numbers and changing industry needs saw the demise of the programme, with the last diplomates in 2014. The Waikato Institute of Technology (Wintec) now offers a briefer, modular, polytechnic Diploma in Dairy Processing.

While lectures in the early years were held in the Batchelar homestead and adjacent temporary buildings, the Main Building was ready for use at the beginning of the 1931 academic year. It contained lecture rooms, teaching and research laboratories, a library, assembly hall, staff studies, a student common room, and also housed the DRI.

In 1928 Massey had a teaching and research staff of 14, 17 if DRI staff were counted. Among notable 1928 appointees was the only women lecturer for this period, Miss Agnes W. Crawford from Scotland who had a NDD and BDFD (meaning of this abbreviation unknown), and was Assistant Lecturer in Dairying until 1932 and 'skilled in fancy cheese-making'. Lectures were also given by invitation on specialist subjects by employees of the DRI and others.

The BAgrSc(Dairy Science) option of the degree was first offered in 1930, later changing its name to BAgrSc(Dairy Tech). A MAgrSc(Dairy Tech) degree was offered for the first time in 1950.

The four-year BAgrSc, with the first ('Intermediate') year having to be taken at other universities until 1959, was offered for those who intended taking up agricultural science as a profession, such as research workers, teachers, field instructors and technical experts. Majors in botany, zoology, chemistry, field husbandry, livestock and dairy science were offered. Before entering the second year of the course (i.e., after completing an intermediate year at another university), students taking the dairy science option were required to "present a certificate that after attaining the age of seventeen years and prior to the commencement of his attendance at lectures in subjects of the Second Professional Examination he has worked for at least one season in a dairy factory and at some other time has devoted at least twelve further months (not necessarily consecutive) to work in a dairy factory."

The practical nature of the degree is illustrated by the requirement for those majoring in dairy science to present a certificate of completion of satisfactory practical work in "Machine-shop Practice" in accordance with the following syllabus:
Chipping, filing and fitting, drilling, tapping and threading; cutting, threading and fitting pipes; sheet metal work; soldering; brazing; babbitting. General repairs – utensils, dairy machinery, beltlacing, electrical fittings.

The dairy factory, across the road from the main campus, was built in 1928 and contained the latest machinery in a small pilot plant. It was designed by an American architect Roy Alston Lippincott (1885-1969) who had also designed the Refectory and Main Building at Massey, as well as the Arts building at Auckland University College.

The function of the DRI was to undertake all research work connected with the production, manufacture and utilisation of dairy products, and the fact that it shared the same Main Building as the College was a distinct advantage with many joint dairy research efforts. Riddet proved skilled at obtaining research funding, largely through setting up co-operative ventures with other organisations.

The excerpt below from the 1938 report to Parliament of the Minister in Charge of Scientific and Industrial Research Department (sic) illustrates that Riddet was also well-connected politically, although the discussions about "training men in industrial technology" do not appear to have led to any new initiatives at Massey:

"One of the biggest factors in the industrial efficiency of most secondary industries is that of the technical education of managers and foremen who are in charge of special technical operations. The need for such education has been emphasized, for example, by the recent experience of the Dairy Research Institute in connection with the maintenance of the activity of single-strain starters under factory conditions. It was found that personal instruction in the special technique had to be given in the factories by officers of the Institute, and when this was done no difficulty was experienced in obtaining entirely satisfactory results."

"The question of providing suitable educational facilities for training men in industrial technology, so as to provide them with a basic knowledge of science as applied to industrial processes and thus enable them to avoid troubles by anticipating their causes, is therefore an important one, and is at present being actively discussed by the Council of Scientific and Industrial Research and the educational authorities".

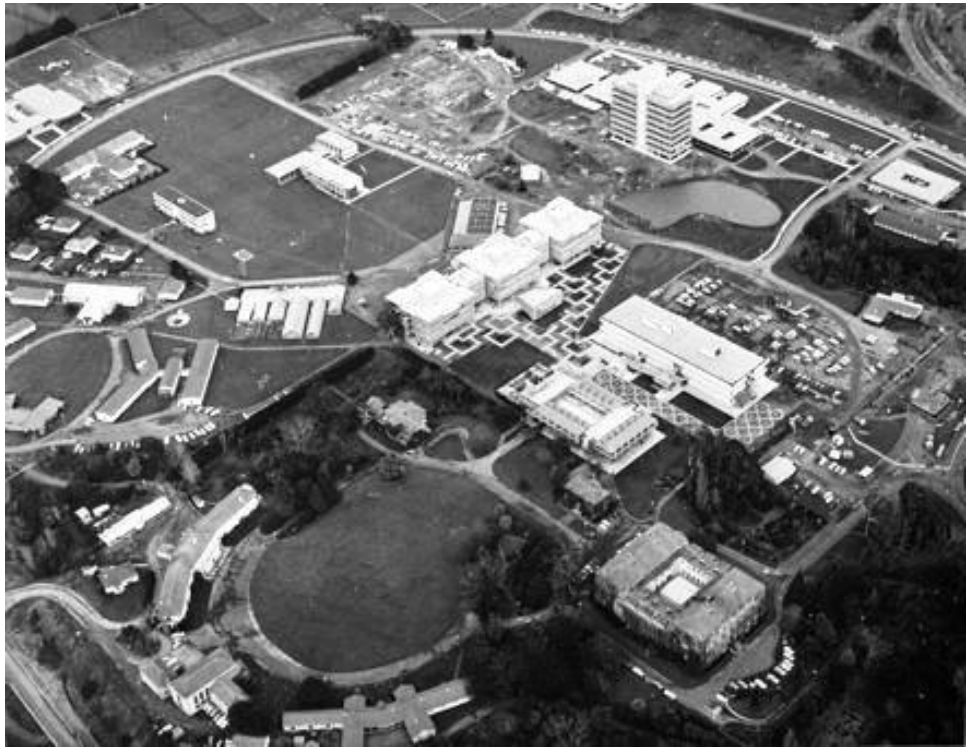
In 1966 the DRI moved from the Main Building to its own building on the other side of Tennent Drive. Local architect Acton Wylde-Brown, responsible for the design of the Riddet Building, also designed the DRI which shares many common design features (see photo on next page). The DRI also transferred many of its activities from the dairy factory to its own process hall, and the Biotechnology Department took over part of the old dairy factory.

Refurbished Main Building

The picturesque swimming pool, initiated by the Student Association and built with student labour, was opened in 1935 but became a car park for Business Studies staff cars in the late 1970s.

In 1961 the original name of Massey Agricultural College (MAC) was changed to Massey College by parliamentary act. This act permitted closer association with Victoria University (including teaching for the degrees of that University) until Massey gained full autonomy in 1964. This association was retained in the Massey University College of Manawatu Act in 1962, and on 1st January 1963, Massey College merged with the branch of Victoria University in Palmerston North based at Hokowhitu, the latter becoming the General Studies Faculty of the new institution. The College had direct access to the University Grants Committee (UGC), but still taught for the degrees of Victoria University. Massey also assumed responsibility for extramural teaching. In 1963 the Massey University of Manawatu Act was passed,

and on 1st January 1964, Massey University of Manawatu emerged as an autonomous university able to grant its own degrees. In 1966 the Act was amended, abbreviating the University's name to Massey University. Dr Alan Stewart, who had been Principal since 1959, become Vice-Chancellor in January 1964 when the College achieved autonomy as a university; he retired in 1982.



Aerial view of Massey campus 1971

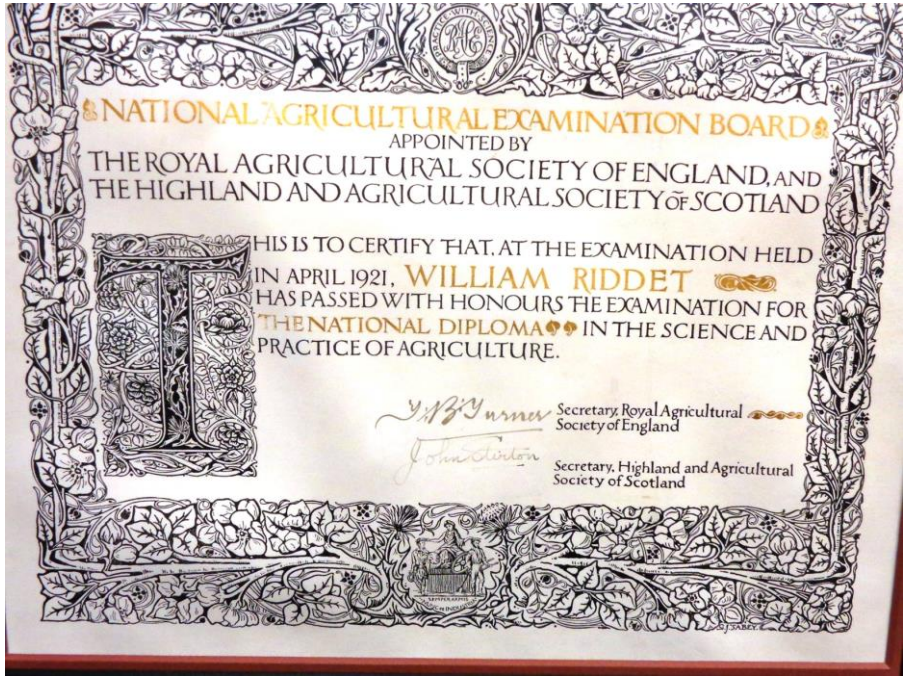
DRAMATIS PERSONAE

William Riddet (1896-1958)

No discussion of the main characters involved in the history of food technology at Massey can begin without mention of Professor William Riddet, the person who introduced the BAgrSc(DairySci) degree in 1930 and laid the groundwork for the introduction of the food technology degree, a development that occurred after his death from leukaemia in December 1958.

William Riddet was born at Cubeside Farm in Dalry, Ayrshire in 1896 and commenced studies in dairying and agriculture at the West of Scotland Agricultural College in 1914.

After just one year of study he volunteered for war service and in 1919 he was demobilised with the rank of Captain. He resumed his studies and qualified (with honours) for a National Diploma in Dairying (NDD) and a National Diploma in Agriculture and went on to graduate BSc(Agric) in 1923 from Glasgow University. He then held various teaching and extension positions at the College. His final appointment at the College was as lecturer in dairying in the Dairy School for Scotland, where he taught a wide range of dairying subjects and gained an introduction to research work in processing. Little over a year later in May 1925, William Riddet, aged 29, was appointed to the Logan Campbell Chair of Agriculture at Auckland University College. Riddet was Vice-Principal and a founding staff member of Massey Agricultural College. In 1927 he was appointed Director of the Dairy Research Institute (DRI), a position he held alongside that of Professor of Dairying. This ensured close co-operation between the College and the DRI in the field of dairying, and his was a major influence on the academic policy of the College.


NATIONAL AGRICULTURAL EXAMINATION BOARD
APPOINTED BY
THE ROYAL AGRICULTURAL SOCIETY OF ENGLAND, AND
THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND
THIS IS TO CERTIFY THAT, AT THE EXAMINATION HELD
IN APRIL 1921, WILLIAM RIDDET
HAS PASSED WITH HONOURS THE EXAMINATION FOR
THE NATIONAL DIPLOMA IN THE SCIENCE AND
PRACTICE OF AGRICULTURE.
Secretary, Royal Agricultural Society of England
Secretary, Highland and Agricultural Society of Scotland

He had an original, fertile mind. He bubbled over with ideas. He was enthusiastic and stimulating. Colleagues recalled that a 15-minute discussion with Riddet would leave a staff member with enough suggestions for work for the next six months. The following week Riddet would be asking for results! He did not appear to recognise the limitations of time, individual capacity, or facilities. He challenged. He himself worked tremendously hard. Laziness was an anathema to him.

Riddet held strong views on agricultural education. By reason of his senior position at Massey, his forceful personality and the respect given his opinions, his was a major influence on the academic policy of the College. Earlier in his career, teaching occupied much of Riddet's time. He made his major contribution in subject material and treatment in the dairying field. He evolved a pattern in which the teachings of the old world in stock feeding and management and farm-scale milk processing were blended with knowledge and experience of the grassland farming and large-scale factory manufacturing of dairy products in New Zealand.

Riddet played a prominent part in selling technical education to the dairy industry. He was remarkably successful in this with the dairy technology diploma course. He found a much less encouraging response to the degree training in dairy technology, and the industry was the poorer because of it.

Riddet had no advanced training in research, and scant knowledge of sophisticated techniques; his role was to organise and stimulate. His extraordinarily wide range of knowledge of the field from dairy husbandry through processing to marketing gave him a perspective that none could match. Above all, he was a fount of ideas. It was the task of his associates to reduce the ideas to practicable proportions, devise the methods and produce results. It was very largely his outstanding work as Director of the Dairy Research Institute that brought him in 1953, at The Hague, one of the highest awards in the dairy world - the Gold Medal of the British Society of Dairy Technology. The award is made to those who (in the opinion of the Council) have rendered particularly distinguished service to the global dairy industry and is awarded no more than three times in ten years. To date 18 medals have been awarded; Riddet was the second recipient and the only one to date from New Zealand. The citation concluded *"Tireless and far-sighted, with great organising ability and ripe wisdom, Professor Riddet has played a major part in the progress and development of dairy technology and the dairy industry in New Zealand".* He was awarded a CBE in 1954 and his funeral on 2nd January 1959 was attended by the Prime Minister Sir Walter Nash.

Riddet was responsible for teaching dairy husbandry and technology and directing research into the many problems confronting the dairy industry. At a time when scientists were treated warily, he was able to talk with both dairy farmers and dairy factory managers. He was renowned for his enthusiasm, energy and endless supply of new ideas, and in the years up to the Second World War his imprint can clearly be seen in a wide range of projects undertaken at Massey. Technical publications bearing his name dealt with pasture management, cow nutrition and milk composition, flavour defects in milk and dairy products, butter boxes and cheese quality.

Riddet formed the Dairy Science Association in 1929, introduced the Dairy Factory Managers' Week in 1931 and the Dairy Farmers' Conference in 1938, all of which met annually at Massey. The highly successful, annual Massey dairy farmers' conference was a unique forum for scientists and dairy farmers to share new ideas and technology. Riddet also promoted the Dairy Factory Managers' Week, equally successful in drawing together researchers and factory managers. In May 1961, for example, it attracted 275 participants.

He was an active member of the New Zealand Dairy Science Association, the New Zealand Society of Animal Production, the New Zealand Grassland Association, the New Zealand Institute of Agricultural Science, and the Rotary Club of Palmerston North, among other organisations. He was a founding member of several and held high office in many. He was also on the Board of Governors of the independent Anglican school St Peter's at Cambridge that opened in 1936 with buildings designed by Lippincott and supervised their dairy herd. As an aside, his grandson Hamish Conway graduated BTech(Hons)(ProdDev) in 1995 and DipDairySciTech the following year.

Professor William Riddet was known by students as Prof. Bill or 'the Wee Mon', the latter sobriquet reflecting his Scottish roots and small stature. He was long remembered as an inspiring teacher and enthusiastic researcher, even if he depended on others to perform the research he so willingly suggested.

Described as 'the founder of dairy science in New Zealand', Riddet is remembered for his untiring work over 30 years for the College and the DRI. He was one of the few in his era who had scientific knowledge and understanding of both milk production on the farm, and milk processing in the factory. Among other things, he pioneered the use of the electric fence, and was known for his endless supply of new ideas in seeking answers to problems.

John Clark Andrews (1903-1966)

Dr Jack Andrews MSc PhD (1928) FNZIC (1936) AMIChemE (1945) FRIC (1947) was the first PhD graduate in Science at the Auckland University College for a thesis on sugars. Somewhat surprisingly there is no copy of his thesis or record of it in the University of Auckland library. He was awarded the 1851 Research Fellowship from the Royal Commission for the Exhibition of 1851, to travel to England for postgraduate study with a stipend of £150 per annum. He declined the award and instead, as Chief Chemist, established the Westfield laboratory of R. & W. Hellaby Ltd, becoming Works Manager in 1936. From 1936 until 1956 he was member of the Council of the DSIR.

In 1941 he was appointed Works Manager at Challenge Phosphate, a position he held until 1950. During the war he was seconded for special service as a member of the Food Preservation and Transport Advisory Committee of the DSIR, together with Drs. McDowall, Doak, Annett and Mr. Tiller. As a consequence of the committee's work, he carried out investigations into the boning of carcasses to facilitate denser packing. He also initiated research and production of dehydrated meats in New Zealand. In this project he was required by the Department of Agriculture to undertake the design of a commercial meat dehydration plant for installation at Borthwick's Feilding freezing works. With help from several sources, a plant capable of producing 5000 tons of dehydrated meat per annum was designed virtually without resource to outside information. Andrews felt that they had made a major contribution to the palatability and nutritive value of their dried meat by returning to the meat the concentrated cooking juices just prior to packing.

In the middle of this project in March 1943, Andrews was sent to the USA to attend a conference on meat dehydration. Once there, his visit was extended into a nine months' study tour during which he met people like Mrak and Joslyn from the Food Technology Department at the University of California, thereby establishing the first real links between food technologists in New Zealand and the USA. Earlier visits to Australia had similarly established links with Dr Jim Vickery, the Chief of the CSIRO Division of Food Preservation & Transport.

His work during this period suffered the same fate as that by McDowall and Dolby on dry butterfat, and Tiller and Doak on dried fruit and vegetables. Contracts for products from the processes developed were not renewed when WWII hostilities ended. In 1951 he was appointed Factory Manager at Brown, Barrett & Co., a producer of Excelsior coffee, coffee essence, HP sauce, Butterfly teas, and baking powder in Auckland. Then in 1955 he was appointed Works Manager (later Director) at Ivon Watkins in New Plymouth, becoming Director of Watkins-Gardinol Chemicals in 1960. Ivon Watkins produced over 200 chemical and engineering products including the herbicide 2,4, 5-T, a key component of Agent Orange - the defoliant used by the United States military in the Vietnam War

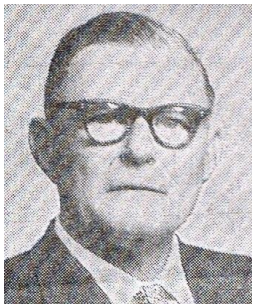
that contained the toxic dioxin TCDD. In 1959 he was appointed to the Board of the Meat Industry Research Institute of New Zealand (MIRINZ).

However, it is as an original and provocative thinker that Andrews really made his mark. In 1945 he was the President of the NZ Institute of Chemistry and took as the theme for his Presidential Address the topic "Food and Food Technology" saying: *"As you all know, a course in chemical engineering is now being established at Canterbury University College, and I hope the day is not far distant when a chair in food technology can be established by the University of New Zealand. When one considers the importance of foodstuffs in the national economy of New Zealand, it is a cause of wonder to me that such a Chair has not been established earlier, and if there is in the community anyone who wishes to benefit the people of this Dominion, there can be no better objective than the endowment of a chair in food technology. I have heard it stated that such a chair would conflict with the work on the nutritional aspects of food now handled by the Home Science Department of the University of Otago, but I can only say that I cannot see any possibility of this, as their functions would be complementary, not overlapping, and would ultimately strengthen each other".*

He also said *"There is a great need for more fundamental knowledge of foodstuffs which will bring in its train a new approach and radical alterations in the methods adopted for their preservation. We have probably in this country achieved more in the case of animals than in the case of plant products. We have a long way to go as yet in the case of fruit and vegetables. Fortunately, the demands of war have focussed our attention on these products, and it is to be hoped that a study of modern methods of cultivation and selection will result in more suitable raw materials being available to the factories in the future. To achieve these results some changes in our farming practice and marketing of the raw material may be necessary".* He concluded by saying that *"If we have the will to apply ourselves to the task, not only can we assist in the solution of world food problems, but also improve our own diet. Much can be done in New Zealand if all contribute their share and realise that continued effort is necessary for its achievement".*

Andrews was a member of the Auckland University College Council from 1947 until 1955. In 1953 he was appointed to the Council of Massey Agricultural College (MAC) as a representative of the Auckland University College Council. In his position as the Vice-Chairman of MAC Council, he was prominent in putting forward the case for a food technology degree. In 1963 he became the first Chancellor when MAC was granted university status as Massey University of Manawatu. He died in 1966, the same year he presided over the official opening of the Riddet Building. His advocacy within the College Council and further into the policy-making system of the University of New Zealand, was an important factor in the establishment of a food technology degree.

As chairman of the Auckland Branch of the NZ Association in 1939, he proposed that the first conference on food technology in New Zealand be held in association with the New Zealand Centennial Celebrations in 1940. Unfortunately, the war intervened and so it was not until May 1964, as Chancellor of Massey University, that he was able to attend the first Food Technology Conference in New Zealand which he had the pleasure of opening.



Andrews was elected the first member of the professional society known as the New Zealand Institute of Food Science and Technology (NZIFST) at the May 1965 NZIFST AGM. On the 27th October 1964, Andrews wrote to Professor Scott and commented "Enclosed please find my cheque made out to you personally to cover my application for membership of the NZ Institute of Food Science and Technology. I do appreciate your suggestion that I should be the first member but felt that in all fairness the honour should be yours. This Institute would never have been formed but for your efforts."

John (Jack) D. Sargent

Jack Sargent was appointed in 1940 as a Lecturer in Dairy Bacteriology. By 1951 dairy bacteriology had been changed to microbiology and by 1953 he was listed as Senior Lecturer and Head of the Department of Microbiology. He had an MSc and retired in 1966.

William (Bill) Leslie Harkness (1909-1978)

Bill Harkness had a DipDy from Massey and was appointed to the staff in 1943 as a Lecturer. He had a joint appointment with DRI (25% Massey; 75% DRI) and continued in the Department teaching the Diploma in Dairy Technology students until August 1967. He died in January 1978 at the age of 69.

John (Jack) William Ward (1906-1962)

Jack Ward had a National Diploma in Dairying from England, a two-year course that in addition required six months on an approved dairy farm. He joined the staff at Massey in 1946 and taught the market milk option of the Diploma in Dairying. He was appointed Acting Head of the nascent Department of Food Technology in 1961 and sadly died from drowning in Lake Taupo in December 1962 at the age of 56.

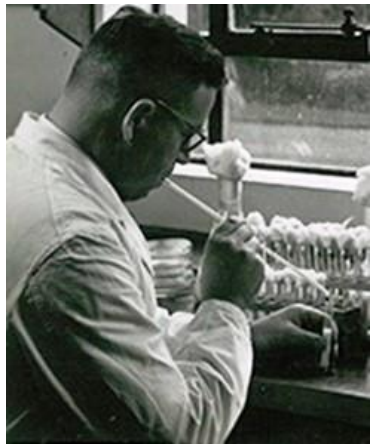
John (Jack) Arthur Singleton (1911-1965)

Jack Singleton was appointed to the staff at Massey in 1946. He had a BSc and BAgrSc from Massey and as the Factory Superintendent was responsible for the operations of the dairy factory; he died in January 1965 at the age of 54.

James (Jim) Havelock Henson (1914-1993)

Jim Henson worked for several years with the Normanby and Hawera dairy companies in Taranaki before deciding to study for a BAgrSc(Dairy Science) at Massey in 1939. In 1940 he enlisted and served for four years with the NZ Medical Corps (NZMC) in the Middle East before returning to Massey to complete his degree. On graduating, he joined the DRI as a Technical Liaison Officer, mainly in

the cheese area which included the development of continental-type cheeses such as Gruyere, Romano, blue-vein and cottage cheeses. He was appointed a Lecturer in Dairy Technology at Massey in 1950 where his main interest was teaching and co-ordinating what at the time was the Diploma in Dairying but was renamed the Diploma in Dairy Technology in 1964.



In 1962 Jim took a 15 month leave-of-absence to work as a Dairy Training Advisor for the government of Maharashtra State in India sponsored by FAO. Also during this period he was co-director of the Dairy Teachers workshop at the Aarey Institute of Dairy Technology in Mumbai sponsored by FAO, UNICEF and the government of India. Jim was very active in the NZ Society of Dairy Technology and the NZ Dairy Science Association and was an advisor to several dairy companies. He retired in February 1976 but continued to teach Diploma students on a part-time basis. For over 20 years he was on the executive of the Varsity Rugby Football club and was elected its fourth life member on his retirement in 1976. He died in March 1993 at the age of 79 as a result of a traffic accident in front of the main entrance to Massey.

Bernard (Bernie) S. Le Heron (1918-2010)

Bernie Le Heron completed a DipDy from MAC in 1946 and was appointed to the staff in 1950. Like Harkness, his was a joint appointment with DRI and he continued in the Department until 1965. Although no longer a member of the Department, he continued to give lectures to the Diploma in Dairy Technology students until 1983 when he retired from DRI where he managed the Processing Hall. From 1987 to 1998 Bernie was editor of the New Zealand Journal of Dairy Science & Technology.

Alan Stewart (1917-2004)

Dr Alan (later Sir Alan) Stewart was Principal of Massey Agricultural College from 1959 to 1963 and founding Vice-Chancellor of Massey University from 1964 to 1983, during which time he guided the institution's transition from agricultural college to full university. He was knighted in 1981 for services to education.

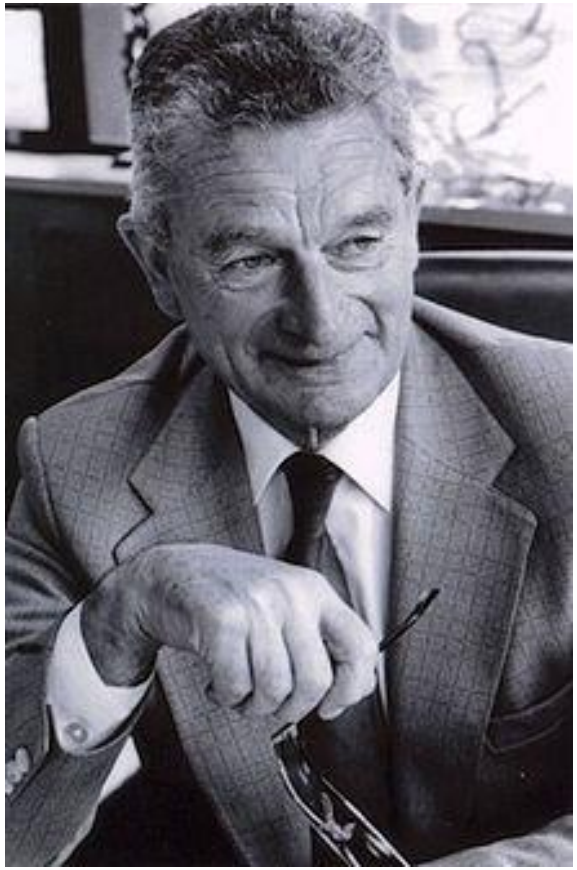
Stewart earned his Bachelor of Agricultural Science in 1939 and Master of Agricultural Science in 1940 where his thesis was published under his nom de plume of "Borax". In 1940, Stewart was awarded Massey's second Rhodes Scholarship, the first being awarded to Malcolm McGregor Cooper in 1934 and the third in 1961 to John Telfer Reid. However, his studies were interrupted by the outbreak of World War II and Stewart served as a NZ naval volunteer in the Royal Navy for the duration of the war. A spell on a destroyer doing convoy duty in the North Sea was followed by officer training time on minesweepers in the Scapa Flow area, and then command of a minesweeper in the Bay of Bengal. After the war, he began working as an Assistant Lecturer at Massey Agricultural College. In 1946, Stewart was finally able to fulfil his Rhodes Scholarship and moved to England to attend the University of Oxford where he was an Oxford

Blue in rugby, played for the combined Oxford-Cambridge rugby team in their 1948 tour of Argentina, and was selected for the Scotland national rugby team, although a knee injury at this time ended his rugby-playing career.

After completing his DPhil at Oxford in 1949 with a thesis entitled "*Study of the heterogeneity of herds in relation to breeding policies for dairy cattle*", Stewart returned to Massey in 1950 as a Senior Lecturer in animal husbandry. Although his specialty was dairy cattle breeding, he covered all aspects of herd improvement. Realising that an academic career of Senior Lecturer/Reader/Professor/Dean was not for him and in the knowledge that Professor Peren was retiring as Principal in 1958, he decided to gain overseas experience in order to play a more significant role at Massey. So in 1954 Stewart returned to England to serve as the Chief Consulting Officer for the Milk Marketing Board of England and Wales, charged with managing an improvement in the productivity of dairy herds. He returned to New Zealand again in late 1958 on being appointed Principal of Massey Agricultural College as Sir Geoffrey Peren's successor. At the time the College's enrolment stood at just 578 students.

Stewart & Peren at Riddet's funeral 2nd January 1959

From his appointment as Principal in January 1959, Stewart was a very strong supporter of a degree in food technology. He was keen to expand Massey's degree offerings and realised that the degree in Dairy Technology could not survive with the small number of annual enrolments. He and Jack Andrews worked assiduously and closely to support a degree in food technology. Without such strong support from Stewart, it is likely that the degree would never have been introduced. In 1964, Massey was made an independent university and Stewart was appointed its first Vice-Chancellor.



Garth Morton Wallace (1919-1992)

Garth Wallace worked as a laboratory cadet in the town milk industry in Wellington while studying for a BSc in chemistry at Victoria University. On graduation, he was appointed Analyst and Works Chemist at Lockwood & Sons who used to manufacture pharmaceuticals, and essences for the jam, ice cream and confectionary industries. In 1940 he enlisted and served in the army for five years in the Middle East. After the war he worked as Mill Foreman at the newly built Dunlop Rubber factory in Christchurch. After two years he moved to Durban in South Africa for six months training before taking over as manager of a new Dunlop factory in the North Island. In 1948 he joined DSIR Dominion Laboratory in Wellington as an analyst and gained Certificates of Proficiency in dairy chemistry, bacteriology and manufacturing before moving to the Government Laboratory in Auckland where he was in charge of chemical and bacteriological analysis of milk, water and food.

In January 1956 he joined Massey as a Lecturer in the Department of Agricultural Biochemistry, transferring to the Department of Food Technology in 1961. He was President of the NZ Dairy Science Association in 1961 and President of the NZ Institute of Food Science and Technology from 1969 to 1971, having been inaugural Secretary/Treasurer from 1964 to 1967. In 1967 he was awarded his PhD for a thesis entitled *"An Investigation of Factors Affecting the Composition of Milk and of Methods for the Analysis of Milk Components".* Garth carried most of the departmental and degree administration under Kelvin Scott and continued this under Ted Richards. He was Acting H.O.D. when Scott moved to the new Department of Industrial Management & Engineering in 1970. He also largely organised the NZIFST conferences held at Massey and helped build liaison with industry. Garth took early retirement when he turned 60 in 1979 and spent the next 5 years running the Dairy Industry Graduate Training Programme before becoming involved with fund-raising for the Arohanui hospice in Palmerston North in 1985. He died at the hospice from skin cancer (a result of 5 years with the army in the Middle East) in October 1992 at the age of 73.

Sybil E. Quin

Sybil Quin became well-known to a generation of students as a demonstrator in the food chemistry and food microbiology laboratory

classes. She grew up in the UK and after completing a National Diploma in Dairying worked for the UK Department of Agriculture in the National Milk Testing and Advisory Service. Sybil arrived in NZ in 1953 and became a Demonstrator in the Department of Agricultural Biochemistry, transferring to the Food Technology Department with Garth Wallace in 1961. In 1964 she returned to England to do a post-graduate Diploma in Food Microbiology at the National College of Food Technology at Weybridge (now Reading University). Outside of work, Sybil was an A Grade squash player and keen tramper. She retired in the 1980s.

James Kelvin Scott (1920-1990)

Kelvin Scott was born in Otorohanga in 1920 and attended Westport Technical College. He won a bursary to study at Canterbury University College where he graduated BE in Mechanical and Electrical Engineering in 1942. As the 2nd World War was in progress at the time, his first job was with the Mines Disposal Unit of the Royal New Zealand Naval Volunteer Reserve (RNZNVR). He also worked on control systems for various military projects and designed servomechanisms for radar installations. Some of his designs were very noteworthy, achieving great economy, with thorough fitness for their purpose. One example is a wartime radar antenna which he designed and is now in the Museum of Transport and Technology (MOTAT) in Auckland that opened in 1964. Very few people have their work on display in a museum during their own lifetime. During this period he became very interested in the mathematics behind rocket flight, etc. and was made a Fellow of the British Interplanetary Society.

After the war he worked as Engineer-in-Charge of the Industrial Development Department attached to the Canterbury University Engineering School where he was involved with heating, cooling and temperature control problems. In 1948 he was appointed Chief Engineer at the Dairy Research Institute (DRI) in Palmerston North where he established the Engineering Department. In 1986 he reminisced that neither he nor DRI knew precisely what was required in this new position so he carried out surveys into the engineering side of the dairy industry and decided that the biggest impacts would be in the processing side. He then began a systematic investigation of all the processes employed by the dairy industry with the aim of linking the processes in with chemical engineering practice. The first task was farm refrigeration equipment for milk, followed by numerous other innovations, among them a rejuvenation of the casein industry through continuous processing; the initiation of moves into continuous cheese-making, and basic work on improving the efficiency and design of the Vacreator™ for removing taints from cream.

In 1958 Scott was presented with the Silver Medal of the Australian Society of Dairy Technology for his paper "*Progress in Engineering of Dairy Processing*" that had been presented to a meeting of the

Victorian Division in October 1957 and published in the *Australian Journal of Dairy Technology*. In this paper, according to the citation, he presented two basic concepts: "heat and mass balance" and "rate of heat or mass transfer" and showed how important and enlightening these were in application to such practical problems as deodorisation of cream, moisture loss from cheese, cooling of milk on the farm, and the measurement of milk quality.

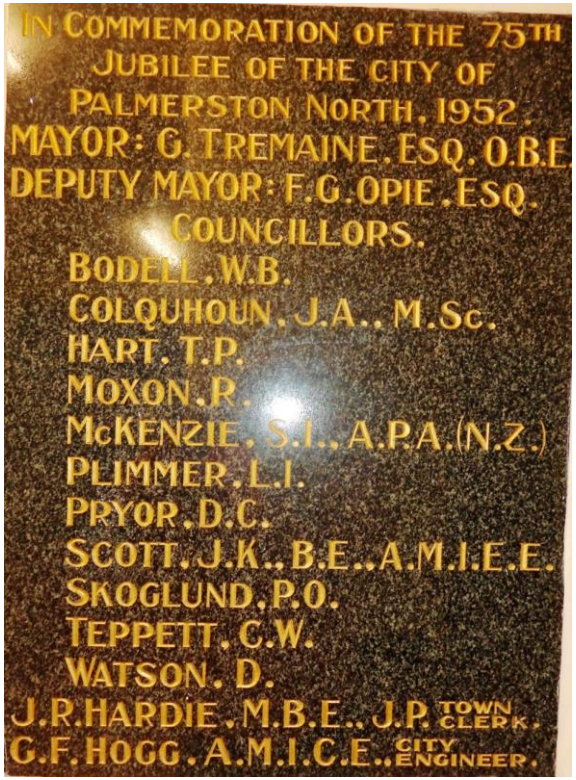
The Introduction to the paper illustrates the importance he attached to process engineering, an importance that informed the content of the food engineering papers in the food technology degree in the 1960s:

"Dairy engineering can be divided conveniently into three sections:
(1) Fabrication, maintenance and operation of equipment;
(2) Engineering services such as steam, electric power, refrigeration, etc.;
(3) Process engineering.
Dairy engineering is widely taken to comprise only the first two sections, probably because the functions of much of the traditional dairy processing equipment have not been adequately studied by engineers in the past. A valuable contribution to dairy technology can be made by an investigation of the fundamentals of processing equipment, and for this reason the Engineering Department of the Dairy Research Institute (N.Z.) gives close attention to a study of the principles of processing equipment used in the manufacture of butter, cheese, casein and milk powder.

Dairy process engineering is largely a specialised branch of chemical engineering; as with any branch of engineering it is not a true science, but a way of thought which gives birth to methods of designing equipment and predicting its operation, using such sciences as mathematics, physics, dairy chemistry, bacteriology, economics, etc. to this end."

At this time Scott had the unique honour of being an Associate Member of the (UK) Institutes of Electrical, Mechanical and Chemical Engineers.

He was also active outside of work, completing six years on the Palmerston North City Council (1950-1956) and nine years on the Manawatu-Oroua Electric Power Board (1952-1961).



By virtue of his position as Professor of Food Technology, Scott was appointed a member of the UN Economic Commission for Asia and the Far East (ECAFE) whose purpose was to encourage economic cooperation among its member states. His particular role was in helping to establish food processing in South East Asia. He was also a member of the International Dairy Education Academy, and the FAO Expert Panel on Dairy Education that met in Rome. These appointments, together with some short sabbatical leaves, ensured that he had the opportunity to travel overseas at least twice a year.

In his address on receiving the J.C. Andrews Award for eminence in food science and technology at the 1986 NZIFST conference, Scott (who had retired the previous year) took the opportunity to reminisce about his appointment to the Logan Campbell Chair in Food Technology. He noted that in common with most other Departments of Dairy Science and Technology in the USA and UK in the late 1950s, Massey was considering the conversion of its Dairy Technology Department to a Food Technology Department, in order to offset the problem of small enrolments (in the 32 years that the BAgrSci(DairyTech) degree was offered (1930-1962) there were just 30 graduates of whom half were from Australia). It was this combination of circumstances that made it possible, at that time, to seriously consider a Food Technology Department as put forward by Andrews and others and very strongly supported by Stewart.

The Conditions of Appointment for the Chair made it very clear that the person appointed should be experienced and knowledgeable, particularly in fruit and vegetable processing, and to a much lesser extent, competence in food engineering could be an advantage. The short list of applicants was narrowed to Scott (at the time Chief Engineer with the DRI), a senior academic from overseas with specialist interests in fruit and vegetable processing (Dr Christian J.B. Smit from the Food Science Department at the University of Stellenbosch, South Africa) and Dr. Richard Earle, Chief Research Engineer of MIRINZ, and they were interviewed for the Chair in late 1960. According to Scott, Andrews "Naturally fought long and hard for his fruit and vegetable expert but finally I was appointed. Immediately after the decision, Dr Andrews told me that although he had opposed my appointment, he would give me full and enthusiastic support – and this he did."

Although there is no evidence (and one would not expect there to be any) of any discrimination towards South African academics, it is worthwhile recalling the public attitudes towards South Africa in 1960 when the selection committee met. In 1960 nearly 160,000 people had signed a petition – one of the largest in New Zealand history – opposing that year's tour by what amounted to an 'all white

All Blacks' team. Groups like the Citizens' All Black Tour Association campaigned with the slogan, 'No Maoris – No Tour'. Others argued that politics had no place in sport. In the end, Wilson Whineray's team left for South Africa as planned in May 1960. For the record, the All Blacks lost the controversial series 2–1, with one test drawn.

In 1970 Scott became Professor of Industrial Technology in a new Department of Industrial Management & Engineering (later renamed Production Technology). He was Dean of the Faculty from 1961 until 1978. In 1977 he established the NZ Organisation for Quality (NZOQ) that generated concerns at the time that it might siphon off members of the NZ Institute of Food Science & Technology but such concerns proved to be unfounded and NZOQ has developed into a large and successful professional body that draws members from all sectors of the manufacturing industry and offers a 2-year Diploma in Quality Assurance by distance learning.

Scott retired in December 1985 and died from cancer in May 1990 at the age of 69.

Dr Christian Jacobus Bester Smit (1927-2012)

Dr. Chris Smit was born and received his early education in South Africa graduating with a BSc in chemistry and physics from Pretoria University. He then migrated to the United States and received his PhD from the University of California, Berkeley in 1953 for a thesis entitled *"The tannins and related polyphenols of fruits."* His supervisor was Dr Maynard Joslyn (1904-1984), regarded as one of the founders of the science of food technology, especially in the area of chemical food analysis. Joslyn wrote the standard treatise on this subject, a meticulous work entitled *Methods in Food Analysis* (1950 and 1970). His interest in food processing operations led to the publication of a three-volume treatise *Food Processing Operations* (1963, 1964) in which he acted as Co-Editor with J. L. Heid. It was published by Avi in Wesport, CT and will be familiar to food technology students in the 1960s. Joslyn was a charter member of the Institute of Food Technologists and served as its President in 1964-65.

During WWII Joslyn served with distinction in the Quartermaster Corps of the U.S. Army in Australia, New Zealand and China, leaving the service following the war with the rank of Lieutenant Colonel. During this time he would have had contact with Dr Andrews and this is probably one reason for Andrews backing Smit for the Chair in Food Technology. The other reason is that Massey already had staff with a strong background in dairy technology but no one with a background in fruit and vegetables and Andrews wanted to rectify this weakness.

During his career, Smit served as Professor and Head of the Food Science Department he helped to establish at the University of Stellenbosch in South Africa. He was a research scientist with Sunkist Growers in California and held teaching and research positions at the University of Pretoria, the University of California and the Food Technology Research Institute at Stellenbosch. He also completed a Business Management Program at the University of California, Los Angeles. In a striking parallel with Scott, Smit was a founding member and the first organizing secretary of the South African Association for Food Science and Technology and its first Honorary Life Member.

Smit was particularly interested in the chemistry and technology of plant products and published extensively in this area. At the University of Georgia , Smit served as Professor of Food Science (1968-1993), Department Head and Chairman of the Food Science Division (1973-1980), Interim Dean of the College of Agriculture (1980-1981), and Associate Dean and Director of Academic Programs in the College of Agriculture and Environmental Sciences (1981-1993). He retired from the University of Georgia in 1993.

Had Smit been appointed Foundation Professor of Food Technology in 1961, the food technology degree would likely have had more emphasis on food science and less on food engineering.

Harvey Alton Lyall (Hal) Morris (1925-1985)

Hal Morris joined the DSIR Dominion Laboratory as a cadet at the age of 16 and undertook part-time studies at Victoria University (and later Otago University), graduating BSc in Chemistry. He was transferred to the Dunedin branch for six years, and in 1950 he won the N.Z. Institute of Chemistry industrial essay prize with a paper on the potential of a furfural industry in N.Z. based on waste oat husks from the Otago-Southland oatmeal industry. This was followed by a move to Auckland to initiate a joint DSIR-industry investigation into meat curing. Shortly after arriving in Auckland, he received a post-graduate award to study at MIT in the USA. On his return he spent three years with the Department of Agriculture Dairy Division Laboratory in Auckland before joining Unilever (N.Z.) Ltd at their Birds Eye Foods factory in Christchurch, later transferring to Hastings when the Christchurch operations were closed. He worked in Production Management and then R&D before joining Massey in 1962. Although his primary interest was in fruit and vegetables as a commodity group, he was interested in all food preservation processes and in particular the development of new processes and preservation techniques for foods generally. He is remembered by many students for his interest in agglomeration of powders, puffing of gels and roller drying of fruit purees. He resigned from Massey on the appointment of Ted Richards and left in May 1971 to undertake consultancies for FAO and UNIDO in Argentina, Guyana, Libya, Papua New Guinea, Malaysia, Somalia and the Philippines. He returned to Auckland in 1979 where he wrote many food articles for the Auckland Star and died in 1985 from bowel cancer.

Graeme Bruce Latimer (1931)

Graeme Latimer graduated BSc BE(Chem) from Canterbury University College in 1954 and joined the DSIR doing coal research and being principally concerned with boiler surveys. Then followed a brief period with the Huntly Brick & Fire Clay Co. where he set up a Quality Control laboratory. He then spent five year in the Engineering Section of the DRI working under Kelvin Scott. He did the initial work on sodium caseinate and this provided the impetus for the introduction of high temperature driers to the NZ dairy industry. In 1963 he was appointed Senior Lecturer in the Physics and Engineering Department at Massey, transferring to the Food Technology Department in 1965. He was probably best known for work on the extraction of grass protein and the design of the only grass protein extraction and dehydration plant in NZ which was built in the old Fitzherbert East dairy factory at Aokautere. In August 1968 Graeme joined the NZ Dairy Board in Wellington, later moving to Singapore. In the 1980s he returned to NZ and became manager of the Te Aroha Thames Valley Co-op Dairy Co. Ltd in Paeroa and oversaw a multimillion dollar

expansion. He then moved to Rarotonga and managed an orange juice factory before retiring in Auckland.

Mary Aileen Humphries (1934-2020)

Mary Humphries graduated BHSc from Otago University and spent a year in Auckland at the Teachers Training College before teaching for two years at Southland Girls High. This was followed by two years in the UK with alternate spells of supply teaching and touring the Continent. On returning to N.Z., Mary lectured for 18 months in the Home Science School at Otago University before completing an MS in Experimental Foods in the Home Economics Department of the University of Minnesota. Her thesis was entitled *"Flavor changes in frozen meat stored at different temperatures".* On her return to NZ in 1963 she accepted a position as Lecturer in the Food Technology Department where she lectured on quality evaluation, nutrition and sensory evaluation. Mary moved to the DRI in September 1968 to head up the New Products section and develop a sensory evaluation programme. In 1978 she moved to Auckland where she worked as Head of R&D for the Auckland Milk Corporation for 9 years.

Mary Davidson Earle (1929-2021)

Mary Earle graduated BSc in applied chemistry from the Royal College of Science and Technology in Glasgow that subsequently became the University of Strathclyde in 1964. She then undertook a PhD that was conferred by Glasgow University in 1957 with a thesis entitled *"The purification of soya lipoxidase."* Her research included a period at MIT investigating the irradiation of butterfat. On graduation she accepted a position in product development with Unilever at their global R&D headquarters at Colworth House in Bedfordshire. Mary later returned to Edinburgh to set up a Product Development Department for Cerebos Foods.

In 1961 she married Dick Earle and arrived in Hamilton, NZ where she set up a Product Development Department at the Meat Industry Research Institute of New Zealand (MIRINZ).

Mary was appointed Senior Lecturer in the Food Technology Department in April 1965 to coincide with the appointment of Dick

Earle as Professor of Biotechnology. She set up and developed courses in Food Product Development in the food technology degree and built it up as an alternative option to Food Process Engineering for 3rd & 4th Year students. The courses extended to Masterates in 1967 and PhD's in 1971. She also undertook a great deal of co-operative work with industry, starting with the bread baking and bacon curing industries. Mary also played a major role in the Food Technology Research Centre, introducing projects across a wide range of food industries including fruit, pork, dairy, meat and fish, as well as crops; and government departments, and from this built up the FTRC into a substantial, externally funded, activity.

Mary was awarded an honorary DSc by Khon Kaen University in 1990, and a personal chair by Massey in 1992. In 1993 she was made an Officer of the Order of the British Empire (OBE) for her contribution to food technology.

Mary retired in 1994 and then wrote or co-edited several books:

Creating New Foods: The Product Developer's Guide. 1999. M.D. Earle and R.L. Earle.
Food Product Development. 2001. M.D. Earle, R.L. Earle and A.M. Anderson.
Fundamentals of Food Reaction Technology. R.L. Earle and M.D. Earle, 2003.
Case Studies in Food Product Development. M.D. Earle and R.L. Earle (Eds). 2008.

Mary died in April 2021 at the age of 91.

Richard (Dick) Laurence Earle (1930)

Dick Earle was appointed Professor of Biotechnology at Massey in April 1965 and taught parts of the food engineering papers to food technology students for a decade, although his focus was on setting up a biotechnology option of the degree. He graduated BSc BE(Chem) from Canterbury University College in 1952 and joined the Defense Scientific Corp attached to the Chemical Engineering section of the DSIR Dominion Laboratory where he worked briefly on meat dehydration, particularly freeze drying. In 1953 he left to undertake his PhD on the mixing of bread doughs, receiving his PhD in 1957 from Glasgow University for a thesis entitled *"Fundamental aspects of the mixing of plastic materials."*

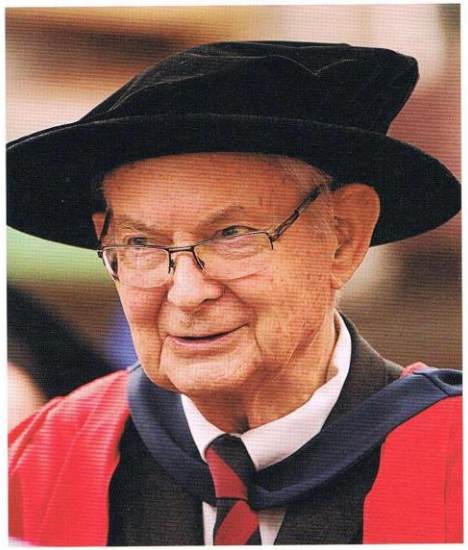
He returned to the Meat Section of DSIR that in 1957 became the separate Meat Research Division centred at Petone, working mainly on refrigeration and processing of meat. In 1960 he moved to Hamilton as Chief Engineer when the Meat Industry Research Institute of New Zealand (MIRINZ) was established. In 1966 his book "*Unit Operations in Food Processing*" was published by Pergamon Press, with a Spanish edition following in 1967; a second edition was published in 1983.

Dick was awarded an honorary DSc by Khon Kaen University in 1990. He was Dean of the Faculty from 1979 until 1989. After retirement in 1996 he then authored several books with Mary (see above). In 2008 he was made an Officer of The New Zealand Order of Merit in recognition of his significant contribution to the engineering profession.

In October 2009 a $1 million scholarship fund that honours Professors Emeriti Richard and Mary Earle was set up by the Riddet Institute to support postgraduate students. The Earle Food Research Fund assists students whose work contributes to the Centre of Research Excellence research programme. The programme covers food materials and structures, gastrointestinal biology, modelling and engineering and innovative food solutions. Students can attend any university in New Zealand providing they are supervised by one of the principal investigators at the Riddet Institute.

The Dick and Mary Earle Scholarship in Technology was established in 2015 for recipients to undertake research in one or both of the two fields: innovation and product development, and bioprocess technology. Normally one Masters scholarship ($17,000 per annum) and one Doctoral scholarship ($25,000 per annum) are awarded each year. They are tenable for up to 3 years in New Zealand universities.

On 15th May 2018 the Earles were each awarded the degree of DSc (*Honoris Causa*) by Massey University.



William (Bill) Reid Bannatyne (1935)

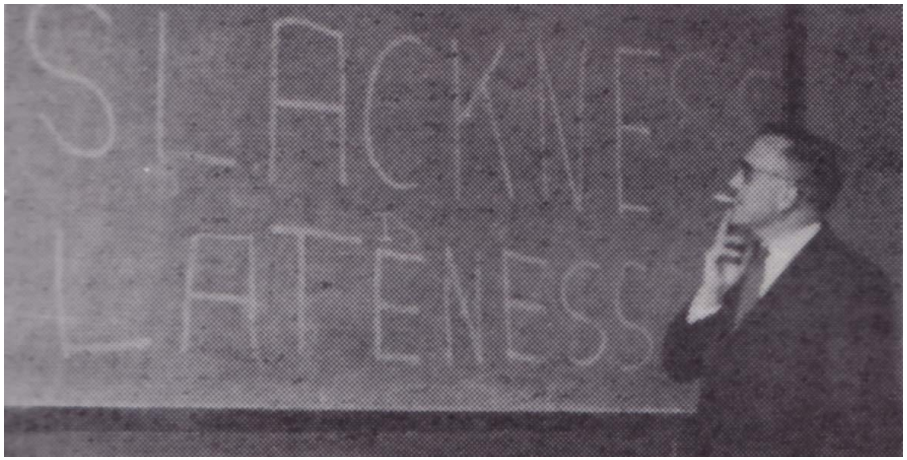
Bill Bannatyne arrived at Massey at the beginning of 1966 to teach courses in food chemistry and food microbiology. He had completed the four year degree in food science at the Royal College of Science and Technology that became the University of Strathclyde in 1964 and was awarded a PhD by Glasgow University in 1961 for a thesis entitled *"Mutual interaction in unsaturated fat oxidase systems."* This was followed by time in the edible oils industry. He spent 1962-64 in Tripoli, Libya at a UNESCO-funded College of Advanced Technology setting up a food technology course, and in 1965 worked for FAO in Ghana setting up the Ghanaian Food Research Institute.

Bill Bannatyne and Mary Humphries at the 1967 Massey Food Technology conference.

His research interests at Massey included enzymic spoilage systems in fish; composition of shellfish lipids, and enzymic fat oxidation. He left NZ in February 1970 to take up the post of Visiting Professor in Food Microbiology at the University of the Aegean, Izmir, Turkey. This was a 2-year posting funded by the UK Ministry of Overseas Development. Little was accomplished in those 2 years as martial law had been declared soon after he arrived because of student unrest. The time spent there was not a total waste as it served as a 'springboard' home to the UK in 1972 when he was appointed Principal of the new Glasgow College of Food Technology (now City of Glasgow College), where he remained for 25 years until retirement.

John McDougall (19?? – 2003)

John McDougall arrived at Massey in early 1967 as a Senior Lecturer for the soon-to-be-formed Biotechnology Department and taught food microbiology to food technology students as well as microbiology to biotechnology students. He had a reputation at Massey for smoking cigarillos in lectures to which he routinely arrived late.



Born in Scotland, he completed his two years of National Service before completing a BSc in microbiology in 1955 at the Royal College of Science and Technology that became the University of Strathclyde in 1964. He graduated in 1958 with a PhD from Nottingham University with a thesis entitled *"The isolation of an alginase and a study of its action on alginates."* After that he took up a lecturing position at Edinburgh University before joining The English Grains Co. as Chief Chemist and Microbiologist, working on yeast growth in various foods. He was then transferred to General Foods Corporation as Chief Chemist of their UK operations, subsequently becoming Quality Control Manager and then Scientific Services Manager before resigning and moving to Massey. He was Honorary Secretary/Treasurer of the NZIFST from 1967 to 1970. In 1973 he moved to Sydney to head up the Microbiology Department at the NSW Institute of Technology that became part of the University of Technology, Sydney in 1988. He died in November 2003.

Robin Milson Fenwick

Robin Fenwick was appointed a Lecturer in the Food Technology Department in June 1967 where he taught principally to the Dairy Diploma students while studying for his PhD. Robin was a member of the Class of '62, the last of the BAgrSc(Dairy Tech) graduates. The following year he completed a MAgrSc(Dairy Tech) degree. After graduating, Robin spent 8 months with the NZ Co-op Dairy Co. in their experimental laboratory at Matangi, working on heat stable milk powders. He then undertook a Volunteer Service Abroad (VSA) assignment in India for 18 months, working at the Rajkot dairy factory which manufactured butter, milk powder and gee (anhydrous milk fat). He set up a laboratory and generally improved the efficiency of the plant. He returned to NZ in December 1965 and the following month was on his way to Kenya where he taught dairy technology to English-speaking Africans at the Njoro Agricultural College. He received his PhD in 1970 for a thesis entitled *"An investigation into the use of starch-gel-urea electrophoresis as a technique for studying the proteolysis occuring during cheese curing".* In August 1971, Robin joined the NZ Dairy Board in Wellington where he worked for 25 years including postings in South Korea and the USA.

Samuel Langston Oldfield (1924-1989)

Sam Oldfield was appointed a Senior Lecturer in the Biotechnology Department in October 1968 with a special responsibility for establishing the sub-degree Diploma in Meat Technology, analogous to the DipDairyTech for middle-level managers in that industry. This course was established against strong opposition from some Massey staff who felt that sub-degree diplomas were inappropriate to an increasingly academic environment. He also gave lectures to food technology students on meat chemistry and technology and was very active in the NZIFST being Honorary Secretary/Treasurer from 1970 to 1973. Sam graduated with a BSc in Chemistry from the University of Auckland and spent 25 years in the meat industry, predominantly at AFFCO (Auckland Farmers Freezing Co.), working in the laboratory, production and management. He died from cancer in June 1989 at the age of 65.

Winifred June Harvey

Winna Harvey was appointed a temporary Junior Lecturer from the end of 1968 until mid-1970, supported by the N.Z. Apple and Pear Marketing Board, to conduct a study on the "storage qualities of the main varieties of N.Z. apples." This interesting report was commercially sensitive and was never released for publication. She assisted Dr Mary Earle in the 4th Year product development and quality control papers, and later worked as a food technologist for DSIR Crop and Food Research at Lincoln and was President of NZIFST.

Terence Moore Gracie (1941 – 1986)

Terry Gracie was appointed Technical Officer in the Department in 1970, replacing Don Kingsbeer who had transferred to the new Department of Industrial Management & Engineering. Terry qualified as an instrument technician with the RNZAF at Ohakea before joining

the Manawatu Co-op Dairy Company at their casein factory in Longburn. While there he completed a Diploma in Dairy Technology, graduating with distinction in 1970. In the Department he was responsible for the Pilot Plant and lectured on casein manufacture to Dairy Diploma students. He saved the Department considerable money with his skills in maintaining and repairing scientific instruments. He died in 1986 from cirrhosis of the liver.

Edward (Ted) Leonard Richards (1927-1998)

Ted Richards attended Victoria University part-time and graduated MSc in Chemistry with 1st class honours in 1952. He was commissioned in the New Zealand Defence Scientific Corps in 1951 and went to Bristol University where he was awarded a PhD in 1954 for a thesis entitled *"Action of amino compounds on sugar"*. During 1953-54 he did a post-doctoral year at the Low Temperature Research Station at Cambridge; he also spent some time at the Ministry of Food experimental factory in Aberdeen. On returning to New Zealand, he joined the DRI where he worked first on milk powders and then the development of lactalbumin, sodium caseinate and other new products, both in the laboratory and in dairy factories.

In 1959 he was appointed as Lecturer in the Department of Agricultural Biochemistry at MAC where he taught organic chemistry, specialising in carbohydrate chemistry. He was a qualified rugby referee and President of the Massey University Rugby Football Club from 1970-1972.

Ted was appointed Logan Campbell Professor of Food Technology and Director of the Food Technology Research Centre in December 1970. He taught food chemistry to undergraduates and dairy chemistry to diploma students. He retired in December 1988 at the age of 62 and died from prostate cancer in September 1998 at the age of 71.

In his 1989 JC Andrews Award address, Ted recalled as a clerical cadet (office boy) in the Head Office of DSIR addressing envelopes to members of the Council of DSIR that included Dr Andrews. Six years later after he had graduated MSc from Victoria University, he was waiting to go to England for postgraduate study when the Army arranged for him to visit what had been food dehydration plants during World War II, and while in Auckland to visit Dr Andrews. He

turned up at the factory in 1951 and was introduced to a man in overalls who was "lustily stirring a pan of soup or jam" – Dr Andrews.

Gordon Lindsay Robertson (1946)

Gordon Robertson graduated BTech(FoodTech) in 1970 and worked in Hastings for Unilever (NZ) Ltd from whom he had a Study Award as a Production Supervisor for 18 months before taking up an appointment as Lecturer in Food Processing in May 1971. He subsequently completed an MTech in 1974 and a PhD in 1980. He was President of the NZIFST from 1975 to 1977. In 1988 he was appointed Foundation Professor of Packaging Technology, and in 1992 his book "*Food Packaging: Principles and Practice*" was published by Marcel Dekker in the USA. In May 1992 he moved to Singapore to take up a new position as Vice President of Environmental and External Affairs in the Tetra Pak Asia Regional Headquarters.

He moved to Australia in September 2003 and became a consultant, author and trainer in food packaging. Since 2006 he has been an adjunct Professor in the School of Agriculture and Food Sciences at the University of Queensland. He edited the book "*Food Packaging and Shelf Life*" published in 2010, and the 3rd edition of his book "*Food Packaging: Principles and Practice*" was published by CRC Press in 2013.

Malcolm John Reeves (1945)

Malcolm Reeves graduated with a BSc in Chemistry from Victoria University in 1966 and then entered directly into the 3rd year of the food technology degree, graduating in 1968. From late 1967 until mid-1971 he worked for Mauri Brothers and Thomson (Aust) Ltd in Melbourne and Sydney with the positions of Food Technologist, Chief Chemist and Production Manager before returning to Massey in July 1971 as a Lecturer in Food Quality Assurance. He completed an MTech in 1976.

In 1999 he left to become a joint owner of Cross Roads Winery in Hawke's Bay. When the winery was later sold, he took up a lecturing position at the Eastern Institute of Technology in Hawkes Bay where he taught courses on wine technology and was Research Leader in the School of Viticulture and Wine Science. In addition, since 2009, he has been a Visiting Professor of Wine Science in the Department of Viticulture and Enology at the College of Food Science and Nutritional Engineering at China Agricultural University (CAU) in Beijing. He maintains his association with Massey as an Honorary Research Associate.

Kelvin Scott's Most Significant Technological Development: The Vacreator™

A Vacreator™ is a vacuum steam pasteuriser for removing undesirable odours and taints from cream, arising from feed, weeds and other sources, that if not removed would result in off-flavours in butter. The first version was invented in New Zealand by H Lamont Murray (1891-1956) who commenced initial development in 1923 when he and his London-based business partner, Frank S Board, were setting up their butter factory (Te Aroha Dairy Company Limited). The aim was to enable profitable butter to be made from the cheaper, lower grades of cream that were available.

Murray's original processes consisted of passing hot cream from conventional flash pasteurisers through a deodorising vessel maintained under vacuum. To increase deodorisation, in 1927 live steam was introduced directly into the cream between the pasteurisers and the vacuum vessel. This injection of steam obviated the need for the conventional pasteurising equipment because the pasteurising and deodorising could be carried out by the one process. By 1933 the first true Vacreator™ was in operation. By adding a second vacuum vessel, this process was further refined to minimise the 10 to 15 per cent dilution of the cream that can result from the injected steam. The Vacreator™ was described as the Type M Tandem and was rated for 12,000 lb/hr of cream. The M type was from the Murray name and the tandem referred to the 2 stage vacuum system developed, and to differentiate it from the original solo development.

In the 1950s Kelvin Scott and his colleagues at NZDRI (in particular Dr Freddie McDowall) studied the steam stripping of volatile tainting substances from cream in the laboratory and the factory. Scott also provided the engineering theory to explain the effect of the vacreator and to predict the stripping efficiency for any substance of known volatility. A small vacreator was fabricated for the NZDRI and arranged so that options of co-current flow and counter flow could be tested. Called the Research Vacreator™, it was rated for up to 1200 lbs/hr. Bernie Le Heron was Chief Buttermaker at the NZDRI in the 1950s and operated the two interconnected Baby Vacreators™ that put Scott's "steam stripping" calculations to the test. The much modified Baby Vacreator™ was subsequently replaced by a Tandem Special designed specifically for research work.

Scott first analysed the existing Vacreators™ that included the normal tandem and the triple Vacreators™. This work was the basis of the double contact with fresh steam. He then went on to research the counter flow methods of stripping of taints and the conclusions that he drew can clearly be found in the opening words of his summary: *"The considerable increase in efficiency of taint removal which can be attained by counter flow methods is shown by …."* He then set out options to get the advantage of counter flow and methods of modifying the existing tandem Vacreators™ to obtain a degree of counter flow.

In a paper published in 1957 Scott wrote *"During the last 5 years the use of a multiple contact counter flow technique has enabled improvements to be made in existing equipment. In this method a minimum of 2 deodorising vessels must be used; the cream is made to flow from the 1st to the 2nd vessel but fresh steam is applied to the second vessel only, this same steam being used again in the 1st vessel. As applied to the Vacreator this principle is known as steam stitching."*

This arrangement resulted in significantly less steam being used. The modified arrangement though suffered from the limitations of steam flow and pressure loss from the 2nd to the 1st body.

In July 1957 the first Vac 25 rated at 25,000 lb/hr cream was installed at the Albertland factory at Te Hana, Northland. The design, based on the work by Scott, was the double contact, counter flow process with a flash cooler, together with a tubular cream preheater to recover waste heat from the stripping steam. It was termed the Economic Vacreator™: the machine with the WEAVING FLOW.

Uncertainty surrounds who conceived the innovative "weaving flow" design of the Economic Vacreator™, of which models 16 and 25 have been manufactured, but Murray and Scott share the credit. Scott reported trials with two type M Vacreators™ connected together, as part of this development. Scott submitted his publications on the Vacreator™ together with a thesis entitled *"Investigation of equipment used for the distillation of taints from cream and some methods for improving the equipment"* to qualify for Associate Membership of the Institution of Chemical Engineers (UK) in September 1955. He made sure in his publications to reference the contemporary books in the relatively new area of chemical engineering: Badgbe & McCabe (1936) *Elements of Chemical Engineering*, Brown (1951) *Unit Operations* and Perry (1951) *Chemical Engineering Handbook*.

The efficiencies gained by the re-use of steam and the recovery of waste heat enabled the Economic Vacreator™ design to eliminate all competitive equipment from the NZ dairy industry. By 1980 all NZ butter was being made from vacreated cream. Vacreators™ were also used to treat milk and cream for table use, milk for cheese-making and even ice cream mixes.

An early example of a Vac 25 is on display (see photo opposite) at Auckland's Museum of Transport and Technology (MOTAT). It was installed as part of the Institution of Professional Engineers New Zealand (IPENZ) "Engineering to 1990" project which the Institution organised to help celebrate New Zealand's sesquicentenary in 1990. A plaque was unveiled in December 1990 to mark the significance of the Vacreator™ Cream Treatment Process as an important part of New Zealand's engineering heritage and the development of the nation.

Scott had died in May 1990 but his children Phil and Lindy attended the ceremony. The Vac 25 on display began work in the Tauranga butter factory in 1961 and was later installed at Edgecumbe where it was extensively damaged in the March 1987 earthquake, to the extent that repair of its internal damage was judged uneconomic.

Vacreator display at MOTAT December 1990

Another view of the Vac 25 at MOTAT

Dr Freddie McDowall (1900-1975) grew up on a farm in Southland and graduated with an MSc in chemistry from Otago University and a DSc in organic chemistry from University College, London. He was appointed Chief Chemist when NZDRI was established in 1928. He is best remembered for his 2-volume, 1590 page Buttermaker's Manual published in 1953. McDowall also worked on taint removal from cream and it was no secret that he and Scott did not get on. While Scott provided an analysis based on the engineering concept of a transfer unit to explain the effect of the Vacreator™ and to predict the stripping efficiency for any substance of known volatility, McDowall applied Raoult's law and Henry's law to the problem of taint removal from cream. In 1955 McDowall (no doubt inspired by Scott's two papers published in 1954) published his first paper on the subject in what became a series of 9 papers over a 10 year period. Garth Wallace was known to boast in later years that he had reconciled both approaches and had the lecture notes to prove it!

Bacteriologist Dr Hugh Whitehead succeeded Riddet as Director of NZDRI in 1959, and on his retirement in March 1964, McDowall was appointed Director, a position he held for just 17 months until his retirement on 31 August 1965 at the age of 65. He was succeeded by Dr Bill McGillivray who served until 1980. Like Scott, McGillivray had worked on radar during WWII, joining Massey in 1946 as a Junior Lecturer in the Agricultural Biochemistry Department and moving to NZDRI as Chief Bacteriologist (*sic*) in 1959; his replacement in the Department was Ted Richards. Scott's greatest disappointment in his professional life was not to be appointed Director of NZDRI in 1965. The Institute was a much larger organisation than the Faculty of Food Science & Biotechnology, and Scott had spent a highly successful and productive 13 years on its staff as Chief Engineer and established an international reputation in dairy technology. What role (if any) McDowall may have played in the appointment of his successor is unknown.

In 2014, the current holder of the Logan Campbell Chair Professor Richard Archer arranged for an early model Vac 16 (probably from a Taranaki dairy factory) that had been used for trials at NZDRI in the early 1980s to reduce steam use and increase throughput, to be installed in a courtyard of the Riddet Building. The Riddet Complex redevelopment completed in 2014 provided both a Kelvin's Grove and an Earles' Court, and the Vacreator™ has pride of place in the re-dedicated Kelvin's Grove.

Vac 16 in Kelvin's Grove in the Riddet courtyard

Despite the best efforts of NZDRI staff in the 1980s to improve the performance of Vacreators™, eventually the Flavourtech Spinning Cone Column developed by CSIRO in Australia for the wine industry was good enough to replace them in the 1990s. It is a true counter-flow contact device where the volatile compounds are removed from a turbulent thin film of flowing cream by a counterflow of steam under vacuum. It maintains the principle of deodorisation of the cream by steam but is more efficient in its use of steam.

Scott's ground-breaking and innovative work to develop the Vac 16 and 25 designs in the 1950s needs to be remembered and appreciated, because it was so efficient that it vanquished all competitors and became the only approved cream treatment equipment in New Zealand butter factories for more than 30 years.

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More Recent Holders of the Logan Campbell Chair

Peter Aaron Munro (1952)

Peter graduated BE with 1st class honours in Chemical and Materials Engineering from Auckland University and was awarded a PhD from University College London in 1976 for a thesis entitled *"Non-porous ferromagnetic particles as supports in immobilised enzyme reactors".* He then joined Auckland University as a Lecturer in Chemical Engineering. In 1984 he was appointed Professor of Food Engineering at Massey University and held the Logan Campbell Chair from 1989 to 1993. In 1993 he joined the New Zealand Dairy Research Institute (NZDRI) as a Distinguished Research Technologist but retained a 20% appointment at Massey University. In 2011 Peter was appointed to the Fonterra Chair in Food Materials Science in the Riddet Institute at Massey University; he retired in April 2016.

Raymond Johan Winger (1950)

Ray Winger was appointed Professor of Food Technology in August 1990 and held the Logan Campbell Chair from 1994 until 2010. He was also Managing Director of the Food Technology Research Centre from January 1992 until June 1998. After graduating BTech(Hons)(Food Tech) in 1974, Ray joined the Biotechnology Department at Massey for 9 months as a temporary Lecturer. He then completed a MS and PhD in Food Chemistry/Meat & Animal Science at the University of Wisconsin, USA.

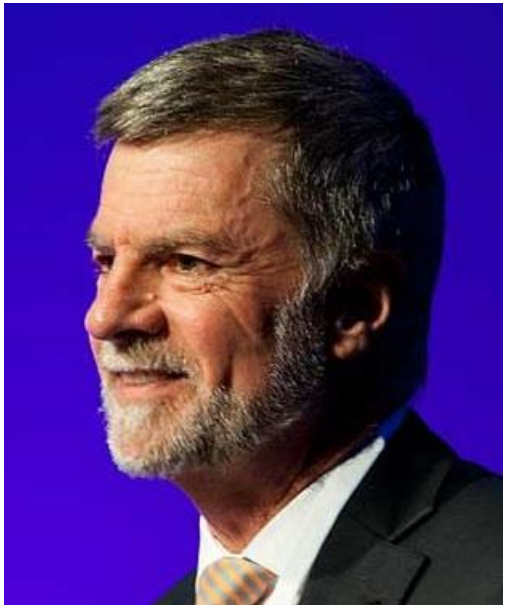
On returning to New Zealand, he worked for 7 years as a Research Scientist at the MIRINZ in Hamilton, predominantly on freezing and frozen storage of meat, meat texture, and developing the sensory evaluation facilities on meat texture and flavours. In 1985 Ray joined

Healtheries in Auckland and as Technical Manager was involved in a major company restructuring. He left Healtheries in 1987 to join a major agriculture consulting group in Adelaide (AACM) where, as General Manager, he established an international food consulting group in the company.

Ray resigned from Massey and moved to the United Kingdom in February 2010, establishing his own company, Inside Foods Ltd., which made prepared meals, soups and sauces for people with medical conditions until 2014. He has since been on several of the US Institute of Food Technologists (IFT) committees and was one of the first of two international board members from 2010–2013.

Richard Hamilton Archer (1955)

Richard Archer graduated BTech(Hons)(Biotech) from Massey in 1978 and PhD in 1980 for a thesis entitled *"Hydrolysis of bile acid conjugates and dehydroxylation of cholic acid by Clostridium bifermentans*". He then spent four years in the pioneering phases of the New Zealand deer by-product process industry, followed by 19 years in the dairy industry where he held senior management roles at the Lactose Company, FonterraTech (formerly KiwiTech) and the powder and protein technology section of the New Zealand Dairy Research Institute. He joined the staff at Massey in 2004 and was Head of the Institute of Food, Nutrition and Human Health from 2007 until 2014. In 2011 was appointed to the Logan Campbell Chair.



University Salaries in 1970

Junior Lecturer $3000-$3800
Lecturer $4300-$5500
Senior Lecturer $5600-$7200
Reader $7000-$8200 (average to be $7637)
Professor $9000-$11,500 (average to be $10,000)

University Salaries in 2023

Junior Lecturer $60,810 - $66,028
Lecturer $75,595 - $96,477
Senior Lecturer $94,735 - $134,058
Associate Professor $125,188 - $146,236
Professor $146,065 to No Limit

DEPARTMENTAL DEVELOPMENTS

In 1958 the Department of Dairy Technology consisted of 5 staff: Professor Riddet (Logan Campbell Professor of Agriculture); Senior Lecturers Ward and Henson; Lecturers Harkness and Le Heron; and Factory Superintendent Singleton. Honorary lecturers in 1958 included J.K. Scott in dairy engineering. After the retirement of Riddet in May 1958, Jack Ward was appointed Acting Head of the Department of Dairy Technology, but no replacement staff member was appointed. Ward was redesignated Acting Head of the nascent Department of Food Technology in 1961, to be replaced in April that year on the appointment of Professor Kelvin Scott.

The Department of Agricultural Biochemistry in 1959 had as Senior Lecturers Dr W.A. (Bill) McGillivray (Head of Department) and Garth Wallace; Assistant Lecturer Robert C. Lawrence and Demonstrator Sybil E. Quin. Later in 1959 McGillivray was appointed Chief Bacteriologist (*sic*) at DRI, becoming Assistant Director in 1964 and Director the following year; he retired in 1980. Richards joined the Department from DRI following McGillivray's move to DRI; Lawrence resigned in November 1960 and joined the DRI. Thus several of the key players in food technology at Massey and dairy research at DRI in the 1960s had worked with each other and formed quite strong opinions about their colleagues' strengths and weaknesses.

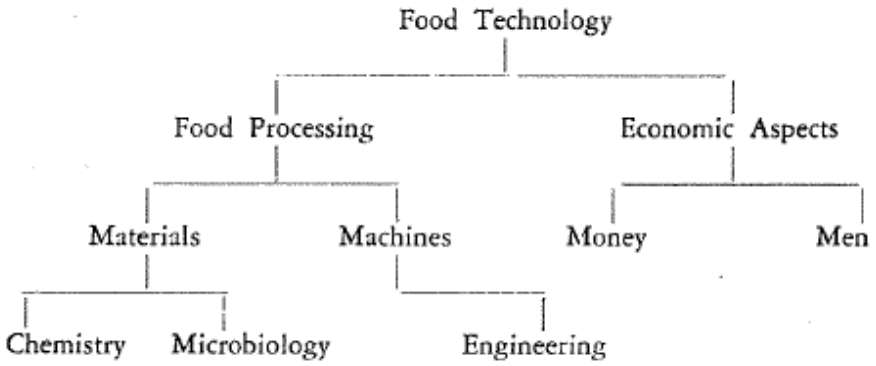
In 1959 Massey was a single faculty institution with 63 academic staff organised in 12 departments, teaching almost 500 students (of whom 180 were studying for degrees) enrolled in 15 degrees, diplomas and certificates. By 1960 there were 201 undergraduate degree students and 294 diploma students, and by 1961 degree students slightly outnumbered diploma students 242 to 237. With the growth in the number of courses available at Massey, Faculties were created in 1962. Initially there were Faculties of Agricultural and Horticultural Sciences, Food Technology, and Veterinary Science. In 1963 the Faculty of Science was established, though the following year it was temporarily renamed the Faculty of Biological Sciences, a name used until 1968.

In 1961 the Department of Dairy Technology was renamed the Department of Food Technology with Ward still as Acting Head; the position of Professor of Food Technology was advertised towards the end of 1960 and Professor Kelvin Scott was appointed in April 1961. Among the applicants for the Chair was a 30 year old chemical engineer Dr Richard Earle who was Chief Engineer at the MIRINZ in Hamilton. The Department of Food Technology was the sole department within a Faculty of Food Technology. Having a separate Faculty for food technology was regarded as very important and significant because overseas, where food technology had evolved from dairy technology, food technology was normally attached to Agriculture and this was thought to inhibit innovation and growth.

By early 1962 H.A.L. Morris with a background in fruit and vegetables had been appointed a Senior Lecturer in the Department, and Garth Wallace had transferred from the Department of Agricultural Biochemistry to Food Technology, together with Sybil Quin as demonstrator. Lecturers Harkness, Le Heron and Singleton held joint appointments in the Department and on the staff of the DRI.

Once appointed, Scott set about publicising the new degree. A paper he published in the *Journal of the New Zealand Institute of Chemistry* in 1962 (clearly with input from Wallace and Morris) defined food technology as the preservation, storage, conversion, refining and compounding of biological raw materials (e.g., flesh, milk and eggs from animals; and seeds, roots, fruit, juice, leaves, stalks of plants) in a

form which is suitable for foods. He included a Table to show the components of food technology:



From this table (he wrote), *"it can be seen that the three basic studies are Chemistry, Microbiology and Engineering and these are combined to give a composite discipline called food processing. The creation of a new attitude or discipline is well known to some people in the development of chemical engineering from chemistry and engineering, and food processing is but one extension of this principle".*

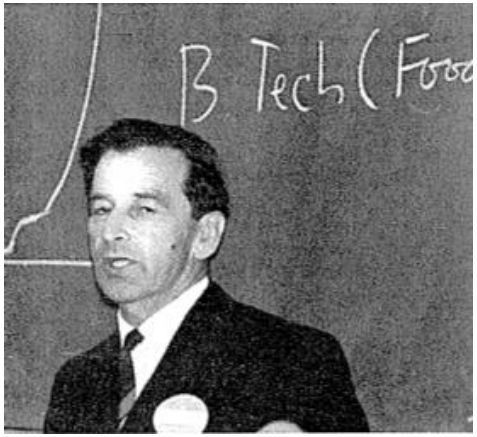
He continued *"The new degrees in food technology in New Zealand follow the plan of this table. The basic importance of chemistry is well illustrated by the fact that among the 17 units in the 4-year degree there are not only three stages of chemistry, but also further chemistry in sections of the two stages of food processing".*

His paper concluded:

"Perhaps Milton could foresee the problems in Food Technology when he wrote:

For hot, cold, moist and dry, four champions fierce
Strive here for Mastery."

The year 1963 was a take-off point at Massey for expansive and expensive ideas. The University Council was ready for innovation, provided it could be tethered to the foundations of the Massey institution. It was suggested informally to Scott that Massey should have a home science development. This did not appeal to Scott at all and was in conflict with the concept of an engineering-based technological activity. On the other hand, Scott considered that a food science development would not be inconsistent with the Faculty's interests. So, in early 1963 the Professorial Board agreed to a recommendation to Council that a new degree, to be named either Bachelor of Food Science or Bachelor of Food Technology (Evaluation) be introduced. This was supported by Andrews and Council agreed with the recommendation. However, Massey was unable to get approval from the University Grants Committee for a Food Science degree but was granted approval for a Product Evaluation option of the Bachelor of Food Technology degree. This new option included additional studies on food materials, nutrition, product development and marketing. The amount of engineering was reduced, but later, supposedly at the request of the students, some engineering studies were put back into the course.



Failure to get approval for a food science option came too late to prevent (or at least deter) the release of a brochure in 1963 promoting the BFoodTech degree. After a common First Year, it listed a food processing option and a food science option. The former (according to the brochure) was designed to meet the needs of graduates wishing to enter production and management in the food industry and provided courses in mathematics, food engineering and business management. The other option *"relates more to food science, food evaluation and quality control laboratories and special subjects studied are in the fields of nutrition, cultural factors in food acceptance, statistics and evaluation of foods by instruments or taste panels." Then followed in block letters THIS SECOND OPTION IS PARTICULARLY SUITABLE FOR WOMEN STUDENTS, AND PROVIDES A QUALIFICATION USEFUL FOR CAREERS IN FOOD AND OTHER INDUSTRIES".*

The brochure stated that *"While food processing has origins dating into pre-history, only recently have scientific methods been applied to process and product improvement. The food industry is still in its infancy in the development of modern products to meet the present and future demands of consumers. All phases of food production, processing, and packaging are being revolutionized".*

The brochure concluded: *"Food Technology must meet the challenge of providing preserved and packaged foods, particularly for urban dwellers in a society structure where food sources are becoming more remote from the consumers. In addition, consumers are demanding increasingly, partly prepared and fully prepared meals available for purchase from small stores or supermarkets".*

The proposal to have another bachelors degree in the Faculty created the opportunity to propose a more general name for the Faculty. The Professorial Board accepted Scott's proposal and recommended that there be a Faculty of Biotechnology. Wallace and Scott were rather proud of the word biotechnology which they thought they had invented and defined as *"the general processing of biological materials"*. Later, they discovered that the same word was being used as an alternative to human engineering (as in ergonomics) or to biomedical engineering or to microbial technology, but at the time they had as much right as anyone else to define biotechnology as they did.

However, Andrews did not agree with the Professorial Board recommendation and wanted food science or food technology to be included in the name of the Faculty. Finally, after much discussion, everyone was happy with the name Faculty of Food Science and Biotechnology. In retrospect, Scott believed that Andrews was right. The really important longer term aspects were the concept of a Faculty that would take an interest in the processing of biological materials on a wide front, and there was strong support for the concept from Andrews as Chancellor and Stewart as Vice-Chancellor.

An important aspect of the scheme was to have commodity options only at sub-degree diploma level, and within that commodity teaching to have a production qualification and a laboratory qualification. The long established diplomas and certificates for the dairy industry were changed in accordance with that philosophy and a Diploma in Meat Technology was introduced in 1968.

In late 1964 Scott presented a report to the Vice-Chancellor which in essence asked for two more Chairs for the Faculty. He classified all products and processes concerned with biological raw materials according to the knowledge of microbiology and biochemistry required as follows:

(a) Limited knowledge, e.g., sugars, oils, wood: Professor of Chemical Processing

(b) Medium knowledge, e.g., food preservation and product development: Professor of Food Technology (existing)
(c) Advanced knowledge, e.g., fermentation, pharmaceuticals: Professor of Microbial Technology

The outcome of this planning and report was a meeting of Scott with Andrews and Stewart and it quickly became apparent that only one new Chair was likely. However, the name of the new Chair, Chemical Processing, was not acceptable to Andrews who asked Scott why he did not like a Chair in Biotechnology. Scott responded that he thought Andrews would object to such a name. The outcome was that (a) and (c) were combined and Massey advertised for a Professor of Biotechnology with Dr Richard Earle, Chief Engineer at the MIRINZ in Hamilton being appointed to the Chair from April 1965. Scott later discovered that Andrews was apprehensive that the name Chemical Processing was too close to Chemical Engineering, and the keepers of the academic vigilante system then in operation (including keeping an eye or two on Massey) probably would have objected to future developments. The immediate outward effect of these actions was a bachelors degree in biotechnology, first included as a BFoodTech option but later separated to be an independent degree and department.

Staff numbers in the Department of Food Technology continued to grow, with Mary Humphries being appointed a Lecturer and Judith Thomas a Junior Research Officer in 1964. In 1965 Mary Earle joined the department to strengthen the product development teaching and Graeme Latimer moved over from the Physics and Engineering Department. In 1966 Bill Bannatyne arrived as a Senior Lecturer and David Beswick was appointed Research Officer. Robin Fenwick was appointed a Lecturer in 1967 and Yngvar Gilberg a Senior Research Officer. In 1969 chemical engineers Phil Collins and David Morgan were appointed; neither had a background in the food industry but were appointed with the intention of moving with Scott into a new department in 1970. Funding for their appointments was generated from existing food and biotechnology students and was the cause of much angst and unhappiness among staff who would have preferred the appointment of replacements for Humphries and Latimer.

Soon after the opening of the Riddet building in May 1966, Scott departed on an 8 month sabbatical leave that included the Technion in Haifa, Israel; the International Dairy Congress in Munich and food processing centres in Germany; the International Union of Food Science & Technology (IUFoST) Congress in Warsaw; universities in the UK and USA; leading the NZ delegation to the Commonwealth Defence Science Organisation meetings in Ottawa, and a 4-month stay at the University of California at Davis to study "industrial university and research developments."

In November 1968, Scott gave a long interview to the Manawatu Evening Standard newspaper that devoted a full page to the interview plus photos and shorter stories on the Earles and Oldfield.

The page was headed **"Frozen Pavlova – Or Food From Grass: Both Are Being Tried At Massey University."**

It began *"From extracting protein from grass to gauging public reaction to frozen pavlova – it's all in a day's work for the staff and students of the Massey University's food science and biotechnology department. It is a scene that could not be witnessed elsewhere in New Zealand, for Massey is the only university offering degree and diploma courses in food technology and biotechnology".*

In the article, Scott stated that he believed that the New Zealand manufacturing industry was becoming more willing to adopt systematic product development and more interested in industrial

design of products. He also believed that export competition would lead to more advanced production planning and control, better quality control, more use of management science to handle complex problems in production and marketing, and that there would need to be more interest in diversification of products.

Scott continued *"There is considerable support for this degree, partly because it hits right at the basic need of the country – the training of people to do more processing of our raw materials, better management and more extensive marketing. The department has one eye constantly on the development of New Zealand. I believe this realistic approach is a factor in our growth and support at all levels".* But this support and the resulting development has presented another problem – staffing. *"We need staff who have good academic qualifications and have been successful in industry. But we are competing with industry for suitable people. There are vacancies for two process engineers, and, although we have advertised twice in the last four months, we have had no helpful replies. We are continuing to recruit some useful staff, however – more recently a meat technologist and a chemical engineer".*

"We are trying to train a new brand of technologist for the manufacturing industries, to bridge the purely scientific type of graduate and the purely commercial type. The aim is to provide a technologist who can handle scientific and engineering aspects of manufacturing and processing and can take into account in his decision-making the requirements of marketing and management".

Since New Zealand's raw materials stemmed predominantly from agriculture, the obvious industry to train for would be in the biotechnical field. The importance of food to New Zealand was the impetus behind the development of food technology. Special aspects of this development were nutrition, flavour, appearance and packaging. *"We are very conscious of the export field, and we expect our graduates to play a part in New Zealand's export drive".*

"About 20% of the students are women, with good scientific ability and with a specific aim in mind, but unattracted by home science. Our approach is to teach the general principles of processing, marketing and management that could apply to all relevant industries and show how they can be applied to specialised industries. We try to gauge the techniques graduates will require in the year 2000. We find that industry as a whole tends to think small in terms of educational targets. Our surveys among industry show that the demand today is in line with our own early *estimates of what would be required – and not in line with the small estimates made by industry at the same time".*

Scott's views about what the food industry needed had been formed long before he was appointed Professor of Food Technology. In 1955 while Chief Engineer at DRI Scott had proposed *". . . the setting-up of a dairy industry service organization — an organization with trained people who can go to factories and advise factory managers and Directors on the application to each individual factory of engineering results".* He envisaged people who could give talks, write bulletins and draw diagrams, and laid great stress on the provision of practical solutions to immediate problems. He felt that what was really needed was, *". . . someone whose job it is to go to a factory and estimate the size of a pump, size of a heat exchanger, size and position of a tank, or whatever the problem happens to be*". He envisaged that the work of the organization would be different from that normally done by the main body of workers at the DRI and recognised that the service organization might need to be separately financed and that charges would have to be made for the work done. His recommendations were accepted and the Engineering Advisory Service, later to become the Engineering Services Section, commenced operating in October 1955 with a staff of two. The Section's first report, covering 14 months'

operation, recorded 75 enquiries "which could be treated as jobs", of which 69 had been completed.

In July 1969, the Food Science and Biotechnology Faculty Board approved in principle the formation of a new department from existing resources in the present Food Technology Department. This new Department was to be responsible for aspects of the Faculty requirements for management, marketing, product development theory, and general engineering associated with processing and manufacturing production. The suggested name for the new Department was Industrial Management and Engineering.

In a memo to the Vice-Chancellor immediately after the Faculty Board resolution, Scott indicated that he would like to have this division of the present Food Technology Department as an agreed objective, to have a transition period before implementation, and to be able to test his present thought about administration of the Faculty Departments before any formal decision was made.

Although approved by the Faculty Board, the decision was not universally popular, especially within the Food Technology Department. Scott had hoped that Mary Earle would move into the new Department to teach product development as a generic subject applicable to all those studying the manufacturing and processing industries. Earle declined to move and it would not be until 1988 when a Product Development option of the BTech degree was offered that Scott's vision of product development as a generic subject was realised. There was also concern that a new department was being 'funded' by resources generated from food technology student enrolments. Humphries and Latimer had not been replaced, and although Harvey had been appointed as a temporary junior lecturer to assist with the quality control and product development courses, several staff had to take on increased teaching loads in 1969. Things did not improve in 1970 when Bannatyne left in February and was not replaced, leaving the department without any food microbiology specialist and reduced expertise in food chemistry. Staff discontent came to a head when Morris wrote to the Registrar in December 1970 and asked to appear before the University Council.

After the Professorial Board approved the above Faculty Board recommendation, Scott wrote to the Vice-Chancellor in November 1969 and addressed two topics: a Food Technology Research Centre and a Chair in Food Technology.

Food Technology Research Centre (FTRC)

Scott began by pointing out that the first 3-year period for food technology research would conclude at the end of 1969 (in fact it had begun with the appointment of Judy Thomas in 1964) and recommended that a Food Technology Research Centre (FTRC) be formed along similar lines to the Poultry Research Centre and the Market Research Centre at Massey, i.e., an organisational grouping of academic staff and research officers to do applied research for industry. Research officers located in the Food Technology Department, plus academic staff in several departments who wished to be associated with this work, would be listed as members of the research centre.

The idea of a Food Technology Research Association had been promoted by Brian Talboys the Minister of Science who in October 1965 had urged its formation when he addressed a meeting in Wellington. In March 1966 he wrote to the Vice-Chancellor stating that *"Judging from the response to date, it would appear that the proposal was a little ahead of its time. However, because I think the idea should not be allowed to die, I recently obtained Cabinet approval that the DSIR be authorised to subsidise on a £ for £ basis contracts which*

the food industry might place with the Department of Food Technology of your University".

The amount of subsidy in any one year was limited to £10,000 and any major equipment or facilities provided from these funds should be held by Massey University and transferred to a Food Technology Research Association should one come into existence.

The Food Technology Research Centre (FTRC) was formally established at Massey in 1970 and the first Director (from 1st January 1971 until 1977) was Professor Richards, the newly appointed Professor of Food Technology. The role of the FTRC was to provide research, on a contract basis, to food industries within New Zealand. The centre was initially funded by the New Zealand Poultry Board, the Consumers Institute, Henry Berry Ltd, and the New Zealand Fishing Industry Board. By 1974 the Fishing Industry Board project was the only one still active. In that year the project and associated staff were moved to Nelson.

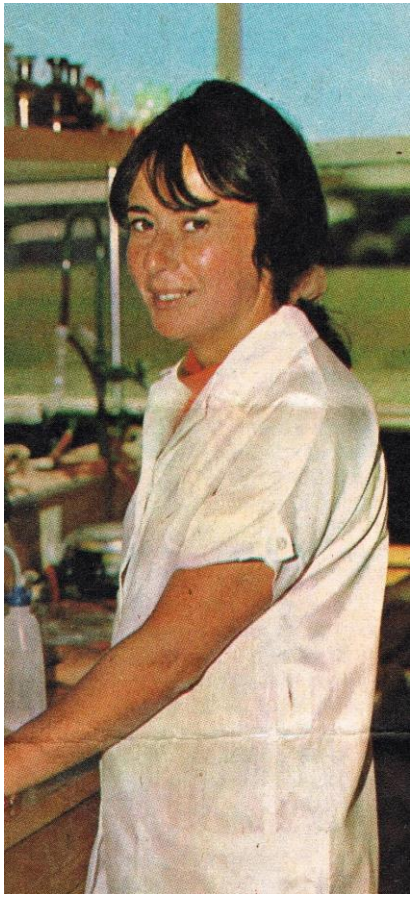
In the Annual Report of the FTRC for 1970, Scott wrote that *"It is intended that the work of the Centre will integrate with the academic interest of departments of the Faculty of Food Science and Biotechnology, particularly in the choice of PhD and Masters work. With adequate integration the normal work of the Faculty Departments should assist the projects undertaken by the Centre, and similarly, the applied problems of the Centre should generate a responsive interest from senior students and academic staff".* Regrettably Scott's intentions never came to fruition and the FTRC struggled for several years.

A drive to attract larger projects and increase the Centre's profile began in 1977 when Dr Mary Earle became Director in addition to her position as Reader in the Department of Food Technology. Within four years there were three project groups, and companies could pay a membership fee to enable them access to the centre's expertise. This included use of Massey's pilot plant to develop new products. During the 1980s the centre began offering product development services and a flavour library. It also produced a newsletter, which provided lists of recently published journal articles and new patents. These helped industry keep up-to-date with the latest developments.

In 1984 Dean Stockwell was appointed as the first full-time Director with an external advisory board but he resigned in 1990. In the late 1980s, the food industry in New Zealand began to change with mergers and tighter economic conditions. Fewer companies wanted to pay a membership fee. The centre struggled to finance itself, and in 1992 it was taken under the wing of Ray Winger, Professor of Food Technology who was Managing Director from January 1992 to June 1998.

The centre was slowly wound down in the early 2000s.

Judy Thomas was appointed Junior Research Officer in the Food Technology Department in 1964. After graduating BHSc from Otago University, she worked briefly in the QC laboratory at Auckland Farmers Freezing Co. (AFFCO). At Massey her work was funded by the Marine Department and supervised by Hal Morris and later Bill Bannatyne. Her brief was to work on ways of utilising the less popular species of fish such as crayfish carcasses, kahawai, red cod and trevally to reduce wastage. Her development of a fish sausage generated considerable publicity in the media and commercial trials and consumer testing were conducted. The Marine Department funding ceased in 1969 which coincided with the departure of Judy.



In 1966 David Beswick was appointed Research Officer. He had graduated from the National College of Food Technology in Weybridge that was part of Reading University. His work was funded by the Poultry Board and the focus was on developing new products from eggs. Work involved dried and frozen pavlova cakes and an egg sandwich spread. A mayonnaise that he developed was produced commercially. He resigned in 1970.

David Beswick and Judy Thomas at the 1966 Food Technology conference.

Norwegian-born Yngvar Gilberg was appointed a Senior Research Officer in February 1967 and his work was funded by the Fishing Industry Board. After completing a Diploma in Chemistry from Dresden University, he worked in food processing plants in Norway. After the war, he worked for 8 years at the government Fish Research Institute in Norway, mainly on solvent extraction of fish meals, fish albumen and dried fish products. Then followed 9 years in South Africa and three years as a field officer for the FAO Fisheries Department working in Malawi, Jordan and Saudi Arabia. His main work at Massey was on new and better methods of crayfish handling, especially freezing and preparation for export. He left early in 1970.

In June 1970 Neil Boyd was appointed Research Officer, replacing Yngvar Gilberg. Neil had graduated BFoodTech in 1966.

Dr John Kitchin who completed his PhD at the City of Leicester Polytechnic (since 1992 De Montfort University) on *"The synthesis of diamines"* in 1969 was appointed a Research Officer in 1970, but

although his name appeared in the University Calendar, it is unclear whether he ever took up his appointment.

In 1971 Victor Sills was appointed Research Officer for egg and poultry products, replacing David Beswick. Vic graduated BSc(Hons) in biochemistry from Birmingham University and spent almost 20 years of his career in Fiji as Government Analyst but resigned after Fiji gained independence from the UK in 1970. He worked briefly as food technologist for Produce Processing Ltd. in Fiji before moving to Massey. He died in March 2006 at the age of 90.

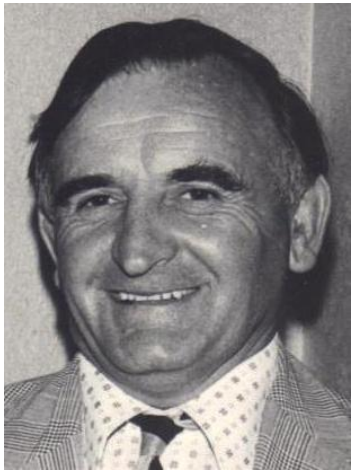
Chair in Food Technology

In his letter to the Vice-Chancellor in November 1969, Scott further recommended that as soon as possible, applications be called to fill the combined post of Professor of Food Technology and Director of the Food Technology Research Centre. The successful applicant would also be Head of Department. He suggested that applicants should have an appropriate degree in food technology or food science, or a degree majoring in chemistry or microbiology, together with appropriate industrial experience or applied research experience. Scott concluded by stating that *"Implementation of these proposals could be timed* to *avoid a situation where the Food Technology Department was without a permanent Head of Department for more than a short time".*

In February 1970 the Chair in Food Technology was advertised and one overseas (Edwards) and three Massey staff members (Wallace, McDougall and Morris) were interviewed in May 1970 by a committee comprising the Vice-Chancellor, Dr McGillivray (DRI), Professors Scott, Frampton (Agricultural Economics) and Malcolm (Physical Chemistry), and Mr Rod Dennis, a BAgrSc(DairyTech) graduate from 1954 and MD of the Rangitaiki Plains Dairy Co. Ltd. The Chair was offered to Dr Ron Edwards then Associate Professor of Food Technology at the University of New South Wales (UNSW). It was decided that if he did not accept, then no appointment should be made and that the University should re-advertise in due course. Edwards delayed accepting the position until October when he declined after having been confirmed as Head of the Food Technology Department at UNSW; he was appointed to the Chair in Food Technology at UNSW in 1975.

According to a report tendered at the December 1970 meeting of the University Council, the Selection Committee comprising the Chancellor, Pro-Chancellor, Vice-Chancellor, Dr McGillivray, Professors Scott, Malcolm and Batt (Biochemistry) and Rod Dennis had reconvened on 30th November and interviewed Dr Richards who had submitted an application following discussions between Professor Scott and the Vice-Chancellor. The committee recommended that Richards be offered the Chair in Food Technology and the post of Director of the Food Research Institute [they meant the Food Technology Research Centre]. Richards accepted and became the second Logan Campbell Professor of Food Technology on 1st January 1971. Despite the later criticisms of Richards by some staff

members, he had done his PhD on one of the most important reactions in food technology (Maillard or non-enzymic browning) and had spent 5 years as a Research Officer at the NZDRI. He had then spent 12 years lecturing in organic chemistry at Massey.



Morris Departure

It was a controversial appointment and unpopular with many staff in the Food Technology Department. Morris met with Richards on the day of the announcement and informed him that he would resign. On 21st December 1970, Morris sent two letters to the Registrar. In one he submitted his resignation; in the other he *"wished to appear before the next (full) meeting of Council, to make submissions regarding matters of importance to the University".* The Registrar replied the same day and asked what date his resignation applied from, and an outline of the matters he wished to place before Council. On 4th February Morris replied that he was *"unable as yet to nominate a precise date for consideration ….but shall, of course, inform you as soon as possible regarding this".*

On the same date he sent another letter to the Registrar outlining the submissions he would like to make to Council: *"the unsatisfactory development of food technology teaching, research, and extension activities at Massey University; inefficient use of finances and development of facilities; unsatisfactory organisation and control of staff and difficult working conditions; and general development of affairs within the Faculty and Department, to give conditions generally unacceptable to professional food technologists. It would also be intended to refer to some suggested deficiencies in organisation and procedure in the University which appear to permit an unsatisfactory development to occur and continue over several years".* The Registrar replied on the 15th February stating that his letter of resignation had been accepted with regret by Council and asking that he forward his submissions in writing when he would then be invited to appear before a sub-committee of Council which could be called together at short notice.

On 10th May Morris wrote to the Registrar indicating that it was his intention to resign as from 31st May. In a separate letter the same day, he wrote that *"my motive in making this request [to appear before the Council] was quite obviously devoid of self-interest and simply related to a sense of duty with respect to the profession and field of food technology development in New Zealand. For this reason I am most surprised that Council did not grant the request and particularly in view of the obvious and widely known problems related to development of this field at Massey. In view of past experience and in view of circumstances surrounding the handling of this matter, I fear that Council has either been uninformed in its consideration or some element of prejudice has been involved – resulting in a reluctance to meet my request. After full consideration, I now feel it would be unwise to further pursue this case within the University and I therefore wish to decline the alternative offer. I feel that my personal duty has largely been fulfilled in*

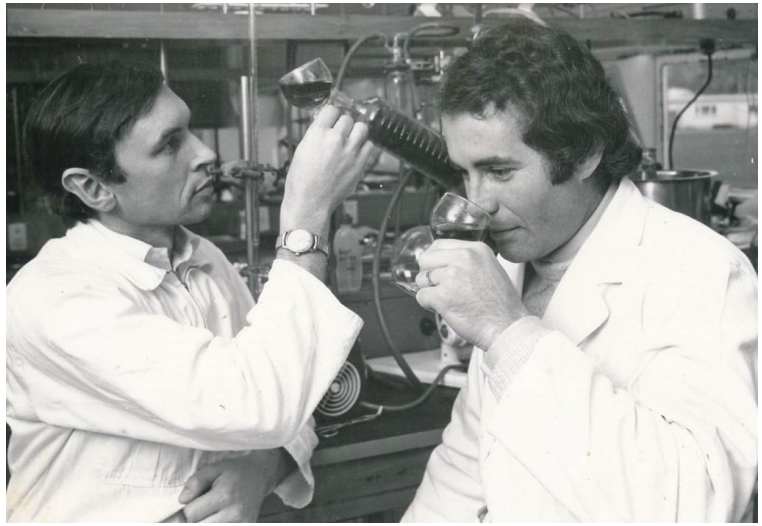
drawing Council's attention to a problem and in having previously offered to appear before it".

Morris cleared out his office on 20th May 1971 and never set foot on the campus again. Thus ended the almost 10-year teaching and research career of a staff member who was held in the highest esteem by students and most staff members and especially by the 6 Masterate students for whom he had acted as supervisor. Clearly upset for some time by the direction in which Scott was taking the Faculty, the appointment of Richards was the final straw that saw Morris leave a deeply embittered man. It is very likely that most members of Council had no idea what he was alluding to in his letter of 10th May.

Robertson joined the Department on 17th May 1971 and had a long chat with Morris on his last day. Morris declined to leave any files, lecture notes or theses and suggested that it was time for a fresh start, as indeed it had to be. Morris went on to have a successful consulting career with FAO and UNIDO and died of cancer in 1985.

Wallace was just as unhappy as Morris over the appointment of Richards. Wallace and Richards had been colleagues in the Department of Agricultural Biochemistry from 1959 until 1961, and when the Chair was advertised in 1970, Richards had asked Wallace whether he should apply. Wallace had replied that they were looking for someone with a food technology background and so Richards did not submit an application. Once Richards was ensconced as Professor of Food Technology, Wallace acted as the unofficial Head of Department. He tried to compensate for Richard's lack of interest or knowledge of the food industry and education of food technologists and was the go-to person for students who had problems with their course or practical work requirements. Despite trying to survive in an environment that caused him continual frustration, he became increasingly despondent and took early retirement on reaching the age of 60. Meanwhile Scott continued on his way, building up a large and successful Department of Industrial Management and Engineering that was later renamed Production Technology.

Early in 1971 the Department advertised three lecturer positions in food technology and received six applications. Two appointments were made: Malcolm Reeves and Gordon Robertson.



Malcolm Reeves and Gordon Robertson preparing themselves for a student laboratory class

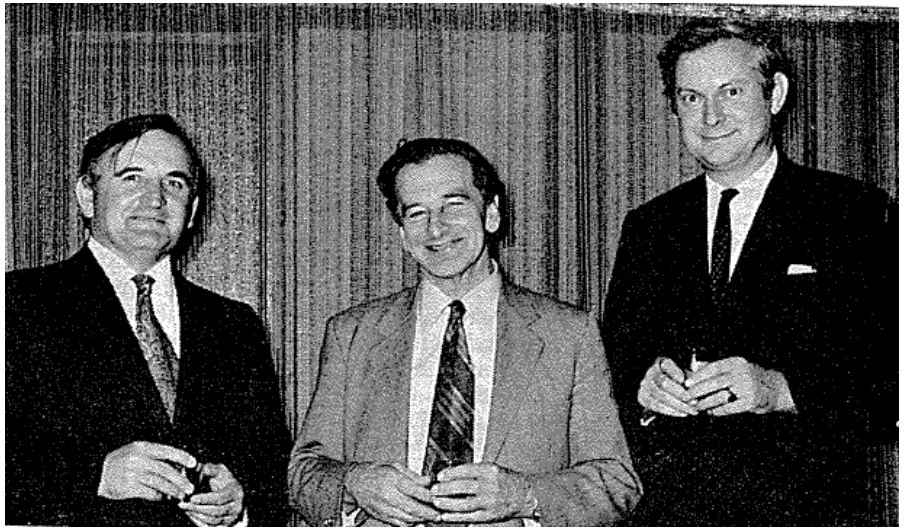
The year 1971 ended with the Food Technology Department at its nadir with just six staff of whom two were greenhorns. It was led by an uninterested Head who spent his evenings writing chapters for a first-year textbook on biochemistry that never saw the light of day. Wallace was a frenzy of activity, drafting letters for Richards to send out to attract industry funding, graduate students, a higher profile for the department, etc. but all to little avail. Henson kept his head down

and focussed on running the Diploma in Dairy Technology. Mary Earle carried a huge workload as the number of 4th Year students opting to take the product development option burgeoned. Bannatyne had not been replaced so there was no one in the Department to teach food microbiology although Richards had taken over his food chemistry lectures. It became a vital necessity to attract additional staff to cope with the increasing number of students in both the undergraduate degree and the sub-degree diploma.

The degree course itself was also in urgent need of an overhaul. Third and Fourth year students each had 38 timetabled contact hours per week that all the staff agreed was too much, but no one was prepared to reduce their particular areas. Richards was a strong advocate for reducing the timetabled hours as he compared the food technology degree with an honours degree in chemistry where 12-15 contact hours per week was the norm. Reeves and Robertson knew firsthand of the overlap and repetition in the various papers, and with their recent industrial experience, were very keen to remodel and improve the degree.

The story of how a small Department grew and indeed flourished over the next few decades is an exciting one that is waiting to be told. All that is required is an author!

Malcolm Reeves and Mary Earle in June 2015



Professors Richards, Scott and Earle

RIDDET BUILDING

In September 1959, the Principal of MAC Dr Alan Stewart requested Messrs Wallace (Convenor), Henson and Sargent to form a sub-committee to bring down a report on a proposed dairy technology building. In his memorandum, Stewart stated *"I do not think you need worry about building costs in the meantime but rather about equipment required, its approximate cost, whether or not it can be made in New Zealand, etc. I think you should give some thought too to the way in which these separate pieces would be installed in the building and the services required for them in the way of water, electricity, etc. You should feel free to co-opt anyone whom you think may be of help and Mr Ward* [he was on sabbatical leave in England] *should be written to, brought into the picture and asked for suggestions and given suggestions as to how he could assist while he is in England. The source of funds prefers to remain anonymous as possible so will you treat the whole matter as quietly as you can. This means essentially that no hint should get into the Press".* They were given one month and three days to prepare their report!

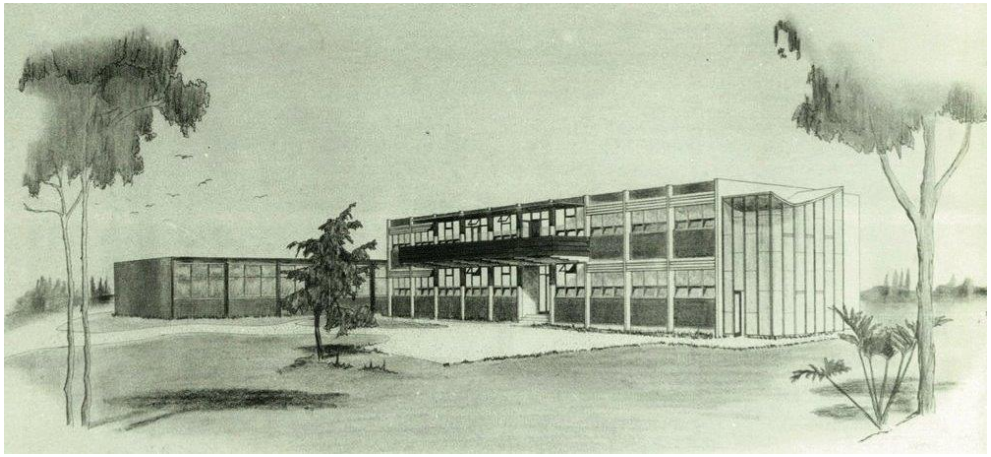
While this sub-committee was at work, Stewart wrote to the Department of External Affairs in September 1959 requesting that Colombo Plan funds be used to finance a Dairy Technology Building, a Hall of Residence and additional Dining Hall facilities. The Government Architect wrote back less than a month later giving results of a preliminary investigation into the building proposals and estimated costs as £76,500 for the Dairy Technology Building, £58,600 for a Hall of Residence and £5000 for additional Dining Hall facilities. A year later in October 1960, the Government Architect advised that *"the Ministers of External Affairs and Finance had jointly approved expenditure of Colombo Plan accumulated funds to the amount of £150,000 to enable Massey College to accommodate more Colombo Plan students".* Unfortunately, only £41,250 was approved for the Dairy Technology Building. The Commissioner of Works wrote to External Affairs in May 1961 pointing out that *"the proper instruction of students in Dairy Technology may be jeopardised by the serious limitations of cost imposed".* He continued *"Because of the need to have the building ready for occupation in February 1963, and bearing in mind your desire to 'enable New Zealand to train more Asian students under the Colombo Plan in a more effective way', work is proceeding on sketch plans on the assumption that your Department and Treasury will seek and obtain approval to additional finance in the sum of £35,250. This will bring the total allocation for the Dairy Technology Building up to the figure of £76,500 originally requested".*

In July 1960 Stewart asked the Massey Council to approve an application to the UGC for £1750 to purchase a spray drier and an evaporator but the UGC was not forthcoming.

In November 1960, Andrews sent a hand-written letter to Stewart with his comments on the proposed Dairy Technology Building. He suggested that a suitable site for the building would be between the gates to Wharerata and the Physics & Engineering Department building near the main entrance to the campus. Stewart wrote on the letter *"Mr Ward to see and discuss with me"* and fortunately, the staff were able to convince Stewart that a greenfield site beyond the Wool Building and the glass houses would be much more suitable.

In February 1961, approval was given by the Ministry of Works to engage Acton Wylde-Brown, a local Palmerston North architect, to prepare sketch plans for two separate buildings: a Dairy Technology Building and a small field laboratory (the latter was never built). In August 1961 the Massey Council accepted the sketch plans, and in

September Wylde-Brown submitted a preliminary assessment of the cost: £88,433.



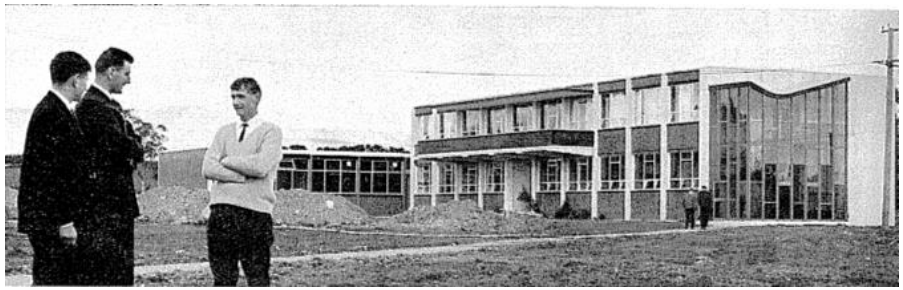
Meanwhile, there had been a slight hiccup over the naming of the building. Stewart had written to External Affairs in April 1961 suggesting that the Dairy Technology Building be known as the Riddet Building. External Affairs replied in June 1961 that *"As you know, we ran into some objections, and I have been discussing the questions with various people in Wellington. I am glad to be able to tell you that the objections have now been withdrawn and the various authorities concerned are willing to agree to the names you have chosen for this building and for the hostel"*.

Then in November 1961 another hiccup appeared when the Fuel Committee of Treasury delayed final approval and insisted on a coal-fired boiler being used to heat laboratories and lecture rooms, despite an oil-fired boiler being used for equipment in the Riddet Building (they were clearly trying to preserve New Zealand's overseas funds). Wallace replied on behalf of Scott who was in Australia with a one-and-a-half page rebuttal, and permission was given for one oil-fired boiler (a Clayton-type steam generator that never worked properly, resulting in freezing cold lecture rooms in the winter months until it was eventually replaced in the early 1970s). When staff complained to Scott in the 1970s about the fact that the morning sun warmed staff offices and left lecture rooms cold while the afternoon sun warmed the lecture rooms and assisted students who wanted to sleep, Scott always maintained that the Riddet building was meant to have had the lectures rooms facing the morning sun but that he was overseas when construction began. No evidence has been found to support his view.

In February 1963, Wylde-Brown gave a firm estimate for constructing the Riddet Building of £92,429 plus £6331 for refrigeration, and this was approved by the Cabinet Works Committee the following month. In February 1964, the tender from H.E. Townshend Ltd, a local builder, for the sum of £105,844 to construct the Riddet building was accepted by the Massey Council. Progress was slow and in January 1965 Wylde-Brown reported that while the roofing of the teaching block was completed and the steel windows in place, the bricklaying of the exterior walls of the pilot plant was delayed due to a shortage of brickies. Then in February 1965, after representations from Scott, the Vice-Chancellor instructed the architect to create a seminar room and remove the raised dais from the now smaller lecture room (R8) which should also have provision for storage of additional drawing boards and T-squares. In August 1965, the builder was placed in liquidation but the liquidator assured the University that the building would proceed as planned (which it did) and staff moved into their offices early in 1966.

While Colombo Plan money was used for the building, the cost of equipping the building (£60,000) was split 50:50 between External Affairs and the UGC. An application was made to the UGC in October 1965 for a grant of £2,271 for furniture and £1800 was forthcoming. Thus continued the game where universities asked for more than they

needed in the knowledge that they would never receive the full amount requested, and funding bodies never gave the full amount in the knowledge that the requested amount had been inflated in anticipation of a cut-back.



Dick Inwood, Rex Perreau and Ed Neff in front of the newly opened Riddet Building in May 1966. All ended up working for multi-national food companies: Unilever and Mars, Cadburys and Heinz respectively

The Riddet Building was officially opened on 25th May, 1966 immediately following the 3rd Food Technology conference held on campus. It was a particularly wet day and the official opening speeches were held in the Interim Biology Block with everyone afterwards entering the Riddet Building through the back entrance to avoid the mud. The Vice Chancellor had not approved a request to place duck boards at the main entrance.

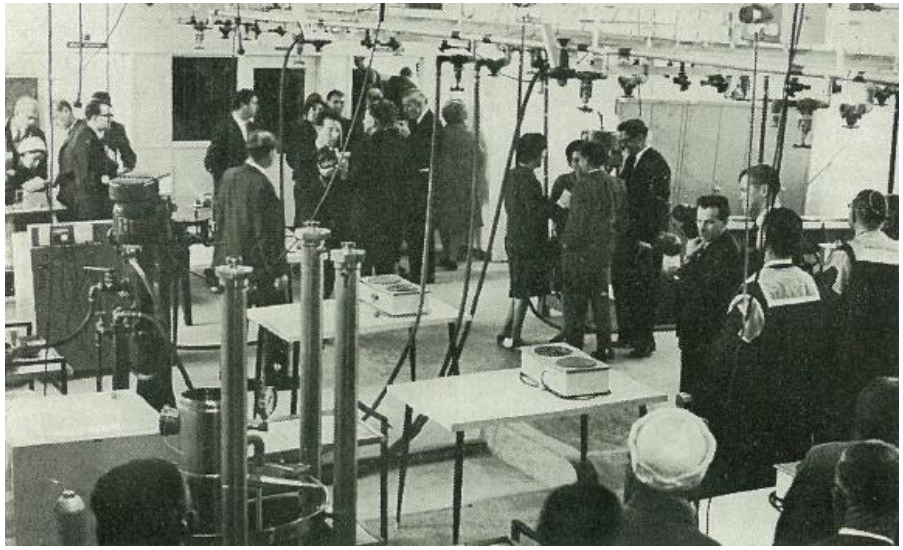
At the opening ceremony, a bronze bust of William Riddet was unveiled and sat on a wooden stand in the foyer outside the pilot plant. However, it was removed some weeks later, apparently because Riddet's second wife Dorothy Richards (1905-1993) did not think it was a good likeness. As Dorothy Abraham she ran a successful art gallery in George Street and was well known in the Palmerston North artistic community. No trace of the bust has emerged despite extensive investigations and no photos of it exist.

Professor Kelvin Scott, Brian Talboys (Minister of Science), Mrs Andrews(?) and Dr Jack Andrews (Chancellor)

Guest of honour at the opening was Dr Emil Mrak (1901–87), a food scientist born in San Francisco who was at Massey as guest speaker at the Food Technology conference. He had graduated in food technology from the University of California at Berkeley and became Chairman of the Food Science Department there in 1948. In 1951 he moved with the Department to the University of California at Davis and was named as Chancellor in 1959. An internationally recognised yeast specialist, he was also an expert on fruit dehydration.

Garth Wallace and Dr Emil Mrak in the Food Chemistry laboratory

Dr Jack Andrews with Dr & Mrs Emil Mrak at dinner after the opening of the Riddet Building



Pilot plant on the opening of the Riddet Building. Scott and Talboys can be seen on the right-hand side and behind them the Vice Chancellor Dr Alan Stewart and the Chancellor Dr Jack Andrews still in their ceremonial robes. For safety reasons the recesses in the floor were later filled in

Riddet building in 1979

View from Riddet Common Room 1977

The High Commissioner for India and Jim Henson view the plaque presented by the Indian Dairy Science Association that was unveiled at the official opening

It hung for many years in the foyer of the Riddet building. Today it hangs in the Riddet Centre.

Onward and Upward

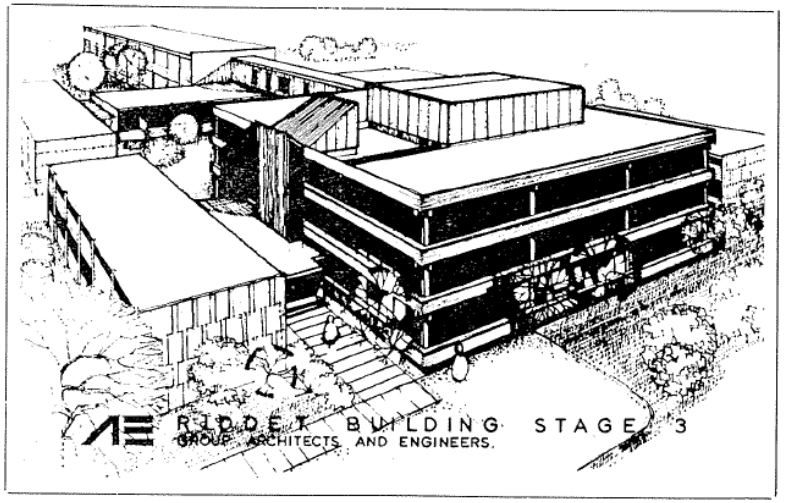
Even before construction of the Riddet Building was completed, Scott wrote to the Vice-Chancellor in March 1965 with a request for extensions to the building of 28,273 ft^2. In September 1966, a revised space schedule for extensions of 18,250 ft^2 was sent to the Chairman of the UGC which would have to provide the funds. In his March letter, Scott estimated degree enrolments in the Faculty as follows:

	1965	1966	1967	1968	1969	1970	1975	1980
2nd Yr	18	25	33	38	44	50	50	50
3rd Yr	8	16	22	29	37	45	45	45
4th Yr	10	7	15	24	33	42	42	42
TOTAL	36	48	70	91	114	137	137	137
Actual (Food Technology students only)	10	7	9	12	14	10	14	18

"*Thus*," Scott wrote, *"we can expect a total of about 100 graduates by 1970 (cumulative total) that would not even be keeping pace with replacement and expansion requirements, let alone achieving the 1% level".* The 1% level was based on data from the USA where the food industry apparently employed graduates at the rate of 1 per 100 general employees. Potential graduate positions in the New Zealand food industry in 1965 were estimated at 530 on the basis of a calculation for graduates in the technical and management fields assuming an enlightened management policy, or 440 using the USA 1% figure. In 1955 it was estimated that there were 80 science and engineering graduates in the New Zealand food and allied industries, and 150 by 1962. Persons employed in the New Zealand food and beverage industry were 29,500 in 1955; 36,557 in 1962 and estimated to be 40,000 in 1965.

Riddet Stage II involving an additional 3000 square feet was completed in 1969 at a cost of $50,000 and consisted largely of a pilot plant with attached workshop and laboratory space.

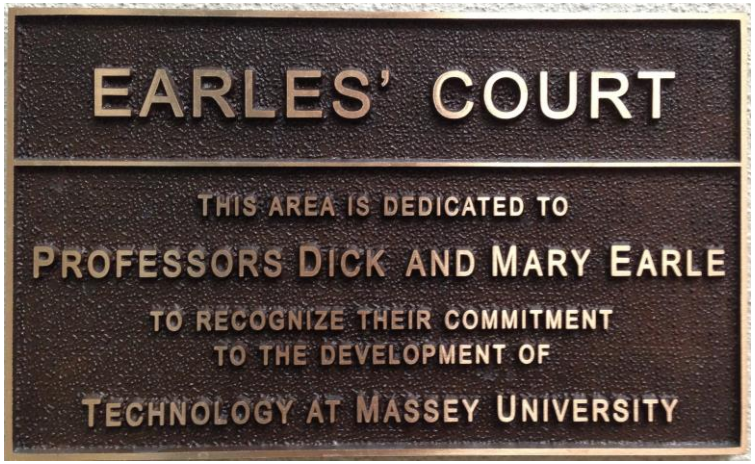
In July 1972, tenders were called for the Riddet Stage III – a 3-level building that contained laboratory, pilot plant and staff offices for the Food Technology and Biotechnology Departments. Like its predecessors, it was designed by Wylde-Brown who was now part of the Group Architects and Engineers practice. It was completed in 1974 and added another 25,000 square feet at a cost of $500,000. It incorporated a walkway across the original pilot plant roof to give access from the original building.



Although Massey had literally acres of land on which to build, almost all of the new buildings since the 1960s have been constructed inside the Ring Road with the result that today buildings are cheek by jowl and the open feeling of the campus has been lost. The original Riddet Building is now barely recognizable as it sits surrounded by recent additions to which it is linked by walkways.

Stairwell of the original Riddet Building in 2015 with the expanded staff room on Level 2 visible on the left

When Riddet Stage III was completed in 1974, the courtyard was informally named Kelvin's Grove after Scott (it is also the name of a Palmerston North suburb which houses the city cemetery and crematorium); when Dick Earle became Dean in 1978 it was renamed Earle's Court. Plaques have now been placed on the walls of new courtyards in the Riddet complex to commemorate the contribution of Scott and Dick and Mary Earle.



Massey in 1961

In 1961 Palmerston North had a population of 43,000 and there were 266 degree and 250 diploma students enrolled. There was hostel accommodation for 350 of whom 80 were overseas students from 18 countries. The hostel fee was £4.2.6 per week and was raised by 2s 6d in 1962. There was great celebration both on the campus and in the city when in September 1961 Cabinet approved the establishment of the first Veterinary Science School in New Zealand at Massey, despite strong lobbying from Otago.

By December 1992, the University's total student roll was 24,675 students. Of these, 9,088 were internal and 15,687 were extramural students.

Massey in 2015

In 2015 Palmerston North had a population of 83,500 (in 2022 it was 90,400). Over the three campuses at Albany, Palmerston North and Wellington, there were 32,449 students (19,101 EFTS) of whom 23,755 were undergraduates (14,377 EFTS). Of the 7391 postgraduates (3535 EFTS), 1303 were doctorate candidates (1189 EFTS).

In 2014 there were 1100 FTE academic staff and 3013 FTE Centres of Research Excellence, support services and administration staff.

EFTS = equivalent full-time students
FTE – full-time equivalent

GRADUATES

Colombo Plan

The destiny of the dairy technology and food technology degree courses was considerably influenced by international students and events. Students from India first enrolled at Massey in 1947 and the numbers grew following Riddet's visit to India in 1953 to study that country's milk production problems. In January 1950, a Commonwealth Conference on Foreign Affairs in Colombo, Ceylon (now Sri Lanka) drew up a plan for Cooperative Economic Development in South and South-East Asia which became known as the Colombo Plan. Under this plan, British Commonwealth countries undertook (among other things) the training of personnel from developing countries in a number of areas including dairy and food technology.

In March 1951, F.W. Doidge, New Zealand's Minister for External Affairs, pledged that NZ would contribute £3 million to the Colombo Plan over a 3 year period. By 1961 NZ had sent 153 experts to Colombo Plan countries, including 9 in agriculture, 15 in dairy development and 15 in land development. Many (but by no means all) of the Asian students attending Massey in the 1950s were funded by the Colombo Plan. Sixty-one students came from 19 countries in 1956, the greatest numbers taking diplomas and masterate-level courses. By the late 1950s, Australians accounted for more than a third of the total number of overseas students although they were not part of the Colombo Plan. From the Plan's inception in 1951 until 1963, 64 Colombo Plan students had gained degrees at Massey, and another 26 had obtained diplomas.

The relevance of these events is that they provided the BAgrSci(Dairy Tech) and BFoodTech degree courses, as well as the diplomas in dairying and dairy engineering, with a regular intake of students who were supported by Commonwealth funds. In fact, it was because of the Colombo Plan students that funds for the Riddet Building (the first new teaching building on campus for over 30 years) were made available in the early 1960s from the Colombo Plan budget. Colombo Hall, a 40-bed student hostel that opened in 1962, was also built from Colombo Plan funds at a cost of £60,000.

Thai Students Studying Food Technology at Massey

In October 1962, over twenty Thai students arrived in Wellington under the Colombo Plan to undertake an English language course at Victoria University before beginning degree courses at various NZ universities. Among the group were six students who enrolled in the Second Year of the BFoodTech degree in 1963. Two of them (Patcharee Pankun (née Chittaporn) and Chaiyute Thunpithayakul) had completed three years of a science degree at Chulalongkorn University in Bangkok; the other four had completed 3 years of the 4-year BAgrSc degree at Kasetsart University in Bangkok.

Ms. Patcharee Pankun (née Chittaporn) graduated BFoodTech in 1966, completed a MFoodTech in 1967 with a thesis entitled *"Enriched orange juice for Thailand"* and a PhD in 1977 with a thesis entitled *"A quantitative model for the design of a processed infant food product for Thailand".* Patcharee was the first woman to complete bachelors and masters degrees in food technology at Massey University. She was a member of staff in the Department of Food Technology at Chulalongkorn University, Bangkok from 1971 until her

retirement. From 1984-88 she was Head of the Food Technology Department.

Buncha Ooraikul also graduated BFoodTech in 1966, and completed a MFoodTech in 1967 with a thesis entitled *"Further applications for the heat shock puffing of food gels".* During 1967 Buncha was Acting Head, QC/R&D, at freeze dried food company Instant Foods (NZ) Ltd in Blenheim, returning to Thailand in 1968 where he began his career in academia lecturing at Kasetsart University. He completed his PhD in 1973 in the Department of Food Science at the University of Alberta, Edmonton, Canada with a thesis entitled *"Processing of potato granules with the aid of freeze-thaw technique"* and then taught at the University Pertanian Malaysia (now University of Putra Malaysia) in Selangor, Malaysia until 1975, after which he accepted a teaching position at the University of Alberta.

He was made a professor in 1987. He was co-editor of the book *"Modified Atmosphere Packaging of Food"* published in 1991 by Ellis Horwood Ltd. In 1997, he was awarded an Honorary PhD degree in Food Technology by Prince of Songkla University, Thailand, for his many contributions to the university. He took early retirement from the University of Alberta in 2003 to take care of his ailing mother in Thailand.

Chaiyute Thunpithayakul graduated BFoodTech in 1966 and completed a MFoodTech in 1967 with a thesis entitled *"Frothing as a food processing technique".* He then completed a PhD at Purdue University, West Lafayette, Indiana, USA in 1973 with a thesis entitled *"Bacteriophage-associated lysin produced by Streptococcus lactis and Streptococcus cremoris"* before joining the staff at Chulalongkorn University in Bangkok where he remained until his retirement.

Ms. Montharop Chakkaphak (née Smitananda) graduated BFoodTech in 1967 and completed an MS in Nutritional Sciences at the University of Hawaii in 1969 with a thesis entitled *"Fish and soy as dietary factors in hypertension."* She then joined the staff of the Home Economics Department at Kasetsart University where she remained until her retirement.

The other two students who began the 2nd Year of the food technology degree in 1963 switched to other courses. Ms. Lavanaya Graidej (née Sawalaksana) completed a Diploma in Dairy Technology in 1966 and returned to Thailand to complete her BAgrSc at Kasetsart University before joining its staff. Choa Tiantong returned to complete his BAgrSc at Kasetsart University after one year at Massey and subsequently represented Thailand as an agricultural attaché to Indonesia and then at FAO in Rome until his retirement in 2000.

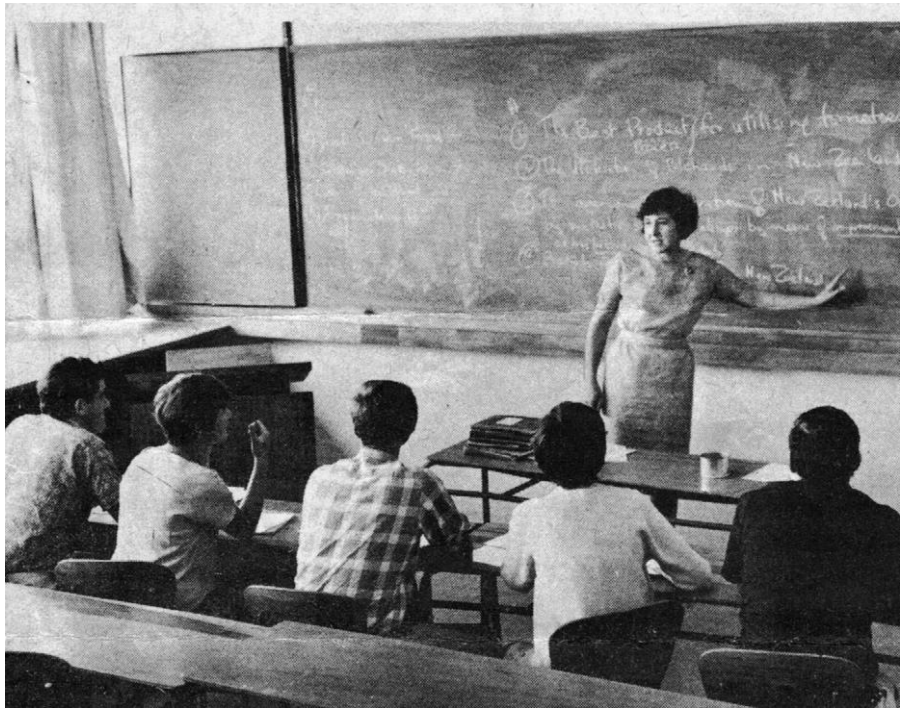
Another Colombo Plan student was Ms. Tipvanna Ngarmsak (née Thantapongse) who graduated BAgrSc(Hons) in 1966 from Kasetsart University in Thailand and arrived at Massey in the same year where she was affectionately known as Jim.

She completed a MTech in 1970 with a thesis entitled *"Development of high protein noodle from soy bean for Thailand"* and a PhD in 1983 with a thesis entitled *"A system of meal planning for self-improvement of the diet of villagers in northeastern Thailand".*

She was Dean of the Faculty of Technology at Khon Kaen University in northeast Thailand from 1985-1993, and then followed various administrative positions in the Research and Development Institute, the Graduate School, and the College of the Graduate School of Management at Khon Kaen University until her retirement in 2008.

Ms. Saisanom Praditdoung (née Kongnak) also went to Massey from Kasetsart University on a Colombo Plan scholarship in 1966 and completed a Diploma in Technology before returning to Kasetsart in 1968 to complete her MSc in Food Technology. She resumed her teaching duties in the Department of Food Science and Technology at Kasetsart, attaining the rank of Associate Professor and retired in 1997.

Paiboon Thammarutwasik arrived at Massey in 1969 with a BAgrSci in food science from Kasetsart University, obtained a Diploma in Technology and returned to Thailand in late 1970 to an academic career where he made significant contributions to food technology education and the advancement of the food industry in Thailand. Paiboon first taught at Kasetsart University, then went to Prince of Songkla University (PSU) to develop a food technology programme and eventually established the Faculty of Agro-Industry, the graduates from which are serving in key positions in the food industry throughout Thailand. He served as the first Dean of Agro-Industry at PSU and retired in 2005 with the rank of Associate Professor.



Dr Mary Earle teaching in R8 in 1968

Honorary Doctors of Science (DSc) conferred by Massey University on Food Technology Graduates

Richard (Dick) Hubbard was awarded a DSc *honoris causa* in 1999.

Dick joined the NZ Co-op Dairy Co in 1969 and after 2 years resigned and went to Niue for 3 years as a project manager, setting up a tropical fruit factory processing passionfruit and lime products. Back in NZ he became Assistant General Manager for Tasti Products Ltd based in Auckland and, after 10 years, CEO for three years. During his time at Tasti Products he was Chairman of the Auckland branch and National President of the NZIFST. After that he was Chairman of the NZ Food Standards committee for 13 years. In 1987 he set up Hubbard Foods Ltd that in 2015 had a turnover exceeding $60 million per year and 200 staff. During the years of getting Hubbard Foods up and going, Dick also chaired the NZ Food and Grocery Council and set up the organisation New Zealand Businesses for Social Responsibility. He was made a member of the New Zealand Order of Merit in 2001 for his services to business and the community. He served on the Massey University Council from 2003-2006 having been elected by Massey alumni. In 2004 he was elected Mayor of Auckland for a 3 year term. In 2020 he was awarded Massey University's most prestigious award, the Sir Geoffrey Peren Distinguished Alumnus Medal.

Peter Hubscher was awarded a DSc *honoris causa* in 2003.

In 1965 Peter commenced permanent employment in the wine industry with McWilliams Wines (NZ) Ltd as Technical Assistant to the Production Director. In 1968 he was appointed Plant Manager for McWilliams (NZ) Ltd in charge of the winemaking and bottling facility. In 1973 he joined Montana Wines as National Wineries Manager with responsibility for all winemaking, and in 1982 he was appointed Associate Director of Montana and given responsibility for vineyard management in addition to winemaking. From 1984 until 1991 he was full Director with responsibility for all production activities and in 1991 was appointed Managing Director of Montana Wines Ltd. From 1985 to 1986 he was also Deputy Chairman of the New Zealand Wine Institute. He was made a member of the New Zealand Order of Merit in 1998 for his services to the wine industry. A lifelong supporter of the arts and an official advisor to Creative New Zealand, he was a driving force in establishing Montana's commitment to the arts.

Photograph of all staff and students in the Faculty taken in March 1966 by PhD student Gordon Packer

Back Row: Malcolm Reeves (3), Gordon Cameron (3), Barry Walker (3), Geoff Southall (3), Ian Darby (3), Hugh Thompson(3), Lee Town (3), Brian Ronson (3), Mike Kerridge (3), Rod Bennet (2), Neville Openshaw (3), Pete Hosking (2), C.H. Lee (3 dnc), Dick Hubbard (2)
Middle Row: Gerry Townsend (2), Roger Montgomerie (2), Gordon Robertson (2) Margaret Gibson (2), Winna Harvey (2/3), H.M. Lim (3 dnc), Tran-Quang Duong (3), Jane Henderson (3), Buncha Ooraikul (PG), David Ward, (PG), David Cullwick (PG), Eddie Neff (PG), Jim Gordon (3), Ray Mawson (3), Mike Matthews (3), Janis Swan (2), Norma Robinson (2), Shona Climo (2), Gordon Packer (PG).
Front Row: Duncan Ross (2 dnc), John Higgins (2), Torben Sorensen (2), Mary Humphries, Graeme Latimer, Dr Bill Banantyne, Hal Morris, Prof Dick Earle, Garth Wallace, Dr Mary Earle, Lee Ban Ho (2 dnc), Soon Cho (Joe) Chow (2), Peter Veen (2), Dave Pooch (2).
Absent: Peter Nixon (4), Stan Bateman (4), Malcolm Graham (4), Han Huu Huynh (4), Helen Kuttel (4), Judith Gilbertson (4), John Duncan (4), Chee Min Seow (2), Jee Hin Keng (2) Roger MacBean (2), Chaiyute Thunpithayakul (PG), Patcharee Chittaporn (PG), Montharop Smitananda (4), Prof Kelvin Scott, Mr Jim Henson
Year of study in bracket after name; PG = post-graduate; dnc = did not complete degree

GRADUATES BY YEAR

1963:

Allan Thomas Griffin
Brian David Maley

Brian Maley on graduation day 5th April 1963

The colour of the hood was (and still is) Claret BCC 36; Garth Wallace was on the committee in 1962 that chose the colour and he was very pleased that they chose a colour with links to food (or at least wine).

1964:

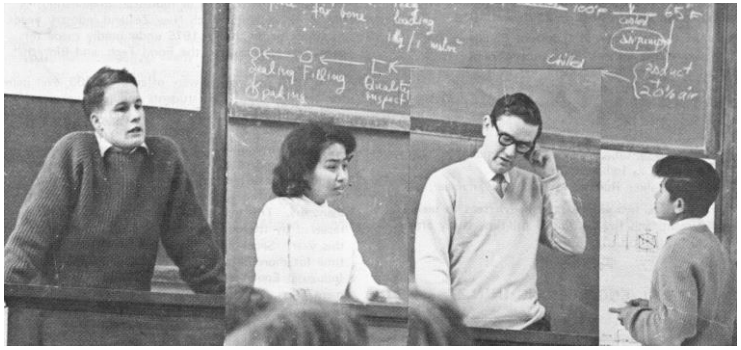
Richard John Inwood (d. 2022)
Edward Neff
Rex George Perreau

1965:

Neil Harvey Clark
Ian Cameron Curtis (d. 2014)
Govindaswamy Jagan Mohan (d. 2019)
Evan Svend Ernst Morch (d. 2017)

1966:

Neil Stuart Boyd
Dennis Allan Cox
Thomas David Cartwright Cullwick
James Stevenson Fraser
Peter Vernon Hubscher NZOM (1998)
Buncha Ooraikul
Patcharee Pankin (née Chittaporn)
John Logan Reid
Chaiyute Thunpithayakul
Warwick David Ward



Montage of Cullwick, Chittaporn, Fraser and Ooraikul presenting their final year reports in October 1965

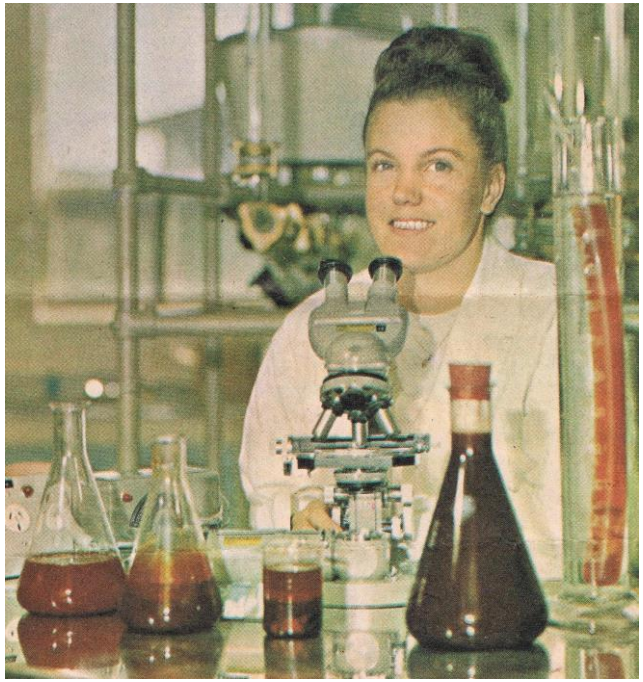
MFoodTech
Rex George Perreau in Food Chemistry and Engineering

1967:

Judith Robyn Bale (née Gilbertson)
Stanley Joseph Bateman
Montharop Chakkapak (née Smitananda)
John Haywood Duncan
Malcolm Neil Graham
Peter Anthony Nixon
Helen Margaret Tervit (née Kuttel) (d. 2010)

MFoodTech
Thomas David Cartwright Cullwick in Food Processing
Phatcharee Chittaporn in Product Development & Marketing
Buncha Ooraikul in Food Processing
Chaiyute Thunpithayakul in Food Processing
Warwick David Ward in Food Processing

Judith Bale (first NZ woman to graduate BFoodTech)
and Dick Inwood at the 1967
Massey Food Technology conference



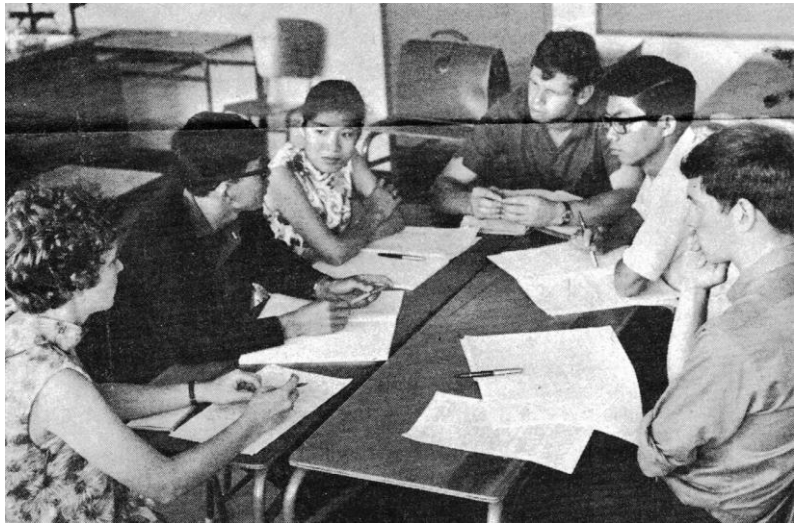
Helen Tervit (first NZ woman to graduate MFoodTech) in 1968

1968:

Gordon Neil Cameron
Han Huu Huynh
Michael Edward Matthews CNZM (2020)
Raymond Frank Mawson
Neville John Openshaw

Malcolm John Reeves
Brian Wallace Ronson
Geoffrey David Southall
Jeffrey Lee Town

DipTech
Saisanom Praditdoung (nee Kongnak)



4th Year students in 1968

1969:

Soon Cho (Joe) Chow
Shonagh Lynn Clark (née Climo)
Ian Howard Darby
Tran-Quang Duong
James Leslie Gordon
Winifred June Harvey [NZIFST President 2001-2003]
Jee Hin Keng
Michael John Kerridge

Jane Onini Markotsis (née Henderson) (d. 2022)
Norma Ruth Miller (née Robinson)
Hugh Hammond Thomson
James Barrie Walker

MFoodTech
Edward Neff in Food Processing

Four Technology students were elected to the MUSA Executive in 1967: Dave Pooch, Winna Harvey, and Peter Veen (Food Technology) and Rod Bennet (Biotechnology)

1970:

Francis Patrick Dunlop
Margaret Follas (née Gibson)
Roger Lennox Harvey
Richard John Hubbard [NZIFST President 1979-1981] ONZM (2001)
Roger Duncan MacBean
Bronwen Morfydd McDonald (née Allan)
Roger Linton Montgomerie
Kia Ming Phoa
David Leslie Pooch [NZIFST President 2009-2011]
Gordon Lindsay Robertson [NZIFST President 1975-1977]
Torben Sorensen [NZIFST President 1983-1985]
Gary John Stichbury [NZIFST President 1985-1989]
Gerald William Townsend
Peter Ronald Veen (d. 2014)

1971:

Allan Malcolm Anderson (Hons)
Roland William Gerard Dowling
Marinus Jacob (Jaap) Groenewegen
Timothy Orr Harrison
Graeme Rex Honeyfield
Philip Vernon Lough CNZM (2008)
Gregory James McDonald
Alexander Douglas Murdoch
Brian John Stanton (Hons)
Dean Thomas John Stockwell (Hons)

DipTech
William Edwardson
Paiboon Thammarutwasik

MTech(Food Tech)
Tipvanna Ngarmsak (née Thantapongse)

1972:

Lynton Alexander Bridger
Alan John Clapham
Marion Verna Cumming (née Hoskin)
David William Devine
Craig Benjamin Gass
Alexander Bryce Gerrie
Gerard Patrick Hall
John Bedford Hammond
Nigel Haig McLisky
Dawn Elizabeth Pethers (née McIntyre)
Michael Leith Thompson
Ross David Tocker (Hons)
Yee Wah Wong

Postgraduate Studies

The relatively large number (at least compared to the next 40 years) of BFoodTech/BTech(Food Tech) students from the first 10 years who went on to complete postgraduate degrees is worthy of note: 11 PhDs and 19 Masters in food science/technology.

Allan Thomas Griffin
MS 1969 (University of Wisconsin - Madison, USA)
The effect of variations in formulation and processing on the whipping properties of high milkfat powders.

PhD 1970 (University of Wisconsin - Madison, USA)
Inter-quarter comparisons on milk from heifers with sub-clinical mastitis: factors affecting the rennet coagulation time and curd tension.

Rex George Perreau
MFood Tech 1965 in Food Chemistry and Engineering
A heat shock process for the puffing of dried food gels.

Edward Neff
MFood Tech 1967 in Food Processing
Reconstitution characteristics of food powders and granules with emphasis on non fat dried milk.

Warwick David Ward
MFood Tech 1967 in Food Processing
Promotion of browning in the development of new dairy products.

Patcharee Pankun (née Chittaporn)
MFood Tech 1967
Enriched orange juice for Thailand.

PhD 1977 in Product Development (Massey University)
A quantitative model for the design of a processed infant food product for Thailand.

Thomas David Cartwright Cullwick
MFoodTech 1967
Freezing rate studies in blocks of meat of simple shape.

Chaiyute Thunpithayakul
MFoodTech 1967 in Food Processing
Frothing as a food processing technique.

PhD 1973 (Purdue University, West Lafayette, Indiana, USA).
Bacteriophage-associated lysin produced by Stretococcus lactis and Streptococcus cremoris.

Buncha Ooraikul
MFoodTech 1967 in Food Processing
Further applications for the heat shock puffing of food gels.

PhD 1973 **(**University of Alberta, Edmonton, Canada).
Processing of potato granules with the aid of freeze-thaw technique.

Helen Margaret Tervit (née Kuttel)
MTech (Food Tech) 1968 in Product Development and Marketing
The effect of heat treatment on blood.

Neville John Openshaw
MTech (Food Tech) 1969 in Food Processing

Preliminary studies of chemical reactions as indices of heat lethality.

Michael Edward Matthews
MS 1972 (University of Wisconsin - Madison, USA)
Flavor enhancement of spray dried butter.

PhD 1973 (University of Wisconsin - Madison, USA)
Some basic and applied studies of membrane processing of skim milk and cheese wheys.

Judith Robyn Bale
PhD 1974 (University of Wisconsin - Madison, USA)
Chemical and physical studies of iron-sulfur proteins.

Roger Duncan MacBean
PhD 1974 (University of New South Wales, Sydney, Australia).
The production of yoghurt by continuous fermentation.

Neil Harvey Clark
MS 1968 (Utah State University, Logan, Utah, USA).
Extraction of rennet from fresh frozen cells.

PhD 1975 (Massey University)
Properties of some animal derived milk coagulating enzymes.

Raymond Frank Mawson
MTech(Food Tech) 1969
A study on ice crystals in frozen meat.

PhD 1982 (Colorado State University, Fort Collins, Colorado, USA)
Studies on binding in processed meats.

Dean Thomas John Stockwell
MTech 1972 in Industrial Management
Continuous buttermaking: a process capability study.

Torben Sorensen
MTech(Food Tech) 1974
The development of a process for the production of restructured fish from recovered fish mince.

Allan Malcolm Anderson
PhD 1975 in Product Development (Massey University)
A quantitative model for the design of nutritious and acceptable foods.

Gordon Lindsay Robertson
MTech(Food Tech) 1974
Studies on the processing of New Zealand grapefruit juice.

PhD 1980 (Massey University)
Solubility relationships of limonin and the phenomenon of delayed bitterness in citrus juices.

Malcolm John Reeves
MTech(Food Tech) 1976
The effect of heat treatment on lysine availability and dye binding capacity of skim milk.

Dawn Elizabeth Pethers (née McIntyre)
MS (Food Science) 1978 (University of Alberta, Canada)
An evaluation of the potential for whey cheese products in Canada.

Jane Onini Markotsis (née Henderson)
MAppSci(Food Tech) 1979 (RMIT, Victoria Institute of Colleges, Australia)
Functional properties of food proteins.

Other PhDs completed in the Department of Food Technology during this period were:

Garth Morton Wallace
PhD 1966
An investigation of factors affecting the composition of milk and of methods for the analysis of milk components.

Gordon John Kitch Packer
PhD 1967
The development of a chemical analogue of thermal destruction of bacterial spores.

Kris Aiyar
PhD 1969
A study of factors contributing to gel formation and to syneresis of gels with particular reference to rennet casein systems.

Robin Fenwick
PhD 1970
The nature of the protein materials which adsorb to the fat:serum interface of homogenised milk.

Abdul Khaleque
PhD 1971
Studies on the preparation, processing and properties of soymilks.

Postgraduate Studies in Other Fields

Thomas David Cartwright Cullwick
PhD (Management) 1972 (Northwestern University, Illinois, USA).
A consumer health behavior paradigm for dietary nutrition improvement.

Neville Openshaw
MBA 1991 (Massey University)

Jane Onini Markotsis (née Henderson)
B. App. Sci. in Health Education 1993 (Canberra University)

Evan Morch
MBA 1993 (Massey University)

Dean Stockwell
MBA 1997 (Waikato University)

Norma Ruth Miller (née Robinson)
Master of Social Work (Applied) 1999 (Massey University)

Winna Jane Harvey
Master of Education 2012 (Canterbury University)

Reminiscences of Allan Griffin (first graduate 1963)

I was one of the four cadets sent to Massey in February 1959 by the Department of Agriculture in Victoria – two to complete the dairy technology degree (the other was Brian Maley) and two for the agricultural science degree. In August/September 1959, I had recurring headaches and thought I needed glasses as in my teens I was diagnosed with a lazy left eye. Accidentally, I visited an ophthalmic surgeon instead of an optometrist. Imagine my surprise when I was asked how quickly I could go for treatment at the Palmerston North hospital as I was diagnosed with a detached retina in the left eye. In those days, the sole treatment was compulsory bed-rest with sitting/sleeping on approximately a 45 degree angle to enable the retina to be floated back on to the rear of the eye. It would take a minimum of 6 to 8 weeks, if the procedure was successful.

I approached all of the Faculty members teaching me first year subjects to explore my options. What emerged was a programme where I would complete all of the laboratory practical work and submit assignments before I went to hospital and this work would be considered for an "aggregate pass" for the first year of the course. I completed the work and went to hospital. The treatment was a failure as the retina had been detached for too long. On the other hand, I received an aggregate pass for the first year.

On my return to Melbourne late in 1959, the Department of Agriculture offered to release me from all obligations of the cadetship. I declined the offer, did my practical training in a suburban milk processing plant, and returned to Massey in February 1960 (after Australia ceased compulsory military training for 18 year old males) to complete the degree.

Our 3rd year was the main transition year and the conversion was complete for our 4th year. I do not recall getting an option to stay on the old course. Kelvin Scott gave us lectures in 3rd and 4th year and the lecturer in Food Chemistry was Garth Wallace.

The Dairy Tech and Food Tech courses had the requirement for 48 weeks practical industry training. I spent the summer of 61/62 working in the quality control lab at J Wattie Canneries at Hastings and in the process lost all of my 3rd year notes in the fire there. At the end of my 4th year while awaiting graduation, I was appointed as the chemist in charge of the Watties' Gisborne factory. I left there at the end of March 1963 to tour the South Island and then returned to Palmerston North for graduation in April.

From my perspective the requirement for 48 weeks of practical training/work experience was a very good idea as it helped to crystallise what we were being taught. The management of the factories were happy to move us through various sections. I worked in a fresh milk packaging plant in Melbourne, a butter factory in Tauranga that received only cream, and did two stints in the separate factories owned by Jim Wattie as mentioned above.

One feature of the new degree course was the extra emphasis on the quality of the raw material, as processing could not add quality to poor raw material. This meant that we focussed on what occurred on farms, including farming/horticultural practices and not just on what we could do in the processing area.

Maybe one anecdote can give an insight into the food industry in the early 1960s. Jim Wattie was proud of the fact that he had grown the company from a bankrupt jam factory in the 1930s and its war-time role in producing dried food for the troops. He would visit the factory floor on most days and talk to the employees where he was always

known as Mr Wattie (he became Sir James in 1966). One day he came onto the floor and explained he was taking his horse called Even Stevens across to Australia for the 1962 Spring Carnival and asked if anyone wanted to give him money to bet on the outcome. He collected a lot on money – from 1 pound to 20 pounds. He asked me and I declined his offer as I knew nothing about horse racing and was not keen to gamble funds I needed to live on during the year.

When he returned from Australia, he came onto the factory floor and was handing fistfuls of money back to staff. I was told that he placed his bets shortly after he arrived in Australia and got 1000 to 1 as the odds for Even Stevens to win the Werribee, Caulfield and Melbourne cups and 100 to 1 to win the Caulfield and Melbourne cups - very happy staff. I still do not bet on racehorses! Even Stevens was the first "fly in" to win the Melbourne Cup when he was on the inaugural Qantas flight for horses that year from Wellington to Melbourne.

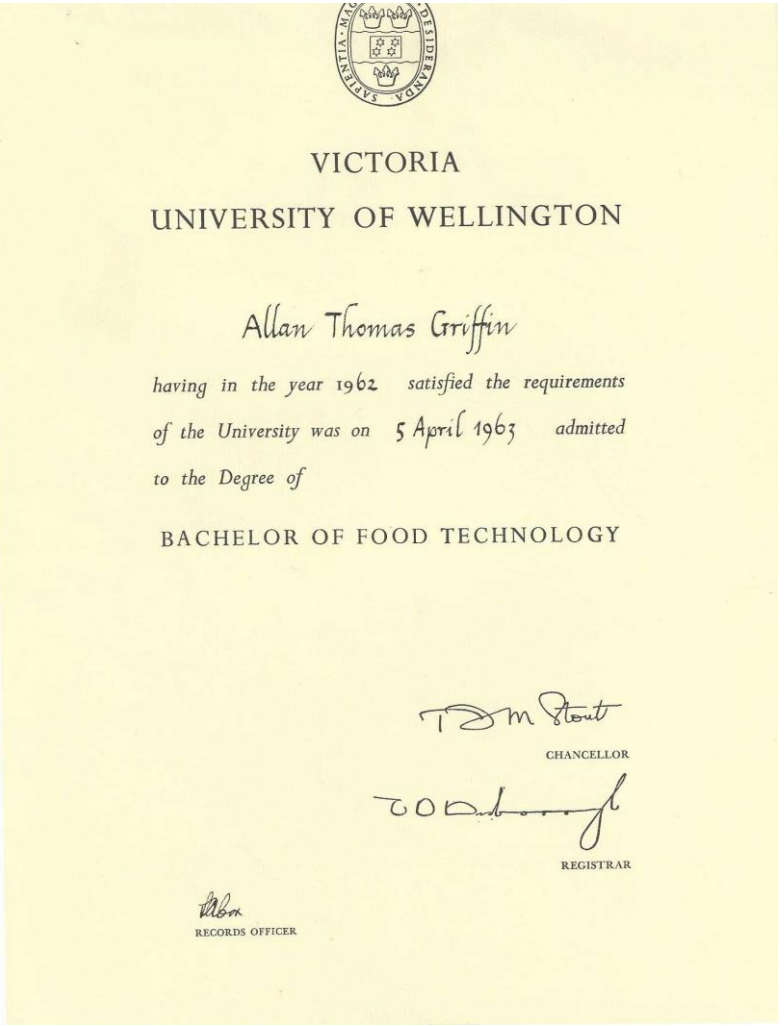
I went on with just one effective eye to have very satisfying professional careers in both technical and managerial positions in a number of different roles and industries in NZ, Australia and USA. Among the highlights were:
Research Officer/Senior Research Officer, Division of Dairying, 1963 to 1974 which included study leave at the University of Wisconsin - Madison, USA to complete MS and PhD degrees. In September 1970 my major professor Dr Clyde Amundsen came to Australia and brought with him the first ultra-filtration tubes seen in Australia. These were installed at the Gilbert Chandler Institute at Werribee and later at the Cororooke plant of the Colac Dairying Company where pioneering work (in collaboration with CSIRO) was done on the ultrafiltration of cheese whey.

Assistant Chief, Division of Dairying, Department of Agriculture 1974-75.
Sole Full-Member of Board of Inquiry into the Dairy Industry in Victoria 1974-75.
First Assistant Secretary (Federal Affairs), Department of the Premier 1975-76.

Deputy Secretary, Department of Premier and Cabinet 1976-85.
Director, Fire and Emergency Services, Ministry for Police and Emergency Services 1985-91.
Director-General, Department of Conservation and Environment and Director of National Parks and Public Land 1991-92.
Executive Director, Superannuation, Department of Treasury and Finance 1992-96.
Director of many public and private companies.

I also completed several diplomas in the management and financial areas:
Diploma in Management, 1973 (RMIT); Graduate Diploma in Banking and Finance 1991 (Monash University) and Graduate Diploma of Applied Finance and Investment 1995 (Securities Institute of Australia).

So Brian Maley could well have been the first and sole BFoodTech graduate in 1963, but having been given the opportunity to study at Massey, I was not about to give up on achieving the degree.



VICTORIA
UNIVERSITY OF WELLINGTON

Allan Thomas Griffin

having in the year 1962 *satisfied the requirements of the University was on* 5 April 1963 *admitted to the Degree of*

BACHELOR OF FOOD TECHNOLOGY

CHANCELLOR

REGISTRAR

RECORDS OFFICER

The first BFoodTech degree certificate was issued by Victoria University of Wellington on behalf of Massey University of Manawatu. After the University of NZ was dissolved on 31 December 1962, Massey was 'attached' to Victoria University

Reminiscences of Dick Inwood (graduated 1964)

On leaving school, I took a job working as a lab technician for the Christchurch town milk company, essentially doing checks on the quality of the outgoing and incoming milk, and learning to "grade" milk for bacterial quality, for pasteurisation, fat content, water content, etc. Towards the end of the year (1959) I spent there, the local Dairy Division inspector suggested I apply for what was then a new bursary being offered to potential dairy technology students at Massey. The Department of Agriculture had long sponsored students to do Agricultural Science, and they were bonded to the Department of Agriculture for four years after graduation, but this was a new thing for the Dairy Division. I subsequently applied, and was one of four such bursaries awarded, to start doing the "intermediate" at Massey in 1960. It was the same intermediate year for all Agricultural, Horticultural Science, and Agricultural Science students, but it was clear then that I was to do the Dairy Tech option of the BAgrSci degree. I was the only one of those with a Dairy Division bursary to pass the first year.

It was not until about midway through our second year in 1961 that those who were not committed to the dairy technology option were offered the option of changing to food technology. There were 7 of us in that second year: John Reid, Rex Perreau, Ed Neff, Ian Curtis, John Duncan, Jagan Mohan and me. Jagan had arrived from India at the start of our second year. Ed and Ian were committed to dairy technology, as they were sponsored by the Victorian Department of Agriculture. John Reid had connections with what was then the Morrinsville Dairy Company, and John Duncan with the Helensville Dairy Company. Rex was the only one of us to formally change to the newly offered food technology option, and again, it didn't matter in our Second year, as we all did the same course: basic chemistry, biochemistry, bacteriology, food engineering and processing classes. Separation didn't happen until the third year, when Rex went off to do special classes.

By Third year, there were only four of us doing the full Third year subjects - Rex, Ed, Jagan, and me. So too, it was in Fourth year. Ed, Jagan and me were doing the dairy tech options, and Rex the food tech options. In reality this meant he had 4 hours a week with Hal Morris, while we were doing dairy tech with Robin Fenwick, who had just completed his MAgrSc in Dairy Technology. Ed, Rex and I all graduated at the end of the 4th year, while Jagan graduated a year later.

My bond was harsh, significantly worse than the Ag Science bond. I was required to acquire a Dairy Factory Managers certificate, which would take a further five years, and on completion of this, I was bound

to work for the Dairy Division for a further 4 years. So essentially it was a 9 year bond. However, I had little or no contact with the Dairy Division. I was directed to start work at the end of 1964 with the (now defunct) East Tamaki Dairy Factory in South Auckland. There, I was paid dairy factory labourers' wages, and spent much of my time testing milk for fat, stacking butter, operating a spray drier, and firing a boiler, all of which was part of the "apprenticeship" involved in getting a dairy factory managers certificate. Although I didn't really mind the work, the wages were definitely inferior to that of other graduates, and I worked 6 days a week for most of the time.

Hal Morris visited me after about 6 months (I was preparing a boiler for annual inspection at the time), discussed what I was doing, and arranged for an interview with Herb Hebden, then R&D manager for Unilever at their Crest/Birdseye Foods Division in Hastings where Hal had worked prior to moving to Massey in 1962. They offered to purchase my government bond, over a period of 4 years, and pay me what was then an appropriate salary. So ended my career as a dairy technologist. Typically, the government continued to pay me for another two years, before they asked for the money back.

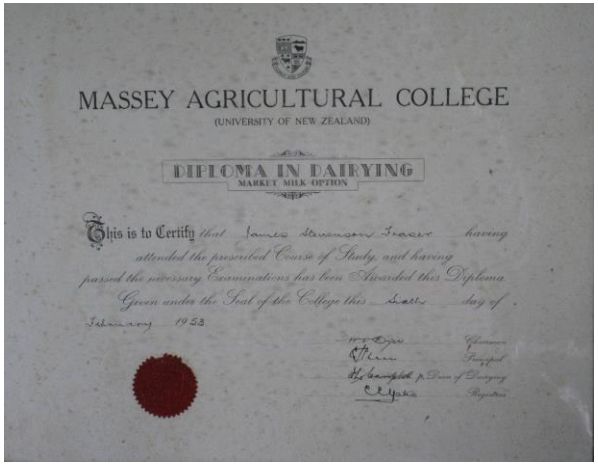
In 1970 I accepted a position with Uncle Ben's in Wodonga as Development Technologist and proceeded through various functions in product and process development, including two years in Germany as a Food Technologist at a sister company. I was promoted to R&D Director in 1985 and became Manufacturing Director in 1987. I then became Technical Director, combining both functions, in 1989. In 1991 I was made Vice President of Mars Petfood R&D in Europe.

In retrospect I was naive in signing up for essentially a 9 year bond, but the early 1960's were a time of shortage of graduates, of optimism, of belief in a world getting better, full of opportunity and continual expansion. Certainly there was no need for career planning as my children, indeed grandchildren, perceive it. Ignorance was bliss.

Dick died while living in France in 2021 and had planned to return to live in New Zealand.

Reminiscences of Jim Fraser (graduated 1966)

My family owned a milk treatment station in Brisbane and I first came from Australia to enroll at Massey Agricultural College in 1951 for the Diploma in Dairying (Market Milk Option) that was taught largely by Jack Ward. After winter terms in 1951 and 1952 it was straight on to the third year unlike the other options that were only taught during the winter (off-season). After completing the diploma in 1952 I returned to work in the family business.



MASSEY AGRICULTURAL COLLEGE

(UNIVERSITY OF NEW ZEALAND)

DIPLOMA IN DAIRYING

MARKET MILK OPTION

This is to Certify that James Stevenson Fraser having attended the prescribed Course of Study, and having passed the necessary Examinations has been Awarded this Diploma Given under the Seal of the College this 28th day of February 1953

In 1959 Kelvin Scott was in Brisbane at an Australian Society of Dairy Technology meeting I attended where he mentioned a proposed new food technology degree at Massey. Following further discussions, I returned to New Zealand with my wife and two young children in 1960 to commence studying for the degree. In 1960 at the age of 29 I took two of the intermediate papers (Botany and Physics) and two the following year (Chemistry and Zoology). I commenced the second year of the degree in 1962 and completed it in 1965. It was tough returning to study as a mature-age student but the staff (several of them my age) were very encouraging and helpful.

After graduation it was clear that opportunities in New Zealand were limited and so I returned to Brisbane and joined the Dairy Division of the Queensland Department of Primary Industries (QDPI). Originally, I was in Field Services, involved with the disposal of dairy waste, insect infestation of casein plants and research into spreadable butter. Within a year I was charged with installing all the laboratory equipment and taste panel facilities and commissioning the pilot plant in the new Otto Madsen Dairy Research laboratory established by the QDPI in Brisbane and officially opened by the Premier in August 1967. However, I could see that the dairy industry was failing in Queensland and so in February 1970 I accepted a position as food technologist with the New Zealand Health Department in Wellington (where we still had a house), despite the salary being lower and the superannuation less remunerative.

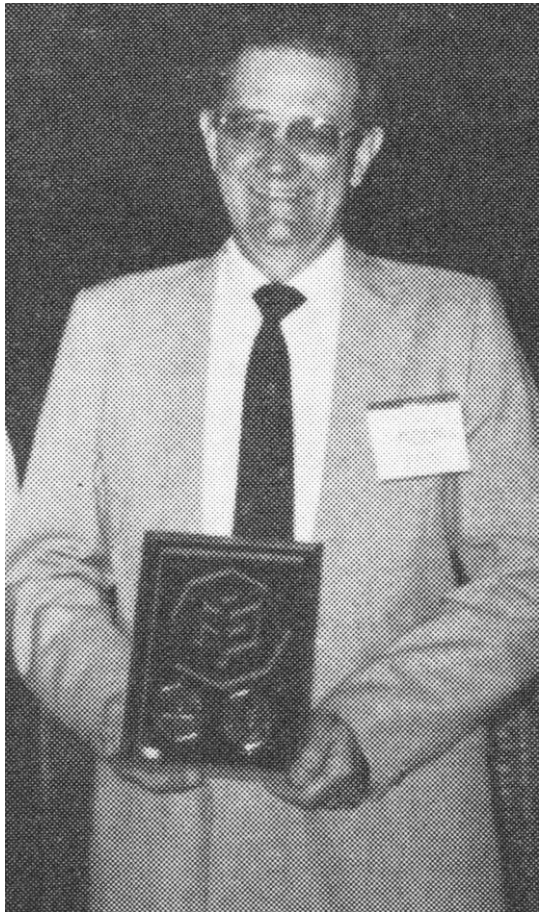
I was part of a team of food technologists, dieticians, toxicologists and inspectors of health in the Public Health Division of the Department. I was involved with a complete rewrite of the Food Regulations, Dietary Supplements and the Food Act and pushed hard for the establishment of the Food Standards Committee. The Health Department was extremely supportive of food technologists and regularly sent staff overseas to visit other Health Authorities, attend conferences and participate in FAO/WHO Codex meetings. Staff also regularly visited food processing plants throughout New Zealand to remain abreast of new technology and to ensure there was compliance with the relevant legislation. Salaries also became more realistic.

There were many high points in my career including rewriting food legislation; establishing the Food Standards Committee in 1973; initiating the Total Diet Surveys; a WHO Fellowship; and being appointed Head and Principal Investigator of the Joint UNEP/FAO/WHO Food Contamination Monitoring programme that

informed governments, the Codex Alimentarius Commission and other relevant institutions, as well as the public, on levels and trends of contaminants in food, their contribution to total human exposure, and significance with regard to public health and trade. Being elected a Fellow of both the Australian and New Zealand Institutes of Food Science and Technology was also nice but the ultimate highlight was undoubtedly receiving the JC Andrews Award in 1990 for "eminence in food science and technology."

By 1987 I was Chief Scientist Health Protection Programme and took early retirement in my 60th year in February 1990. For a few years I was a consultant to the food industry in Australia and New Zealand and received Honorary Life Membership from the Wine Institute of New Zealand in 1999. I have been a member of the Editorial Advisory Board of the journal World Food Regulation Review from 1992 to the present. From 1992 to 2008 I was a member of the New Zealand Pesticide Board representing the Wine Institute of New Zealand and I was also a member of VORAC – the Viticulture and Oenological Research Advisory Committee from its inception in 1980 for many years. My focus now is on drinking wine!

I have never regretted my decision to return to Massey in 1960 and study for a degree in food technology. Despite the hard work that this entailed, it enabled me to have a most enjoyable and fulfilling career.



Reminiscences of Peter Nixon (graduated 1967)

I spent 1967 on an extended vacation job at Prepared Foods Ltd in Palmerston North and undertook part time studies in at Massey. In 1968 I joined the Fisheries Division of the Marine Department which later became the Fisheries Management Division of the Ministry of Agriculture and Fisheries. Since starting work at Fisheries I always thought that time temperature integration was the cheapest, most practical and most meaningful method of assessing fish freshness along the production and distribution chain. I had calculated from published data a first approximation of the temperature-spoilage rate and built some crude electronic integration devices. Then I met Dr. June Olley (Senior Principal Research Scientist at the CSIRO Division of Food Preservation at their Tasmanian Regional Laboratory) at a conference in 1971 and found that she was thinking along the same lines, except that she had an elaborate method for constructing the temperature-spoilage rate curve as an Arrhenius curve with the activation energy varying with temperature (Murphy's Law states *inter alia* that all constants are variables). The relative rate function was found to be valid for all types of fish spoilage reactions whether chemical, bacterial, organoleptic or physical.

When I mentioned this at work my attention was drawn to the Public Service Manual which stated firmly that all intellectual property dreamed up by public servants would be the property of the Crown, and furthermore that that development must be carried out by the (then) Inventions Development Authority (NZIDA). Thus there was an agreement made between my department (I cannot recall whether it was the Marine Department or the Department of Agriculture at that time) and NZIDA that ten prototype integrators would be made and tried out by various parties who had taken some interest. The professionally-made machines had June Olley's temperature-spoilage rate curve incorporated as ROM (read-only memory) on a chip and storage of the integral also on a chip (cf my use of electromechanical counters).

In due course the prototypes were made, delivered to NZIDA, and distributed to the various parties who had expressed interest. At the worst possible time NZIDA went out of existence to be replaced by the Development Finance Corporation (DFC). I had little success in recovering either the machines or any of the assessments that were supposed to be made. I received US patent 4061033 in 1977 for a Temperature function integrator assigned to the DFC. By chance in 1978 I met a DFC man at Maungahuka Hut (top of Tararua Range) who expressed a total lack of faith in time temperature integration but was some help in recovering a prototype.

In the late 70s or early 80s I became aware that MAF Animal Research Labs at Wallaceville had the capacity to do HPLC analysis, which would enable fish quality assessments by hypoxanthine or K factor to be correlated with temperature function integrals. Unfortunately, I could not convince anyone senior enough to favour this proposal. That was the last gasp of the time-temperature integration effort.

After a few years of uncertainty and constant restructuring, all the science and technology staff in Fisheries were made redundant to fund the ITQ scheme (Individual Transferable Quota or Intangible Total Quandary depending on your opinion). Now there are not the organisations which could use time-temperature integration. MAF Fisheries no longer exists, The Wallaceville Animal Research Laboratory was closed, The Fishing Industry Board made all its food techs redundant and was itself abolished in 1992, the Boyd and Wilson team at Massey's Food Technology Research Centre suffered a similar fate, and the Torrey Fisheries Research Station in Aberdeen Scotland died in 1996.

To sum up in few words: "I proposed the idea of temperature function integration as the simplest and cheapest method to assess fish freshness and discussed this with like-minded people including June Olley . We had some success in establishing the temperature function to be integrated and designing automatic portable devices to do the job but ultimately there was neither the interest nor the resources to proceed further and the vision died in the Rogernomics revolution of the 1980s."

United States Patent [19]
Nixon

[11] **4,061,033**
[45] **Dec. 6, 1977**

[54] **TEMPERATURE FUNCTION INTEGRATOR**

[75] Inventor: **Peter Anthony Nixon,** Wellington, New Zealand

[73] Assignee: **Development Finance Corporation,** New Zealand

[21] Appl. No.: **664,475**

[22] Filed: **Mar. 8, 1976**

[30] **Foreign Application Priority Data**

Mar. 10, 1975 New Zealand 176879

[51] **Int. Cl.**[2] **G01D 1/04;** G01D 3/02; G01N 33/02

[52] **U.S. Cl.** ..... **73/339 R;** 73/362 AR

[58] **Field of Search** ..... 73/362 AR, 339 R, 343.5; 426/88

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Primary Examiner—James J. Gill
Attorney, Agent, or Firm—Holman & Stern

[57] **ABSTRACT**

The temperature function integrator disclosed senses the temperature of a temperature sensitive food and provides as an output a measure of the food deterioration. A temperature transducer produces an electrical signal which is modified according to a transfer function simulating the temperature — rate of deterioration relation for the food by either analogue or digital means. The modified signal determines the pulse rate or the number of pulses generated at a sample time by a pulse generator, and these pulses are counted by a digital counter which performs an integrating function. A number of counters can be used to give deterioration for a number of selected temperature ranges. An integral or remote read-out decodes the counter. Rate of deterioration and absolute deterioration information may be telemetered to a remote receiver and read-out.

8 Claims, 4 Drawing Figures

The Australian Connection

In 1948, the Dairying Division of the Victorian Department of Agriculture initiated a training programme to develop a core capability in dairy extension and advisory services for the production and processing sectors of the industry in the state. The then Chief of the Division was Tom Jensen who was the second student to complete the dairy science option of the BAgrSci degree at Massey in 1935. He had reviewed undergraduate training at Australian universities and concluded that none of the courses on offer specialising in either dairy husbandry or dairy technology were as suitable as that provided by Massey Agricultural College at Palmerston North. In total 52 scholarships were awarded from 1948 to 1970.

The first two graduates in food technology were Australians sponsored by the Victorian Department of Agriculture. In total 8 Australians were sponsored to complete the food technology degree at Massey:

Dennis Cox
Ian Curtis
Ian Darby
Allan Griffin
Roger MacBean
Brian Maley
Greg McDonald
Edward Neff

Earlier, 5 Australians had been sponsored to complete the BAgrSci(Dairy Tech) degree:

Howey 1953
Bevan 1954
Dixon 1955
Buchanan 1957
Jarvis 1961

The Department did not manage to retain all their scholarship recipients for long careers, due in large part to the demand for Massey-trained food technologists in Australia by other sectors of the food industry, and in part (according to those who left), the culture and management of the Division and the uncompetitive salaries offered. Although the breadth of the degree in Food Technology compared to the dairy focus of the preceding Dairy Technology degree may have made it less suitable to the requirements of the Dairying Division, they nonetheless continued to award scholarships.

Brian Maley resigned from the Department after just 6 months in 1963 and joined Campbell Soup Company as Chief Chemist. Like the others who left before serving 4 years, he had to pay all the scholarship money back so one could say he was one of the original student loan people. He spent 15 years with Campbell's including 4 years in the USA.

Ian Darby worked as milk products officer for the Department for 9 months in 1969 before joining Mars Inc. at their Uncle Ben’s plant in Wodonga. He took out a bank loan to pay back the bond and, because of the significantly higher salary at Mars, was able to repay the loan within 12 months. He spent 13 years with Mars Inc. as food technologist in R&D (3 years), then product group manager developing a string of new brands, with a 3 year stint as regional sales manager. He then started a promotional marketing business under the umbrella of Young & Rubicam Adelaide.

Ian Curtis resigned from the Department after 4 years to take a position with Containers Ltd.

Ed Neff left the Department after 5 years (which included 18 months study leave to undertake a MFoodTech degree at Massey) to join HJ Heinz Co (Australia) Ltd as a food technologist in R&D.

Roger MacBean left the Department after 9 years (which included 3 years study leave to do a PhD at UNSW) to become Technical Manager of the Victorian Dairy Industry Authority.

The last sponsored student Greg McDonald joined the Department in 1971 as Milk Products Officer and resigned in 1976 to join Provincial Traders (Vic) as Technical Manager (Industrial Fats & Oils). In 1978 he rejoined the Department as Supervising Dairy Technologist, based at Warragul.

Students Society

Up until March 1968, food technology students belonged to MUFTSA: Massey University Food Technology Students Association. At the annual dinner in 1966 held in the Majestic hotel, Sir James Wattie was the guest speaker and drove down from Hastings in his Bentley (or rather his chauffeur did the driving). In March 1968, Gordon Robertson began editing Technocrat, a fortnightly newsletter (kindly typed and mimeographed by the Dean's secretary Miss Denise King) that was distributed to staff and students in the Faculty.

In June 1968, with the introduction of a biotechnology degree option, MUFTSA was changed to SOFABS: Society of Food and Biotechnology Students. At the annual SOFABS dinner in September 1968, Mr Stan Brooker, Chief Chemist at Abels in Auckland, spoke on his career as a chemist and lately (in his view) as a food technologist. In March 1969, biotechnology student Suzanne Fauchelle became editor of Technocrat.

At the AGM in March 1969, the society name was changed to Technosoc. The original idea was to follow the engineering students at Canterbury University whose student society was called Engsoc and call the Massey one Techsoc. However, at the time there was considerable publicity in New Zealand about technician training and to avoid technology being confused with technicians, the name Technosoc was chosen. At the September 1969 Technosoc dinner held at Monties restaurant (tickets $2.50 per head), local barrister and City Councillor Trevor de Cleene was the guest speaker. Technocrat continued intermittently until the end of 1974.

4th Year Food and Biotechnology students in Ongley Park ready to take on the 3rd Year students at rugby football in 1969

Dress Regulations June 1968

Minimum standards of dress required in all teaching buildings were outlined by the Registrar Mr. A.J. Weir as follows:
1. with walking shorts, three-quarter length hose and open-necked shirt
2. with long trousers, shirt preferably with tie or shirt with high-necked pullover.
Dress reminiscent of the beach is not permitted.
Fifth Year Veterinary Science students have been told that unless they wear ties to lectures and labs, they will not be permitted to complete the course.

Food Technology staff responded as follows (as reported in Technocrat):
Dr Wallace: I hate wearing ties, but must wear one out of necessity. I don't care what a student wears as long as he is clean, neat and tidy – this includes shaving every day (i.e., beards are OUT!).
Mr Morris: I see no need for students to wear ties. This is purely an academic question, as a tie doesn't convert a ruffian into a gentleman.
Miss Humphries: I don't think students should wear ties. However, they should look presentable and be clean, not 'tatty'.
Mr Latimer: I don't care what the boys wear, as long as they are presentable. Personally, I favour mini-skirts on girls.
Dr Earle: Not all students can afford to buy many clothes, so they shouldn't be tied down to any particular form of dress. However, they must be clean and tidy – soap and water doesn't cost much. When students go on outside trips, I expect them to wear the best clothes they have.
Dr McDougall: If a shirt is designed for a tie, then a tie should be worn. Also I think students should bring slippers to change into once they enter the building.
Dr Bannatyne: Students should exhibit a reasonable standard of decorum, but I see no need for ties, blazers, etc.

No attempt was made to enforce the dress code and in October 1969, dress regulations were drawn up individually by each Faculty but appear to have received minimal publicity or adherence. The photographs of 4th Year Technology students taken during the early 1970s indicates that dress reminiscent of the beach was starting to become the first choice of many students.

4th Year Technology students in March 1972. Ray Winger, later Professor of Food Technology, is left hand side in the front row.

Publications

Unlike the universities of today, in the 1960s at Massey (as well as many other universities) there was little emphasis placed on publication of research in academic journals. Below is a list of publications from food technology staff during the first 10 years.

Scott J.K. 1962.
Chemistry and food technology.
Journal of the New Zealand Institute of Chemistry 26(3): 94-103.

Wallace G.M. 1962.
Application of the hydrometric method of analysis to the estimation of solids-not-fat production.
Journal of Dairy Research 29: 11-19.

Wallace G.M. 1963.
Use of hydrometric technique in estimating SNF content of milk.
Dairy Industries 28: 600-603.

Neff E., Morris H.A.L. 1968.
Agglomeration of milk powder and its influence on reconstitution properties.
Journal of Dairy Science 51: 330-338.

Bannatyne W.R., Thomas J. 1969. Fatty acid composition of New Zealand shellfish lipids.
New Zealand Journal of Science 12: 207-212.

Thomas J. 1969. Correlation of pH and quality of fresh New Zealand oysters (*Ostrea lutaria*).
New Zealand Journal of Science 12: 784-788.

Khaleque A., Bannatyne W.R., Wallace G.M. 1970.
Studies on the processing and properties of soymilk I.—Effect of preprocessing conditions on the flavour and compositions of soymilks.
Journal of the Science of Food and Agriculture 21: 579-583.

Wallace G.M., Bannatyne W.R., Khaleque A. 1971.
Studies on the processing and properties of soymilk: II.—Effect of processing conditions on the trypsin inhibitor activity and the digestibility *in vitro* of proteins in various soymilk preparations.
Journal of the Science of Food and Agriculture 22: 526-531.

Wallace G.M., Khaleque A. 1971.
Studies on the processing and properties of soymilk. III. Factors affecting concentration of soymilk and its stability during heat sterilisation.
Journal of the Science of Food and Agriculture 22: 531-535.

FOURTH YEAR STUDENTS "ANALYSE" THE FOOD TECHNOLOGY DEGREE (TECHNOCRAT JULY 1970)

Fourth year students were asked to consider, critically, the degree which they were about to (or hoped to) complete. A brief analysis of their replies is as follows:-

The predominant feeling is that the course embraces too wide a field of subjects and, due to the limitation of time, coverage of many of these subjects is inadequate. Two solutions were proffered:
(i) lengthen the time of the courses;
(ii) convert to more specialised courses at an earlier stage.

It is also felt that too much consideration is given to the Meat and Dairy Industries (repetition of lecture material often occurring), and thereby insufficient coverage of others. Can the Fourth Year Food Industries subject really be called an "Elective Industry" when there are only two choices available?

More suitable background material would be obtained in the first and second years if these were taught within the Faculty. The students would have the opportunity to become associated with foods earlier in the course by this method.

Another suggestion made was that more use could be made of project-style practical work instead of just repeating the same old practicals every year in each subject. The students feel that more is obtained from practical exercises in which they are left to their own "resources"'- after all, isn't this the very situation that they will face in industry?

Comments from two fourth year students merit particular reference:

(i) Quality Control has too much emphasis placed upon it for a one-year subject. The practical course for this subject could well be applicable to the suggestion outlined above.
(ii) Food Marketing does not contain enough material directly relevant to food products. As it stands, the course is orientated about the production of agricultural raw materials, price fluctuations, etc. and not the marketing of food products specifically.

DR GARTH WALLACE RESPONDED IN THE NEXT ISSUE OF TECHNOCRAT

In reply to the last issue of Technocrat, I wish to submit my philosophical concept of the basis for setting up the present course structure and requirements for the Bachelor of Technology (FoodTech) degree.

A food technology course leading to a graduate qualification must provide the opportunity for the student to receive a training that is both sufficiently broad and of adequate depth for a proper understanding of raw materials, of processes, of products and of the management and marketing skills necessary for efficient commercial exploitation. Because technology is the application of science for industrial and commercial exploitation, it is essential that the food technologist has a background of scientific knowledge adequate for understanding the technology with which he is involved. Furthermore, on analysis, food technology is found to be based on a limited number of unitised operations, processes, reactions and responses, although the methods of achievement or of study of these are as diverse as the food industry.

Because of this relatively common basis, it is logical that the primary course in food technology should be broadly based in terms of commodity interest, for it is only thus that the student will appreciate

the full extent of this common background. A further important factor resulting from this broad multi-commodity approach is the opportunity it gives the student to realise the diversity in the processes and methods available, and in commercial use, for achieving a common objective, and as a result of this it is hoped he will seek widely outside as well as inside his typical industry horizon for the answers to his problems.

To achieve an adequately balanced training essential for his efficient functioning as a food technologist, the student must study, at some depth, a selection of courses in basic and applied science together with courses in which the science and its integration into technology are considered. Since technology includes efficient commercial exploitation of science, management and marketing skills and economic studies must be included. As a consequence of these needs and in view of the limited time available, it is necessary to require the food technologist to follow a carefully and closely prescribed course of study, with little freedom of choice, if his rounded training as a food technologist is to be achieved in minimum time.

In conclusion I agree with the desirability of making a more detailed study of a specific commodity industry but believe that this will be much more efficiently achieved by enrolling for a postgraduate Diploma in Technology, especially after a period of experience in the particular industry. In this way the graduate approaches his specialised problems from a broad base which is a more adequate foundation on which to support his specialised knowledge. Too early specialisation can only lead to an undesirable imbalance in the basic technology degree.

The original food chemistry/microbiology laboratory in the Riddet Building

TECHNOCRACY - PROFESSOR SCOTT IN TECHNOCRAT AUGUST 1968

Having just finished studying *"The World Bank Report on the New Zealand Economy 1968"* and assuming that not many Technocrat readers would have done likewise, here are some salient points from the report for future BTech graduates.

Basically, the report informs us that NZ is in a financial warp due to an attempt (a) to broaden our agricultural base by over-protection and support of many uneconomic industries, (b) lack of competition on our domestic markets due to import control, and (c) too much borrowing.

The cure, says the report, is to do more processing of our agricultural and forestry industries provided the products are acceptable on world markets; expose our manufacturing industries to outside competition; make use of our high education standards by developing advanced technology in these selected industries, and have more dynamic management and marketing. The positive side of this recommendation should be of particular interest to Massey graduates in Technology, because the built-in objectives to the degrees follow similar lines.

To continue to depend on wool, meat, and dairy products for 80% of our export income, and to sell 50% to the UK is a risk the World Bank advises us to reduce. Diversify they say, but not as you have done in the past. By changing the form of industrialisation to the cure, Norway, Denmark and Ireland have been successful in reducing their dependence on agricultural exports. They concede that New Zealand has a problem that does not plague these countries, namely sea transport costs, but the World Bank suggests we develop low-weight high-value goods for export and make selected bulky-items for domestic use.

The report tells us how to get moving now - by establishing a permanent planning unit of professional economists and technologists to assess the economic (i.e., export) value of our resources and to constantly appraise the results and advise the government. Whether this is good or bad can be argued, but some plan of action will be developed. (It may arise from the National Development Conference next month). Whatever guidelines emerge, let us hope that our BTechs with their competence in science and mathematics, and not unnerved by computers, critical paths or linear programming in management, can meet the challenge.

"Plus ça change, plus c'est la même chose?

The Riddet Institute is a premier centre for fundamental and strategic scientific research. Its area of expertise is at the intersection of food material science, novel food processing, human nutrition and gastrointestinal biology. It was established in 2003 and awarded Centre of Research Excellence (CoRE) status by the New Zealand Government in 2007. The Riddet Institute provides a unique intellectual environment using a multi-disciplinary scientific approach and integrating New Zealand's expertise across multiple organisations.

Distinguished Professors Paul Moughan and Harjinder Singh, co-directors of the Riddet Institute in 2015.

The Riddet Institute is one of seven government-funded Centres of Research Excellence. It is hosted by Massey University and has partners at the University of Auckland, University of Otago, AgResearch and Plant and Food Research.

FoodHQ is a research collaboration that aims to enable New Zealand's food exports to reach NZ$60 billion by 2025. The super-campus, in Palmerston North, encompasses the Fitzherbert Science Centre and Massey's Manawatu campus Turitea site. It is home to more than 4000 researchers and educators involved in the agrifood value chain.

FoodHQ is New Zealand's international gateway for collaborative food research. It generates value for the global food industry through innovation across the value chain. FoodHQ further unifies the relationship between AgResearch, Fonterra, Massey University, Plant & Food Research, AsureQuality, the Riddet Institute, Environmental Science and Research and the BCC. It is supported by the Palmerston North City and Manawatu District Councils.

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CURRICULA

Dairy Technology

The Diploma of Associateship in Dairy Manufactures with options in either butter-making or cheese-making was offered by Massey Agricultural College (MAC) from 1928, while the Bachelor of Agricultural Science degree with a dairy science option was first offered in 1930. The post-WWII period saw a restructuring and proliferation of courses. The Diploma in Dairy Manufactures was originally intended for the training of workers in butter and cheese factories but its scope was expanded in 1946 to include an option for students who wished to specialise in market milk (i.e., town milk). It was renamed the Diploma in Dairying (Dip.Dy. M.A.C.), and a one-year certificate course for milk technicians was developed.

According to the 1946 Calendar, "the objects of the course are to give students a general understanding of the several sciences involved in the manufacture of butter and cheese and in the treatment of market milk; to show the application of these sciences to dairy plant practice; to provide students with an up-to-date knowledge of modern dairy plant practices; and to give students a broad understanding of the business side of the dairy industry, including the management of plants, and some understanding of international trade in dairy produce."

However, the Calendar made clear that "the course cannot, and does not pretend to train students for advanced technical work or research work in dairying; that is provided by the Dairy Science option of the course for the degree of B.Agr.Sc." No student was allowed to enter upon the course without having had at least one season's experience or the equivalent in an approved dairy plant. In examining students in the practical dairying subjects, the college staff was assisted by factory managers nominated by the New Zealand Dairy Factory Managers Association and the market milk trade.

In 1939 the dairy science degree option, BAgrSc (Dairy Sc), was restructured. The second, third and fourth Professional years were taught over two terms only in order that students might be free for the period August to February (the peak milk production season in New Zealand) to undertake practical work in approved dairy plants.

The degree was revised again in 1957 and Brian Jarvis (on a scholarship from the Victorian Department of Agriculture) was the first student to take the newly revised Dairy Technology option of the BAgrSc degree. He was the only student in the class and assisted the lecturers in developing the course content as he had a Dairy Diploma from Nottingham University. He returned to Melbourne on completing his studies at Massey but resigned from the Department to briefly take up a position in charge of the laboratory at Model Dairy before moving to the University of New England, Armidale, NSW where he completed his PhD in 1966. After two years as a post-doctoral Fellow at the University of California, Davis, he was appointed Senior Lecturer in Microbiology at Massey University in 1967, retiring as Associate Professor in 1993.

Number of BAgrSc (Dairy Tech) and DipDy enrolments:

	2nd & 3rd Years	4th Year	Diploma in Dairying
1955:	3		66
1956:	1	2	71
1957:	1		62

1958:	1	1	50
1959:	6		55
1960:	8	1	77
1961:		5	70

In 1958 Massey could at last offer first year science teaching in chemistry, botany, zoology and physics. Previously agricultural degree students had been required to complete the first year of their degree at one of the four University Colleges (or overseas) and Professor Peren had long considered this a stumbling block to degree enrolments. The availability of science teaching meant that students could complete their entire degree at Massey, and this contributed to the fact that by 1961 there were 242 undergraduates at Massey, a six-fold increase in the number of degree students in just four years. Masters, requiring a further full-time year of study, were also now offered in horticulture and dairy technology.

The 1959 Parry Report on university education was adopted by the Government, and following its recommendations the University Grants Committee (UGC) was established, and the constituent colleges of the University of New Zealand (UNZ) gained autonomy in 1961.

At the time of his retirement in 1958, Sir Geoffrey Peren drew attention to the need to provide training in food technology. He said that Massey's experience in dairy technology and its interest in meat, fruit and eggs meant that it was well prepared to develop such a course. In August 1959, the newly-appointed Principal Dr (later Sir) Alan Stewart pointed out to the UGC that Massey had offered a course in dairy technology for a number of years and that a *'Food Technology course was considered a natural and desirable extension of this course in view of the increasing amount of food processing now being undertaken in fields other than dairying'*. Massey intended to broaden the dairy technology option into a food technology degree, and Dr Stewart told the UGC that the new course would be more attractive to prospective students and employers than the dairy technology option had been.

When a proposal was submitted to the Curriculum Committee of the UNZ, the preferred name for the new degree was the Bachelor of Food Technology. However, the Committee recommended the title of BAgrSc (Food Technology) as this would not require any changes to university legislation. Other university colleges pointed out that the proposed degree was sufficiently different from its predecessor to warrant a new name, so Massey reverted to the favoured title.

The strongest opposition to the new degree came from Canterbury University College, where the Faculties of Science and Engineering argued that the degree was unnecessary, inconsistent with policy and based on an unsuitable structure. Despite these concerns, in 1960 approval was granted to develop the Bachelor of Food Technology, and the necessary legislation passed. The new degree was introduced in 1961, and Professor Kelvin Scott was appointed to the Logan Campbell Chair in Food Technology in April 1961. It was greeted in the press as an exciting development that promised to play a key role in diversifying and increasing New Zealand's exports.

1958 BAgrSci(DairyTech) Course Regulations

(identical regulations were in the 1959 and 1960 calendars)

CALENDAR NOTE: This course normally covers five years – the Intermediate year and four Professional years. The second, third and fourth Professional years extend over two terms only in order that the candidate might be free for the period August to February in those years to undertake practical work in approved dairy plants for the purposes of the degree.

Intermediate Examination

1. **Chemistry** (Two papers and practical examination)
2. **Botany** (Two papers and practical examination)
3. **Zoology** (Two papers and practical examination)
4. **Physics** (Two papers and practical examination)

Professional Examinations

First Professional Examination

1. **Biochemistry** (One paper).
2. **Economics** (One paper).
3. **Dairy Bacteriology I** (One paper).
4. **Dairy Husbandry** (Two papers).
5. **Agricultural Economics I** (One paper).
6. **Dairy Bacteriology II** (One paper).
7. **Dairy Chemistry I** (One paper).
8. **Dairy Practice I** (One paper).
   Certificate required: Physical Chemistry (56 hours)

Second Professional Examination

9. **Dairy Chemistry II** (Two papers).
10. **Dairy Practice II(a)** (One paper).
11. **Dairy Engineering** (One paper).
12. **Dairy Practice II(b)** (One paper).
13. **Dairy Practice II(c)** (One paper).
14. **Dairy Plant Management** (One paper).
15. **Dairy Organisation and Trade** (One paper).
    Certificates required:
    Dairy Plant Book-keeping (40 hours)
    Machine Drawing and Workshop Practice (240 hours)

Prescription of Subjects

First Professional Examination

7. **Dairy Bacteriology I** (One paper).
Principles of bacteriology and mycology. Microscopy. Classification, morphology, physiology, metabolism and nutrition of micro-organisms. Bacteriophage. Microbial associations and antagonisms. Elementary study of infection and immunity. Detailed study of types of organisms important in dairy practice. Principles of sterilization and disinfection.
A laboratory course based on the above course of lectures.

8. **Dairy Husbandry** (Two papers).
Dairying: Relation to systems of agriculture, particular features and requirements; distribution in New Zealand. The dairy farm; its selection, layout, buildings, machinery and equipment. Breeds of dairy cattle and pigs, their history, characteristics, uses and importance in New Zealand. Milk secretion and milking.
The Dairy Herd: Establishment, application of the principles of animal breeding, rearing of young stock, feeding, and management. Pigs, establishment of herds, improvement, feeding and management.
Dairy Farm Management: A study of the systems of dairy farming in New Zealand with particular reference to: types of crops and pastures grown and their utilization, capital required, labour requirements,

organization and conditions of work, estimates of income and expenditure
Maintenance of the fertility of the land. The use of records.
Establishment of a farm.

10. **Dairy Bacteriology II** (One paper).
Microbiology of milk and milk products. Bacteriology of starter cultures. Nature and significance of pathogenic organisms occurring in milk. Principles and techniques involved in quantitative and qualitative bacteriological examination of milk, milk products, and dairy requisites. Sterilization and disinfection in dairy practice. Bacteriology of water supplies and sewage.
A laboratory course based on the above course of lectures.

11. **Dairy Chemistry I** (One paper).
Biochemistry of milk secretion. Composition and properties of milk. Detailed chemistry and elementary physics of milk, butter, cheese, concentrated milks, ice cream and other products. Nature of chemical changes occurring during storage, and factors influencing storage-life of dairy products. Utilization of dairy by-products, including whey, skim milk, buttermilk, casein, lactose. Analysis of milk and dairy products.

12. **Dairy Practice I** (One paper).
Principles and practice of the production of high quality milk. Types of defect in milk quality, their causes and control. Legislation governing production and sale of milk. Milking machines. Principles and practice of cream separation, cooling and chilling of milk on the farm. Maintenance of farm dairy machines and factors influencing their efficiency. Cleaning and sterilization of farm dairy equipment. The principles and practice of sampling and testing milk, cream and skim milk for butterfat content. Dairy calculations. Introduction to the practices involved in the processing of milk, including the treatment of market milk and manufacture of milk products and by-products.

Certificate subject:
Physical Chemistry: A study of the principles of physical chemistry.

Second Professional Examination

13. **Dairy Chemistry II** (Two papers).
A more advanced treatment of certain aspects of stage I, together with chemical and physico-chemical methods of analysis and control of dairy products, with special reference to detecting adulteration and impurities. Properties and analysis of materials used in dairy manufacturing. Metals used in dairy plants. Corrosion. Detergents and sterilizing agents. Water treatment. Disposal of dairy wastes. Food value of milk and its products. A course of quantitative chemical analysis based on the foregoing course of lectures.

14. **Dairy Practice II(a)** (One paper).
Milk, Cream and Dried Dairy Products. Market Milk and Cream: Nature of trade, supply, demand, relation to public health; market milk organisations; sources of supply, contracts, methods payment, production, inspection and regulations affecting these; milk transportation; grading, testing, processing, inspection, and distribution of raw, pasteurized and sterilized milk and cream. City milk depots; construction and arrangement of buildings; design, types and operation of plants; plant upkeep; cost of milk treatment and distribution. Disposal of surplus milk. Preparation and sale of special milk products, reconstituted, humanized, standardized and fermented milks. Ice Cream: Raw materials, materials, manufacture, storage and distribution. Dried milks and condensed milks; commercial manufacture, packing and storage.

15. **Dairy Engineering** (One paper).
A general study of the principles, design and operation of machinery used in dairy practice.

16. **Dairy Practice II(b)** (One paper).
Types, classification and food value of cheese. Principles and practice of cheese manufacture; control and grading of milk; standardization of milk; nature, preparation and maintenance of starters; nature, care and use of coagulating materials; ripening of cheese. Description of method of manufacture, curing and storage of common varieties of fancy cheese. Cheese grading and defects. Cheese yields and basis of payments for cheese milk. Value and utilization of whey. Acts and regulations affecting the manufacture and sale of cheese. Manufacture and uses of casein. Construction and arrangement of buildings. Design, types and operation of plant. Methods of drainage disposal.

17. **Dairy Practice II(c)** (One paper).
Butter manufacture. Creamery design, construction, and layout; cream transportation, reception, grading and testing. Principles and practice of buttermaking; neutralization, pasteurization, cooling and holding of cream, use of starter, churning of cream, packing, storage, and transport of butter, control of butterfat losses. Butter grading and defects in butter. Whey butter manufacture. Overrun. Disposal of creamery by-products. Acts and regulations affecting cream supplies, butter manufacture, grading, storage and transport.

18. **Dairy Plant Management** (One paper).
General outline of Limited Company under Companies Act, 1933. Dairy Industry Act and regulations. Dairy Factories in relation to Factories Act. Legislation affecting arbitration, employment, machinery, sale of food. Purchase of milk, cream and factory supplies. Organization of factory personnel and equipment in relation to efficiency. Costs of manufacture of dairy produce. Managers' reports. Disposal of dairy products. Import and export regulations directly affecting the Dairy Industry. Outline of dairy methods in other countries.

19. **Dairy Organization and Trade** (One paper).
Development and organization of the dairy industry in New Zealand and other dairying countries. International trade in milk and dairy products. Marketing systems. Trends in marketing and utilization of dairy products and substitutes.

Certificate subjects:

Dairy Plant Book-keeping: Elementary book-keeping up to and including trial balance. Elementary business practice. A brief treatment of closing entries and final balance sheet. Records and accounts as currently used by dairy factories and milk plants.

Machine Drawing and Workshop Practice: Principles of pictorial and orthographic sketching; elements of machine drawing. Use of hand and machine tools; oxy-acetylene and electric arc welding.

Food Technology

1961

It was in the 1961 calendar that details about the degree of Bachelor of Food Technology (BFoodTech) finally appeared with a note that "This degree is an extension of and will replace the BAgrSc(Dairy Tech) degree." For those still pursuing the latter degree, they were referred to the 1960 calendar for course regulations and prescriptions.

Not surprisingly, the course regulations for the degree Bachelor of Food Technology (BFoodTech) printed in the 1961 Massey Calendar were quite different from those of the degrees of Bachelor of Agricultural Science (Dairy Science) or Bachelor of Agricultural Science (Dairy Tech). While the dairy-based degrees were focused on the manufacturing and processing of milk and dairy products, the Bachelor of Food Technology degree involved courses related to the processing of food derived from both plants and animals. It also had a greater emphasis on engineering and related subjects.

The subjects of study and examination in the 1961 Calendar were:

First Examination

1. **Chemistry** (Two papers).
2. **Botany** (Two papers and practical examination).
3. **Zoology** (Two papers and practical examination).
4. **Physics** (Two papers).

Second Examination

5. **Food Chemistry II** (Two papers).
6. **Food Microbiology I** (One paper).
7. **Food Engineering I** (One paper).
8. **Economics** (One paper).

Third Examination

9. **Food Chemistry III(a)** (One paper).
10. **Food Microbiology II** (One paper).
11. **Food Engineering II** (Two papers).
12. **Food Economics** (One paper).
13. **Food Production** (One paper).

Fourth Examination

14. **Food Chemistry III(b)** (Two papers).
15. **Food Technology** (Three papers).
16. **Industrial Management** (Two papers).

Candidates were also required to complete courses in Experimental Method and Book-keeping. Reflecting the lack of autonomy that Massey College had at that time, it was also stated that "The Vice-Chancellor of the University of New Zealand may, on the recommendation of the Professorial Board, modify the application of these Course Regulations in cases of undue hardship." In 1961 there were no students enrolled in the Fourth Examination and just two (Griffin and Maley) in the Third Examination.

Prescription of Subjects

5. **Food Chemistry II** (Two papers):
Physical properties of liquids, gases and solutions; elementary thermodynamics and reaction kinetics; properties of colloids. More advanced organic chemistry with particular reference to compounds of importance in plant and animal metabolism.

Biochemistry of digestion, absorption, metabolism, blood, muscle, cell respiration, mineral metabolism, detoxification and excretion; introduction to plant biochemistry.
Principals of animal and human nutrition.
A laboratory course based on the above prescription.

6. **Food Microbiology I** (One paper):
An introduction to the morphology, physiology, growth characteristics and classification of micro-organisms; methods of isolation, culture, staining and identification; microscopy; sterilization and disinfection; detailed study of types of micro-organisms important in food manufacturing processes; bacteriophage; infection and immunity; bacterial variations; microbial associations and antagonisms.
A laboratory course based on the above prescription.

7. **Food Engineering I** (One paper):
A general study of mechanical and physical principles in the design and operation of machinery; workshop and laboratory practice; introduction to machine drawing.

9. **Food Chemistry III(a)** (One paper):
Foods as physical and biochemical systems; composition of foods with special reference to New Zealand primary food products; factors influencing their quality and flavour; control of raw materials; stability of foods.
A laboratory course based on the above prescription.

10. **Food Microbiology II** (Two papers):
A more advanced and detailed study of microbiology, particularly in relation to food preservation and food manufacturing processes.
A laboratory course based on the above prescription.

11. **Food Engineering II** (Two papers):
A general study of physico-chemical principles in the design and operation of food processing equipment; unit operations and unit processes used in food engineering.

12. **Food Economics** (One paper):
Economic analysis of food production, processing and marketing.

13. **Food Production** (One paper):
The primary industries concerned with food production; factors affecting quantity and quality of production; problems of organizing producing units.

14. **Food Chemistry III(b)** (Two papers):
Biochemical and physical principles of food processing and preservation; assessment of quality and storage life; materials used in the food industry; corrosion; water supplies and purification; sewage disposal; detergents.
A laboratory course based on the above prescription.

15. **Food Technology** (Three papers):
Milk and dairy products, meat and meat products, fruits, vegetables, cereals, and their products; collection, transport, reception, grading; processing, packaging, storage, quality control; defects; pest control.

16. **Industrial Management** (One paper):
Function and organization of companies: administration and finance. Control and operation of factories: location, size, layout; selection of plant and equipment: control of materials, production and quality; labour organization, utilization and relations; industrial safety; budgeting; cost control.

1962

The 1962 Calendar saw a reduction in the number of First Year papers from eight to six:

First Examination
100. **Chemistry I** (Two papers and practical examination).
105. **Physics I** (Two papers and practical examination).
Either
104. **Botany Intermediate** (Two papers).
Or
102. **Zoology Intermediate** (Two papers).

In the Second Examination (increased from five to six papers), Food Engineering I was replaced by the curiously-named Power Engineering I, Food Microbiology I was replaced by Agricultural Microbiology I (a paper designed primarily for Agricultural Science students), Economics was removed, Food Production was moved from the Third to the Second Examination and a new paper Technological Mathematics was introduced:

240. **Food Chemistry II** (Two papers).
241. **Power Engineering I** (One paper).
242. **Food Production I** (One paper).
243. **Technological Mathematics** (One paper).
304. **Agricultural Microbiology I** (One paper).

The Third Examination also saw changes with Process Engineering I replacing Food Engineering II, Food Processing II was introduced and Food Economics removed:

Third Examination
340. **Food Chemistry III** (Two papers).
341. **Food Microbiology II** (One paper).
342. **Process Engineering I** (One paper).
343. **Food Processing II** (One paper).

The Fourth Examination was offered for the first time in 1962 and was completely changed from the 1961 Calendar: the two papers of Food Chemistry III(b) disappeared and the two paper Industrial Management was replaced by Business Management and Economics I. Three new papers were also introduced for the first time, replacing the three-paper Food Technology:

Fourth Examination
470. **Food Hygiene and Quality** (One paper).
471. **Food Plant and Process Design** (One paper – three day's duration*).
472. **Food Processing III** (Two papers).
473. **Business Management** (One paper).
202. **Economics I** (One paper).
* Although this is how the paper was described in the Calendar, the actual meaning was that the final examination was of three day's duration, similar to the design papers taught at the Engineering Schools at Auckland and Canterbury universities, except that their final examination lasted for 5 days.

Prescription of Subjects

Second Examination
240. **Food Chemistry II** (Two papers).
A course in physical chemistry (paper a) and agricultural biochemistry (paper b), with specific reference to the following:—
(Paper a): Properties of gases, liquids, solids and solutions. Principles of electrochemistry, thermodynamics and reaction kinetics. Theory of analytical processes.

A laboratory course based on the above prescription.
(Paper b): The chemistry of carbohydrates, lipids, proteins and nucleic acids. Enzymes. A general survey of the reactions involved in the intermediate metabolism and biosynthesis of carbohydrates, lipids and proteins. The biochemical processes of digestion and absorption. Biological pigments and the functions of blood. The role of vitamins and inorganic elements in metabolism. Metabolism and nutrition. Nitrogen metabolism in plants; photosynthesis.
A laboratory course based on the above prescription.

241. **Power Engineering I** (One paper).
Introductory course in power engineering with specific reference to the following:—
Fuels and combustion. Gas flow, liquid flow, fans, pumping. Principles of thermodynamics, applied thermodynamics, steam production, refrigeration and air-conditioning. Heat transfer by conduction, radiation, convection. Simple heat exchangers. Simple applied electricity, electric motors.
A laboratory course based on the above prescription.
A course on workshop practice.

242. **Food Production I** (One paper).
A study of the more important aspects of the production of food, including the harvesting or collection of the raw foods and their assembly at the place of manufacture in a form suitable for processing. There will be special reference to:—World distribution of foods, food populations, nutritional value of various foods in relation to land use. Extent of the food industry with particular reference to food industries in New Zealand. Systems and locations for farming; the soil, topography and climate in relation to costs, and factors affecting local prices. The organisation of individual farms. Factors affecting quantity and quality of meat, dairy, horticultural and agricultural crop production, particularly with reference to processing requirements.

243. **Technological Mathematics** (One paper).
A course covering calculus, simple differential equations, with supporting algebra, empirical equations and graphical analysis, for the solution of problems in technology, together with a second course covering the principles of statistics and statistical quality control.

304. **Agricultural Microbiology I** (One paper).
Introductory course in agricultural bacteriology, mycology and plant pathology, with specific reference to the following:
Morphology, physiology, reproduction and growth of micro-organisms. Principles of classification. Microscopy. Methods of staining, cultivation, isolation and identification. Destruction by chemical and physical agents. Bacteriophage. Infection and immunity. Nature and causes of plant disease and proof of pathogenicity. Study of selected diseases and their causal organisms. Principles of plant disease prevention and control. Yeasts. Selected aspects of the microbiology of soil, water, sewage, milk and milk products.
A laboratory course based on the above prescription.

Third Examination
340. **Food Chemistry III** (Two papers).
A course in the properties and reactions of food components, and in analytical methods (Paper a); and an advanced study of agricultural biochemistry (Paper b). There will be specific reference to the following:
(Paper a)*:* Analytical methods, application and interpretation. Mechanisms of chemical spoilage. Effect of storage on chemical and physical properties. Surface chemistry in relation to foods and food technology. Rheological properties of foods. Physico-chemical properties of specific food systems.

A laboratory course based on the above.
(Paper b): Kinetics of enzyme reactions, biological oxidation, phosphorylation, utilisation of energy. More detailed study of intermediate metabolism and alternative pathways. Biosynthesis of polysaccharides and complex lipids. Macromolecules. Cell structure and function. Protein structure and amino acid metabolism. Nucleic acid metabolism and biochemical genetics. Plant biochemistry with particular reference to ion transport, nitrogen metabolism, plant growth regulators. Chemistry and biochemistry of selected fungicides and insecticides.
A laboratory course based on the above.

341. **Food Microbiology II** (One paper).
A more detailed study of aspects of the following:—
Taxonomy, activities and importance of selected families of the Eubacteriales, Pseudomonadales and Actinomycetales. Bacterial physiology. Bacterial variations and genetics. Microbial associations and antagonisms. Destruction and inhibition of micro-organisms. Food-borne disease. Microbiology of foods, air, water and effluents. Microbiology of food manufacturing processes. Application and interpretation of laboratory control methods.
A laboratory course based on the above.

342. **Process Engineering I** (One paper).
A more detailed study of heat transfer and heat exchangers together with a study of the basic principles of the unit operations commonly used in food processing with specific reference to the following:
Evaporation and distillation. Extraction, stripping, absorption, washing. Drying of solids, vacuum drying, freeze drying, drying of liquids. Mixing and dissolving, homogenisation. Crystallisation. Sedimentation, filtration, centrifugal separation. Extrusion. Instrumentation and control. Sorting equipment.
A laboratory course based on the above.
A course in equipment construction may be required.
A course in elementary drawing.

343. **Food Processing II** (One paper).
A course covering the chemistry and technology of raw materials and their primary processing with specific reference to the following:
Principal foods; composition and factors affecting composition, quality control, synthetic sources. Refining, reconstitution, compounding and fermentation processes. Effects of processing on chemical, physical and nutritional properties. Nutrition of man.

Fourth Examination
470. **Food Hygiene and Quality** (One paper).
A course covering the hygiene requirements of the food industry in principle and practice, and the control of the quality of the processed food with specific reference to the following:
Food and health regulations and their application. Biological and microbiological sanitation. Detergency. The supply of pure air and water. Disposal of effluent. Corrosion. Organoleptic and other methods of quality testing. Food additives. Antibiotic and chemical residues. Analytical control.

471. **Food Plant and Process Design** (One paper). The paper to be completed in 3 days.
A course covering the planning and design of selected process lines, engineering services and factory construction with specific reference to the following:
The principles and practice in the planning of processes, services, plant layout and buildings. Materials of construction for plant and buildings. Safety. Site selection. Equipment replacement. Engineering economics.

472. **Food Processing III** (Two papers).

A course covering the preservation and packaging of food in general with a detailed study of a specific food industry. Special reference will be made to the following:
Principles and practice of preservation by heating, cooling, irradiation, dehydration, controlled fermentation, and the use of chemicals. Analytical control. Principles of packaging techniques and selection of materials. Detailed study of **one** of the following industries: (a) dairying, (b) meat, (c) fruit and vegetable, (d) secondary food manufacturing.
A practical course in the process laboratory based on the above.

473. **Business Management** (One paper).
A study of the general principles of administration; and an introduction to the main principles of scientific management, with specific reference to:
General administration, management and decision making. Business structure. Financial control, data processing and costing. Control of production and marketing. Operations research including linear programming, queueing theory and inventory analysis. Personal (*sic*) control. Labour laws, safety regulations.
A laboratory course of one hour per week will supplement the course work on operations research.

202. **Economics I** (One paper).
An outline of general economics treated analytically. Money, banking, international trade with special reference to New Zealand's place as an agricultural exporter in the world economy. The New Zealand economy treated analytically and descriptively. National income, sector incomes.

With the disestablishment of the University of New Zealand and its replacement by four autonomous universities, the Calendar now stated that "The Vice-Chancellor of the Victoria University of Wellington may, on the recommendation of the Professorial Board, modify the application of these Course Regulations in cases of undue hardship."

For the first time, details of the Master of Food Technology were given (with the caveat that they were subject to approval by the Curriculum Committee of the UGC). Candidates for this degree must have been admitted to the degree of Bachelor of Food Technology or Bachelor of Agricultural Science (Dairy Technology), but there was provision for Admission *ad eundem statum*, i.e., admission 'at an equivalent level'.

The examination consisted of an approved section of one of the following subjects:
1. **Food Chemistry** (Three papers).
2. **Food Microbiology** (Three papers).
3. **Food Chemistry and Engineering** (Three papers).
4. **Food Microbiology and Engineering** (Three papers).
5. **Food Processing and Marketing** (Three papers).

In addition a thesis which counted as two papers was required.

Prescription of Subjects

1. **Food Chemistry** (Three papers):
An advanced study of Food Chemistry.

2. **Food Microbiology** (Three papers).
An advanced study of Food Microbiology.

3. **Food Chemistry and Engineering** (Three papers).

An advanced study of Food Chemistry together with a study of the principles and design of processing equipment to give practical expression to the chemistry studies.

4. **Food Microbiology and Engineering** (Three papers).
An advanced study of Food Microbiology together with a study of the principles and design of processing equipment to give practical expression to the chemistry studies.

5. **Food Processing and Marketing** (Three papers).
A comprehensive study of the manufacture of a food or group of foods, together with a study of the distribution and marketing of the commodity.

The degree could be awarded with First or Second Class Honours only if the candidate completed at his (*sic*) first attempt the requirements for Honours within three years of passing the Fourth Examination of the BFoodTech degree.

Course regulations for the degree of Master of Agricultural Science MAgrSc(Dairy Tech) were also listed. The subjects were:
1. **Dairy Bacteriology**
2. **Dairy Chemistry**
3. **Dairy Trade and Practice**
There were two papers in each subject: a general paper and a paper related to the candidate's field of research. A candidate was required to present a total of three papers comprising two papers in the subject in which he (*sic*) presented his thesis, and one general paper in the second subject selected. The thesis counted as two papers.

1963

Despite the arrival of Mr Hal Morris in 1962, there were no changes made to either the BFoodTech or MFoodTech regulations in the 1963 Calendar.

The name of the Faculty was changed in 1963 from Food Technology to Food Science and Biotechnology in anticipation of a new degree option in Biotechnology, together with a Chair in Biotechnology, and the new name appeared in the 1964 Calendar.

1964

The 1964 Calendar contained some major changes to the Second, Third and Fourth Examinations. The most significant was the introduction of alternatives to the engineering papers following a considerable failure rate in Power Engineering I in 1962 and 1963, and the feeling at the time that women students would not be attracted to a degree that contained compulsory engineering papers. Instead, papers in food geography (this paper became compulsory for all students in 1965), nutrition, food evaluation, and food preservation and marketing were offered, with economics being a compulsory fourth year paper for students taking the non-engineering option.

The Diploma in Dairying was renamed the Diploma in Dairy Technology although students who had enrolled prior to 1964 were still awarded the Diploma in Dairying when they completed their studies.

Second Examination
240. **Food Chemistry II** (Two papers).
Either

241. **Power Engineering I** (One paper).
Or
244. **Food Geography** (One paper).
242. **Food Production I** (One paper).
243. **Technological Mathematics** (One paper).
304. **Agricultural Microbiology I** (One paper).

Third Examination
340. **Food Chemistry III** (Two papers).
341. **Food Microbiology II** (One paper).
Either
342. **Process Engineering I** (One paper).
Or
344. **Nutrition I** (One paper).
343. **Food Processing II** (One paper).

Fourth Examination
470. **Food Hygiene and Quality** (One paper).
Either
471. **Food Plant and Process Design** (One paper – three day's duration).
Or
474. **Food Evaluation** (One paper).
Either
472. **Food Processing III** (Two papers).
473. **Business Management** (One paper).
Or
475. **Food Preservation and Marketing III** (Two papers).
202. **Economics I** (One paper).

In the preamble to the prescriptions, the Calendar included the following:

The Food Technology Department provides instruction for diploma courses in Dairy Technology and Dairy Engineering, and degree courses for BFoodTech, MFoodTech and PhD; and is interested in the application of science and management to food and dairy processing. The main research interests are heat transfer during sterilization, dehydrated foods, new food forms, reconstituted dairy products, starch-gel electrophoresis in food analysis, sensory evaluation of foods, the determination of solids-not-fat in milk, and the effect of time and temperature on quality changes in raw milk.

Prescription of Subjects

Second Examination
240. **Food Chemistry II** (Two papers).
As for 1962.

241. **Power Engineering I** (One paper).
As for 1962.

244. **Food Geography** (One paper).
A course covering customs and habits in food production, consumption and preparation in the geographical regions of the world, with particular reference to:
Mode of living, housing, climatic, geographical and historical factors, and their influence on patterns of diet throughout the world. Housing, domestic equipment and facilities as affecting the preparation of foods in various countries. The effect of income, social and religious considerations on food preference and habit. Nutritional states of populations in various countries.

242. **Food Production I** (One paper).
As for 1962.

243. **Technological Mathematics** (One paper).
As for 1962.

304. **Agricultural Microbiology I** (One paper).
As for 1962.

Third Examination
340. **Food Chemistry III** (Two papers).
As for 1962.

341. **Food Microbiology II** (One paper).
As for 1962.

342. **Process Engineering I** (One paper).
As for 1962.

344. **Nutrition I** (One paper).
A course covering basic nutritional requirements, with particular reference to:—
Nutritive quality in the appraisal of foods and in relation to digestibility, palatability and other factors. Compilation of diet programmes and charts. Nutritional requirements in special cases.

343. **Food Processing II** (One paper).
As for 1962.

Fourth Examination
470. **Food Hygiene and Quality** (One paper).
As for 1962.

471. **Food Plant and Process Design** (One paper – three day's duration).
As for 1962.

472. **Food Processing III** (Two papers).
As for 1962.

473. **Business Management** (One paper).
As for 1962.

474. **Food Evaluation** (One paper).
A course covering the evaluation of raw and processed foods with particular reference to:—
Techniques and equipment for food preparation, and the design and layout of facilities. Evaluation of prepared food products and packing (*sic*) in terms of quality, convenience and cost. Food preference testing and sensory evaluation of quality. Demonstration cooking and consumer advisory techniques. Formulation of food products, and stages in development of manufactured new products.
A laboratory course based on this prescription.

475. **Food Preservation and Marketing III** (Two papers).
A course covering the preservation, packaging and marketing of food, with particular reference to:—
Principles and practice of preservation by heating, cooling, irradiation, dehydration, controlled fermentation, and the use of chemicals. Quality control. Principles of packaging techniques and selection of materials. Market research techniques and consumer testing. Marketing budget and programming in terms of advertising, retailer and consumer incentives, seasonal demand and economic conditions. Product changes and new products, marketing procedures. Convenience, costs, and quality aspects of marketing. Advertising methods. Income and social status in relation to food purchase, impulse purchase, trends in prepared foods, retail trends.
A laboratory course on food processing.

202. **Economics I** (One paper).
As for 1962.

1965

The 1965 Calendar saw further changes to the Second Examination with the alternative to power engineering switching from food geography to food production, and quality control statistics being listed as an alternative to technological mathematics. The Third and Fourth Examinations were reduced to just five papers per year.

The other major change was the numbering of papers according to the department responsible for their teaching. Only papers bearing the prefix 41 were taught by the Food Technology. Papers taught by the Department of Agricultural Economics and Farm Management had the prefix 12; Departments of Dairy and Sheep Husbandry had the prefix 17; the Department of Chemistry and Biochemistry 23; the Physics & Engineering Department 38; the Geography Department 45; the Department of Mathematics and Statistics 59, and the Department of Microbiology and Genetics 62.

Second Examination
23.22 **Food Chemistry II** (Two papers)
Either
38.22 **Power Engineering I** (One paper)
Or
17.12 **Food Production I** (One paper)
45.22 **Food Geography** (One paper)
Either
59.32 **Technological Mathematics** (One paper)
Or
59.42 **Quality Control Statistics** (One paper)
62.13 **Agricultural Microbiology I** (One paper)

Third Examination
41.13 **Food Chemistry III** (Two papers)
62.23 **Food Microbiology II** (One paper)
Either
41.23 **Process Engineering I** (One paper)
Or
41.33 **Nutrition I** (One paper)
41.43 **Food Processing II** (One paper)

Fourth Examination
41.14 **Food Hygiene and Quality** (One paper).
Either
41.24 **Food Plant and Process Design** (One paper – three day's duration).
Or
41.34 **Food Evaluation** (One paper).
Either
12.94 **Business Management** (One paper)
41.44 **Food Processing III** (Two papers)
Or
12.22 **Economics** (One paper).
41.54 **Food Preservation and Marketing III** (Two papers).

Prescription of Subjects

Second Examination
23.22 **Food Chemistry II** (Two papers)
A course in physical chemistry (Paper A) and biochemistry (Paper B), with specific reference to the following:

Paper A: Properties of gases, liquids, solids and solutions. Principles of electrochemistry, thermodynamics and reaction kinetics. Theory of analytical processes.
A laboratory course based on the above prescription.
Textbook: Glasstone and Lewis, *Elements of Physical Chemistry.*
Paper B: The chemistry of carbohydrates, lipids, proteins and nucleic acids, enzymes. A general survey of the reactions involved in the intermediate metabolism and biosynthesis of carbohydrates, lipids and proteins. The biochemical processes of digestion and absorption. Biological pigments and the functions of blood. The role of vitamins and inorganic elements in metabolism. Metabolism and nutrition. Nitrogen metabolism in plants; photosynthesis.
A laboratory course based on the above prescription.
Textbook: Conn and Stumpf, *Outlines of Biochemistry*.

38.22 **Power Engineering I** (One paper)
As for 1962.

17.12 **Food Production I** (One paper)
As for 1962.

45.22 **Food Geography** (One paper)
As for 1964.

59.32 **Technological Mathematics** (One paper)
As for 1962.

59.42 **Quality Control Statistics** (One paper)
A course covering the mathematics required in the applications of statistical quality control to food processing, with particular reference to:
Calculus, simple differential equations, empirical equations, graphical analysis, statistical mathematics, statistical quality control.

Third Examination
41.13 **Food Chemistry III** (Two papers)
A course in the properties and reactions of food components, and in analytical methods (Paper A); and an advanced study of agricultural biochemistry (Paper B). There will be specific reference to the following:
Paper A: Analytical methods, application and interpretation.
Mechanisms of chemical spoilage. Effect of storage on chemical and physical properties. Surface chemistry in relation to foods and food technology.
A laboratory course based on the above.
Paper B: Kinetics of enzyme reactions, biological oxidation, phosphorylation, utilisation of energy. More detailed study of intermediate metabolism and alternative pathways. Biosynthesis of polysaccharides and complex lipids. Macromolecules. Cell structure and function. Protein structure and amino acid metabolism. Nucleic acid metabolism and biochemical genetics. Plant biochemistry with particular reference to ion transport, nitrogen metabolism, plant growth regulators. Chemistry and biochemistry of selected fungicides and insecticides.
A laboratory course based on the above.
Textbook: Karlson, *Introduction to Modern Biochemistry*.

62.23 **Food Microbiology II** (One paper)
A more detailed study of aspects of the following:
Taxonomy, activities and importance of selected families of the Eubacteriales, Pseudonadales and Actinomycetales.

41.23 **Process Engineering I** (One paper)
A more detailed study of heat transfer and heat exchangers together with a study of the basic principles of the unit operations commonly used in food processing with specific reference to the following:

Evaporation and distillation. Extraction, stripping, absorption, washing. Drying of solids, vacuum drying, freeze drying, drying of liquids. Mixing and dissolving, homogenisation. Crystallisation. Sedimentation, filtration, centrifugal separation. Extrusion. Grinding, size separation, powder collection. Conveying, materials-handling. Instrumentation and control. Sorting equipment.
A laboratory course based on the above.
A course in equipment construction may be required.
A course in elementary drawing.

41.33 **Nutrition I** (One paper)
A course covering basic nutritional requirements, with particular reference to:
Nutritive quality in the appraisal of foods and in relation to digestibility, palatability and other factors. Compilation of diet programmes and charts. Nutritional requirements in special cases.

41.43 **Food Processing II** (One paper)
A course covering the chemistry and technology of raw materials and their primary processing with specific reference to the following:
Principal foods; composition and factors affecting composition, quality control, synthetic sources. Refining, reconstitution, compounding and fermentation processes. Effects of processing on chemical, physical and nutritional properties. Nutrition of man.

Fourth Examination
41.14 **Food Hygiene and Quality** (One paper)
A course covering the hygienic requirements of the food industry in principle and practice, and the control of the quality of the processed food with specific reference to the following:
Food and health regulations and their application. Biological and microbiological sanitation. Detergency. The supply of pure air and water. Disposal of effluent. Corrosion. Organoleptic and other methods of quality testing. Food additives. Antibiotic and chemical residues. Analytical control.

41.24 **Food Plant and Process Design** (One paper – the paper to be completed in 3 days)
A course covering the planning and design of selected process lines, engineering services and factory construction with specific reference to the following:
The principles and practice in the planning of processes, services, plant layout and buildings. Materials of construction for plant and buildings. Safety. Site selection. Equipment replacement. Engineering economics.

41.34 **Food Evaluation** (One paper)
A course covering the evaluation of raw and processed foods with particular reference to:
Techniques and equipment for food preparation, and the design and layout of facilities. Evaluation of prepared food products and packing in terms of quality, convenience and cost. Food preference testing and sensory evaluation of quality. Demonstration cooking and consumer advisory techniques. Formulation of food products, and stages in development of manufactured new products.
A laboratory course based on this prescription.

41.44 **Food Processing III** (Two papers)
A course covering the preservation and packaging of food in general with a detailed study of a specific food industry. Special reference will be made to the following:
Principles and practice of preservation by heating, cooling, irradiation, dehydration, controlled fermentation, and the use of chemicals. Analytical control. Principles of packaging techniques and selection of materials. Detailed study of *one* of the following

industries: (a) dairying; (b) meat; (c) fruit and vegetable; (d) secondary food manufacturing.
A practical course in the process laboratory based on the above.

41.54 **Food Preservation and Marketing III** (Two papers)
A course covering the preservation, packaging and marketing of food, with particular reference to:
Principles and practice of preservation by heating, cooling, irradiation, dehydration, controlled fermentation, and the use of chemicals. Quality control. Principles of packaging techniques and selection of materials. Market research techniques and consumer testing. Marketing budget and programming in terms of advertising, retailer and consumer incentives, seasonal demand and economic conditions. Product changes and new products, marketing procedures. Convenience, costs, and quality aspects of marketing. Advertising methods. Income and social status in relation to food purchase, impulse purchase, trends in prepared foods, retail trends.
A laboratory course on food processing.
Pre-requisite: 41.43 Food Processing II

12.94 **Business Management** (One paper)
A study of the general principles of administration; and an introduction to the main principles of scientific management, with specific reference to:
General administration, management and decision making. Business structure. Financial control, data processing and costing. Control of production and marketing. Operations research including linear programming, queueing theory and inventory analysis. Personnel control. Labour laws, safety regulations.
A laboratory course of one hour per week will supplement the course work on operations research.

1966

The 1966 Calendar introduced major changes to the degree content, reflecting in part the appointment in 1965 of Professor Dick Earle as Professor of Biotechnology and his wife Dr Mary Earle as Senior Lecturer in Food Technology, and in part a reorganisation of first year science courses, with the two papers each in Botany and Zoology being replaced by two papers in Cell Biology and two papers in Pure Mathematics.

The abbreviation for the degree of Bachelor of Food Technology was changed from BFoodTech to BTech(Food) with three options offered. Option A was for those wishing to major in food engineering and plant management; Option B was for those wishing to major in food product development and marketing, and Option C, a new (unnamed) option in biotechnology. In all three options the first two years were identical. Although Option C had not yet been officially approved by the UGC at the time the Calendar went to print (typically November of the preceding year), a 'Note on the BTech(Food) Course' in the Calendar mentioned that changes had been made in the course to provide training for a larger part of the biological industries.

Biotechnology was defined as *"the unified technology of the biological raw materials, including not only foodstuffs but industrial fermentations, pharmaceuticals, etc."* At the time, biotechnology was a very new word, but over time it became more common and its meaning changed so that today, for example, Wikipedia defines biotechnology as *"the use of living systems and organisms to develop or make useful products"*, or *"any technological application that uses biological systems, living organisms or derivatives thereof, to make or modify products or processes for specific use"* (UN Convention on Biological Diversity, Art. 2).

In the Second Examination, the number of papers increased from six to seven; Food Geography I was renamed Raw Material Production; Food Chemistry II became Biological Chemistry; Power Engineering became Unit Operations I and Agricultural Microbiology became Industrial Microbiology I. Quality Control Statistics became a compulsory paper and was moved to the Third Examination.

In the Third Examination, the number of papers increased from five to seven; Process Engineering I became Food Engineering II with Food Marketing I and Economics rather than Nutrition I as an alternative.

In the Fourth Examination, the number of papers increased from five to eight; Food Hygiene and Quality became Quality Control; Food Plant and Process Design became part of Food Engineering III and Plant Management included what was previously Business Management as well as lectures on operations research, linear programming and computing; Food Preservation and Marketing III for the non-engineering option was replaced with Product Development and Food Marketing II with each having a value of two papers, the latter including lectures in common with the Plant Management students on operations research, linear programming and computing. A compulsory paper involving the study of a particular sector of the food industry was also introduced.

First Examination
23.21 **Chemistry Intermediate** (Two papers)
26.11 **Cell Biology** (Two papers)
38.21 **Physics Intermediate** (Two papers)
59.41 **Pure Mathematics** (Two papers)

Second Examination
17.32 **Raw Material Production** (One paper)
23.32 **Biological Chemistry** (Two papers)
41.12 **Unit Operations I** (Two papers)
59.62 **Technological Mathematics II** (One paper)
62.12 **Industrial Microbiology I** (One paper)

Third Examination
41.13 **Food Chemistry III** (Two papers)
41.43 **Food Processing II** (One paper)
Either
41.73 **Food Engineering II** (Two papers)
Or
12.22 **Economics** (One paper)
45.33 **Food Marketing I** (One paper)
59.63 **Quality Control Statistics** (One paper)
62.23 **Food Microbiology II** (One paper)

Fourth Examination
41.44 **Food Processing III** (Two papers)
41.64 **Quality Control** (One paper)
Either
41.74 **Food Engineering III** (Two papers)
41.84 **Plant Management** (Two papers)
Or
42.22 **Product Development** (Two papers)
42.84 **Food Marketing II** (Two papers)
and *ONE* subject only, from the follow group:
41.94 **Dairy Industry** (One paper)
42.14 **Canning and Freezing Industry** (One paper)
42.23 **Meat Industry** (One paper)
42.34 **Brewing and Baking Industries** (One paper)

Prescription of Subjects

17.32 **Raw Material Production** (One paper)
A study of the factors influencing the production and harvesting of food raw materials. Problems related to cost, quality and seasonality.

23.32 **Biological Chemistry** (Two papers)
A basic course in physical chemistry, organic chemistry and biochemistry as an introduction to further studies in chemistry applied to the processing of biological raw materials.
A laboratory course.

41.12 **Unit Operations I** (Two papers)
Simple heat and material balances. Elementary hydraulics, including flow metering, Bernoulli's equation, laminar and viscous flow, and Reynolds number. Characteristics of pumps and fans. Viscosity of Newtonian and non-Newtonian fluids. Heat transfer by conduction, convection, and radiation. Elementary heat exchangers. Elementary thermodynamics including the properties of gases, vapours, and air/water mixtures. Selected unit operations.
A practical course.

59.62 **Technological Mathematics II** (One paper)
Calculus, simple differential equations with supporting algebra, empirical equations and graphical analysis, for the solution of problems in technology.

62.12 **Industrial Microbiology I** (One paper)
An introductory course in general microbiology, with particular reference to aspects of importance to industrial microbiology and food microbiology.
A laboratory course.

Third Examination
41.13 **Food Chemistry III** (Two papers)
A study of selected analytical methods. A study of deterioration (*sic*) reactions of food systems. A study of biophysical properties of food systems. A study of the physical, chemical and structural properties of natural food materials.
A laboratory course.

41.43 **Food Processing II** (One paper)
A study of the following processes as they apply to the food industry: Separation and refining, reconstitution, modification, fermentation, curing and pickling.
A practical course.

41.73 **Food Engineering II** (Two papers)
More advanced heat and mass balances. The flow of real fluids, both Newtonian and non-Newtonian. More advanced heat transfer in steady and unsteady state, including heat penetration into solids and in batches of liquids and ice formation. Selected unit operations
A practical course.

45.33 **Food Marketing I** (One paper)
A course covering the food resources of various geographical regions of the world. Customs and habits in food consumption and their influence on the nutritional status of populations.

59.63 **Quality Control Statistics** (One paper)
A general introduction to statistics and its application to technology.

62.23 **Food Microbiology II** (One paper)
A study of micro-organisms in relation to the manufacture, processing and preservation of foods.
A laboratory course.

Fourth Examination

41.44 **Food Processing III** (Two papers)
A study of the principles and practice of food preservation, with special reference to heating, cooling, drying and irradiation. Packaging materials and techniques for the packaging of foods.
A practical course.

41.64 **Quality Control** (One paper)
A study of the subjective and objective measurement of quality of food materials, sampling, and quality control techniques. Legislation relating to food products.
A practical course.

41.74 **Food Engineering III** (Two papers)
Paper A: Engineering economics, engineering services including waste treatment, the selection of equipment; process instrumentation and control.
Paper B: The design and costing of food processing installations (the examination time for paper (B) is three days).

41.84 **Plant Management** (Two papers)
Business and industrial administrative practice. Economics relating to manufacturing, particularly the economics of factory production. Analysis of complex systems, particularly in relation to planning and decision making. Linear programming, operations research, and data processing.
A practical course in programming and computation.

42.22 **Product Development** (Two papers)
A study on the formulation of food products and stages in development of manufactured new products. Design and evaluation of food products in terms of quality, convenience, and cost. Paper (b) will consist of a three-day examination in product development.

42.84 **Food Marketing II** (Two papers)
The principles of marketing and their application to processed and packaged food products. Product acceptance and promotion, market research and consumer trials. The application of economics in the solution of marketing problems. Decision making, linear programming, operations research applicable to marketing problems.
A practical course in programming and computation.

41.94 **Dairy Industry** (One paper)
A study in detail of the industry with reference to raw materials, processing and marketing.
A practical course.

42.14 **Canning and Freezing Industry** (One paper)
A study in detail of the industry with reference to raw materials, processing and marketing.
A practical course.

42.23 **Meat Industry** (One paper)
A study in detail of the industry with reference to raw materials, processing and marketing.
A practical course.

42.34 **Brewing and Baking Industries** (One paper)
A study in detail of the industry with reference to raw materials, processing and marketing.
A practical course.

In the 1966 Calendar, changes were also made to the MFoodTech degree, with firstly a change in name to MTech(Food) and secondly a change to three new fields of study that emphasised (according to the Calendar) that "this is a technological degree in which the student combines and applies the different basic principles to food industry problems."

The three fields of study were:

42.14 **Food Materials** (Three papers)
An advanced study in selected aspects of food materials.

42.25 **Food Processing** (Three papers)
An advanced study in selected aspects of food processing.

42.35 **Product Development and Marketing** (Three papers)
An advanced study in selected aspects of product development and marketing.

The thesis was to the value of two papers.

1967

The major change in 1967 was the provision for students who had failed a paper (or papers) from the First Examination to be permitted to sit a special examination. If successful, they were credited only with a Technology version of the paper, e.g. Chemistry (Tech) which meant that they could proceed to the Second Examination of the BTech but could not switch to a BSc and take advanced papers in, for example, chemistry. This manoeuvre was an attempt to address the comparatively high failure rate among first year BTech students.

The 1967 Calendar contained no changes to either the papers or the prescriptions for the three options of the BTech(Food) degree, despite the existence of a Biotechnology option. Professor Dick Earle remained a member of the Food Technology Department.

There were no changes to the MTech(Food) degree course regulations or prescriptions. The degree of MAgrSc(Dairy Tech) was still listed in the Calendar although there had been no candidates enrolled for this degree for several years.

1968

For the first time the degrees were listed as Bachelor of Technology (Food Technology) and Bachelor of Technology (Biotechnology) with the abbreviations BTech(Food) and BTech(Biotech). There were no changes to either the papers or the prescriptions for the two options of the BTech(Food) degree with the exception of Food Microbiology II that was now taught by the Food Technology Department following the arrival of Dr Bill Bannatyne in 1966. Despite this change, there was no prescription in the Calendar for 41.63 Food Microbiology II, it retaining its earlier designation of 62.63 Food Microbiology II.

There were no changes to the MTech(Food) degree course regulations or prescriptions but it was now designated Master of Technology (Food Technology).

The post-graduate Diploma in Technology (DipTech) was introduced. Candidates had to have a BTech, BSc or BE or been admitted *ad eundem statum.* It was essentially introduced to enable potential MTech and PhD candidates to undertake a selection of undergraduate papers (3 or 4) from the BTech degree in areas where they may have been weak; they were also required to submit a dissertation to the value of one or two papers.

1969

The only change to the course regulations was the replacement of the optional papers Dairy Industry, Canning and Freezing Industry, Meat Industry and Brewing and Baking Industries with a single paper entitled Food Industries.

42.94. **Food Industries** (One paper)
A study of one or more food industries including practical courses, a project or dissertation.

The Master of Technology regulations were changed and two options were offered: Food Technology or Biotechnology. A candidate for the degree of Master of Technology had to have been admitted to the degree of Bachelor of Technology or Bachelor of Food Technology or admitted "in accordance with *ad eundem* regulations."

42.45 **Food Technology** (Three papers)
An advanced study in selected aspects of food technology.

1970

The major change in 1970 was the introduction of the degree Bachelor of Technology with Honours (1st or 2nd class) designated BTech(Hons)(Food). The course was identical but candidates had to perform at a 'sufficiently high standard' to be eligible for honours.

Quality Control Statistics was replaced by Technological Mathematics III in the Third Examination, and Industrial Management was listed as an option to Food Industries although not offered in 1970. This was in anticipation of the new Department that Scott was setting up and heading from 1971.

Although not reflected in the course prescription, lectures on the Laplace transform were introduced in the Food Engineering III paper by Scott.

In March 1970, Council approved a recommendation to no longer offer the Diploma in Dairy Engineering or the MAgrSc(DairyTech) degree.

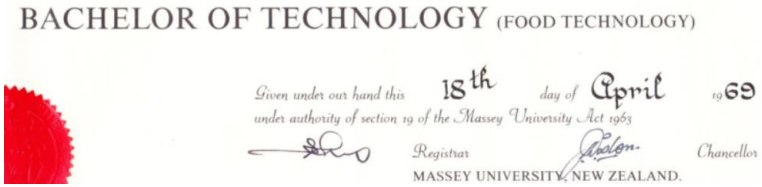
59.33 **Technological Mathematics III** (One paper)
A practical course in computer programming. Simple differential equations for the solution of problems in technology. Statistical methods and applications.

41.14 **Industrial Management** (One paper)
Studies of Business Administration. Further studies of decision-making and planning techniques.

The regulations for the MTech degree provided for admission in accordance with the *ad eundem statum* regulations, as well as those with a BTech or BTech(Hons) degree.

1971

For the first time the abbreviation for the food technology degree was listed as BTech(Food Tech) although the degree certificates since 1969 had listed the degree as Bachelor of Technology (Food Technology).


BACHELOR OF TECHNOLOGY (FOOD TECHNOLOGY)

Given under our hand this 18th day of April 1969
under authority of section 19 of the Massey University Act 1963

Registrar Chancellor

MASSEY UNIVERSITY, NEW ZEALAND.

Also for the first time the regulations for the new degree option in Industrial Management (BTech(IndMgt)) were listed.

A Note in the Calendar gave details about the three options of the BTech degree. For the Food Technology option, the Note stated: "This four year option provides training for the food industry. It consists basically of three years of pure and applied sciences progressing to an advanced level, which have been selected as being appropriate to the requirements of the food industry. In the fourth year the particular emphasis is in the advanced technology of processing, quality control; and product development or process engineering. Students may also undertake limited specialisation in management or marketing. Limited specialisation is also possible in particular commodity industries. Two courses are normally offered within the option, one specialising in management and engineering, and the other in marketing and product development, but other combinations might be possible by arrangement." In reality, due to timetable clashes, no other combinations were possible!

The prescription for Food Processing II was changed with the introduction of lectures on food preservation.

41.43 **Food Processing II** (One paper)
A study of processes used in the food processing industry. Particular studies will relate to selected separation, refining, reconstitution, modification, and food preservation processes.
A practical course.

The course regulations for MTech included a third option: Industrial Management and Engineering. Scott had always wanted to have the word engineering in his new degree options but this was always bitterly (and successfully) opposed by the Engineering schools at Auckland and Canterbury universities in their submissions to the UGC who had to approve all new degrees. Slipping in "and Engineering" after Industrial Management was a typically Machiavellian (and Kelvin) move. It would be 1979 before the BTech degree option could be renamed Industrial Management and Engineering and not until 1999 that engineering degrees (including a BFoodEng) were offered by Massey. However, the new department that Scott set up in 1970 was named Industrial Management and Engineering and he was designated Professor of Industrial Technology.

In response to difficulties encountered by students in obtaining suitable practical work in industry, the requirements were revised and the total number of weeks reduced from 48 to 36. The old dodge of claiming more than 12 weeks during the summer vacation as a result of working overtime was also closed by excluding overtime from the calculations, and those who worked for more than 12 weeks in any one vacation were only credited with 12 weeks.

1972

Despite the arrival of Professor Ted Richards as Professor of Food Technology and Head of Department, as well as the appointment of Malcolm Reeves and Gordon Robertson as Lecturers in 1971, there were no changes to the food technology degree course in the 1972 Calendar. However, significant changes were afoot and would be revealed progressively over the next few years.

2015

By way of comparison, it is interesting to see the 2015 course curriculum for the BFoodTech degree (the degree had reverted to its original name in 2010). The course consists of four parts totalling at least 480 credits and includes 900 hours of practical work experience and completion of a major in either Food Product Technology or Food Process Engineering.

Part One (120 credits)

Chemistry for Biological Systems 1
Physical Principles for Engineering and Technology 1
Food Technology 1: Global Perspectives
Engineering Mathematics 1A
Chemistry for Biological Systems 2
Physical Principles for Engineering and Technology 2
Food Technology 2: Creative Solutions
Engineering Mathematics 1B

Part Two (120 credits)

Molecules to Materials
Food Technology 3: Product Development
Engineering Mathematics 2
Heat and Mass – Conservation and Transfer
Chemical Energetics
Food Technology 4: Manufacturing
Industrial Microbiology
Fluid Flow and Particle Technology

Part Three (120 credits)

Food Technology 5: Food Microbiology and Safety
Food Chemistry
Statistical Modelling for Engineers and Technologists
Process Engineering Operations
Food Technology 6: Food Characterisation
Food Formulation Technology
Reaction Technologies and Process Modelling
Food Product Technology Major
Nutrition and Food Choice
Food Process Engineering Major
Bioseparation and Purification Processes

Part Four (120 credits)

Compulsory Papers:
Food Packaging Engineering and Legislation (15)
Industrial Systems Improvement (15)

Food Product Technology Major
Advanced Food Technology (15)
Food Technology Project (30)
Innovative Food Design and Development (30)

Plus an approved elective from:
International Agri-Food Marketing Strategies (15)
Advanced Topics in Macronutrient Nutrition (15)
Sustainable Energy Systems and Society (15)
Life Cycle Assessment (LCA) and Footprinting Principles (15)
Chemical and Bioprocess Engineering (15)
Process Control (15)
Quality Improvement (15)
Quality and Production (15)

Food Process Engineering Major
Food Engineering Research Project (30)
Food Engineering Design (30)
Process Control (15)
Chemical and Bioprocess Engineering (15)

Selected Course Prescriptions

Food Technology 1: Global Perspectives
Food Technology is the application of science and technology and mathematical principles, integrated with business and management, to develop and provide products and processes for industry and the community. In this paper you will help solve problems faced by many people in need. Concepts of systematic problem solving, communication and self assessment form an integral part of this project focused paper.

Food Technology 2: Creative Solutions
Food Technology is the application of science and technology and mathematical principles, integrated with business and management, to develop and provide products and processes for industry and the community. This paper allows you to develop your creative skills and encourages a thirst for knowledge. The development of prototyping, teamwork and communication through design form an integral part of this project focused paper.

Molecules to Materials
The chemistry of biological and engineering materials under-pins all food and chemical processing industries. This course extends the chemistry introduced at 100-level to facilitate a fundamental understanding of aqueous solutions, organic, inorganic and polymer chemistry relevant to food and engineering materials, and soft materials such as gels and colloids.

Food Technology 3: Product Development
The development of new and improved products is a key role of most practicing food technologists. This paper provides the structured process and tools required for successful product development in the context of an applied project.

Food Technology 4: Manufacturing
The design, development and on-going operation of manufacturing processes is central to the daily activities of most food technologists. This paper explores the key variables that impact the design, development and operation of food manufacturing processes within the context of an applied project.

Food Technology 5: Food Microbiology and Safety
A project-based course aimed at providing the skills and knowledge to select appropriate food processing, storage and testing methods necessary to understand the growth and control of microorganisms to ensure food safety and quality. Specific components of food analysis and risk assessment will be applied to develop analytical and problem solving skills in an industry relevant scenario.

Food Technology 6: Food Characterisation
A project-based course developing the selection and utilisation of food characterisation methodologies in assessment of food/ingredient function, quality and stability. The course will focus on instrumental and sensory methods of assessing structure, appearance, flavour and texture of a variety of food products. Assessment and characterisation tools will be used to develop analytical and problem solving skills in industry relevant scenarios.

Nutrition and Food Choice
Nutrient requirements, nutrition and disease, functional properties of foods, New Zealand diet, influences on food choice including relevant models, role of nutrition within the New Zealand food industry.

Bioseparation and Purification Processes
The principles and practice of bioseparations and purification processes. The following unit operations will be included: distillation, leaching, liquid/liquid extraction, protein fractionation, flocculation and chromatographic separations. A laboratory course.

Food Packaging Engineering and Legislation
The properties of packaging materials and requirements of labelling/legislation and the implications of choice on product shelf life, integration with processing, transport, traceability and information systems, and impact on consumer interaction with the product, sustainability and product cost.

Industrial Systems Improvement
Innovation in integrated engineering systems, emphasizing food industry systems and systems dynamics. Continuous improvement processes in industrial systems.
Systems design, planning and control for fast flow of products in supply chains. Methods and measures for control and daily decision-making in food businesses. Leadership of improvement teams in the workplace.

Food Technology Project
An original investigation of a food industry problem or opportunity. The student works under academic supervision within an industrial research brief and learns from practice, systematic skills in problem analysis, research and communication. Consideration of ethical, legal and social environments. This major project integrates knowledge the student has already acquired.

Innovative Food Design and Development
Students will commercialise an innovative food product from idea generation through to the business case for full-scale manufacture. The emphasis is on following a formal, systematic process that utilizes both qualitative and quantitative analysis techniques, within a realistic commercial context. Critical evaluation of the product development outcome and process from commercial, technical, and professional perspectives is an important component.

Advanced Food Technology
An integrative study of food systems. Individual and group problem-based learning is used to understand political, economic, societal and technological forces shaping the global food industry. Additional aspects of the course focus on interactive project-based activities aimed at honing market awareness, product development and food production skills and competencies. Proficiency in the selection and application of appropriate tools and methodologies for quality assurance and evaluation will also be developed.

Food Engineering Research Project
Students apply their problem-solving skills and accumulated knowledge to a specific Food Engineering research problem. This is an individual, scholarly research project conducted under academic supervision. Projects are either sourced from industry or are related to ongoing research and development activities at the university.

Food Engineering Design
Students will design an innovative factory-scale food manufacturing process based on a product specification. The emphasis is on following a formal, systematic methodology that makes appropriate

use of both mathematical modelling and empirical data, within a realistic commercial context. Critical evaluation of the design outcome and process from commercial, technical, and professional perspectives