Chapter 8

Extension, modelling, publications, education, research stations

This chapter describes a range of activities which were vital to the Department of Agriculture's work but which individually do not warrant separate chapters. Extension, to a degree, was the raison d'être of the organisation. Publications issued by the department were a key part of the organisation's information flow to the farming community and are covered in this chapter.

Education deals with computer modelling, a new but very important activity. The department's contribution to formal agricultural education is also covered. The final section covers the 29 research or experimental farms which were part of the department at various times. While all of them were important, only a handful still operate as research farms and many are closed.

Extension in summary

The extension officers (generally district advisers) were the face of the department, being seen on farms, at meetings and living in the community. They were also its eyes and ears. They were in contact with farmers on a daily basis, visiting farms, living in the environment and observing issues with professionally-trained eyes. The development of the extension services over the years was initially slow due to the small size of the department, communication difficulties, shortage of hard information and the shortage of trained people. Having trained officers in the field was a high priority for the first professional Director of Agriculture, GL Sutton. In 1937 departmental staff were stationed at 16 country centres. They had varying qualifications and responsibilities but would have been experts in their fields.

Ten years later there were just four country offices and three professional advisory officers recorded as being in the country. No record was made of the number of inspectors and instructors in the field at that time. This reduction was doubtless associated with World War II.

As increased numbers of trained officers became available after the war it was possible to develop a fully operational and equipped extension staff. As the capacity of the offices increased it was decided to increase their responsibilities. In the mid-1970s some research officers were placed in the major country centres and in 1977 the offices became independent branches in a Regional Services Division.

In the early 1980s they took over control of the research stations in their areas. This process of regionalisation of services continued through the next two decades with substantial offices established at Bunbury, Albany, Esperance and Northam with a significant research capacity. The Animal Breeding and Research Institute was established at Katanning and the Dryland Research Institute at Merredin during the early 1980s. These facilities were not initially part of the district offices. Significant research capacity also existed at Geraldton from the mid-1970s even though no major facilities had been established there.

The issues faced by an extension officer changed with the season. A wide range of knowledge coupled with a capacity to go back to first principles was essential. Experience in general and experience of the issues in 'your' district was important. For this reason the department in the 1960s, 1970s, and 1980s, moved away from single
officers in towns. Fewer larger offices were established. Not only was there a mix of experienced and less experienced officers at the larger offices but they were equipped with libraries, post-mortem rooms and later, machinery for managing their experimental programs. Interaction at larger offices with experienced staff was invaluable to a young officer. The re-establishment of single officer locations at a number of centres following the 1994 review reverted to a system found to be unsatisfactory earlier.

As farmers became more aware of the value of professional advice, and the need for this advice to be considered against the background of their personal and financial capacity, the private consultant sector grew. This was followed when a third arm of professional advice became available to farmers through private company advisers. This happened as the products sold by commercial firms became more complex and they saw the advantage of having professional staff to explain and sell their products and services to the rural community.

These developments, which began in the 1960s, caused a progressive change in the role of the departmental extension officer. Initially the public and private extension services operated comfortably side by side with the private advisers concentrating mainly on financial management and the government services on the technical issues. In the cropping areas the 1970s saw major technical changes in cropping which provided new challenges for the farming community and a need for extensive soundly-based professional advice on technical issues. By the 1990s the ‘new agriculture’ had been substantially settled, computers were appearing on farms, the internet was being used and changes were inevitable.

In the major downturn in the wheat and sheep areas of the late 1960s and early 1970s when wool prices collapsed and wheat quotas were introduced, the department's advisers were instructed to provide both group and individual financial advice to farmers, if requested. A short training course in financial management prepared them for this work. During the 1969 to 1972 economic downturn Australian governments introduced the first Rural Reconstruction Scheme. In the scheme’s early years the department's rural economists provided assessment advice to the State Rural Reconstruction Board and extension officers were involved in the process to varying degrees.

As the financial crises passed and the board became more independent, the department operated at arm's length from the rural adjustment process. This allowed the advisers to revert largely to technical advice. The introduction of minimum tillage to cropping was very challenging, requiring both detailed advice to some farmers and the development or assisting with the development of new information over the 1970s and 1980s.

In 1986/87, faced with continuing economic pressure on the farming industries the department again became involved in the provision of individual and group financial advice. This was initially successful and provided a new opening for the officers to maintain their contact with farmers. However, there were always going to be questions asked about the government providing services which could be provided...
by private consultants. Even if the private industry was not concerned, the Treasury would have asked questions. The final outcome was that the administration decided in the mid-1990s that it was inappropriate for departmental extension officers to deal with farmers on a one-to-one basis.

‘Development officers’

This was later reflected in the change of advisers’ titles to ‘development officers’. It appears that this policy was based both on the same logic that resulted in charges being made for all services by the department which were for the benefit of the individual farmer and contained no public benefit. There appears to have been no recognition of the importance of raising the efficiency of ‘second tier’ farmers who did not have private advisers, or the importance of transfer of knowledge, particularly of current issues from farmers to field staff. It effectively ignored the value of such services in maintaining contact with the farming community and advertising the department’s problem-solving role.

There also appear to have been significant unintended outcomes on the regional centres of the move to program planning and funding. For a time this process included the Funder, Purchaser, Provider approach. The 1977 reforms had aimed at making the regional centres separate branches of the department, with the officer-in-charge determining the response and focus of the office on the rural industries in the district. This was reinforced by transferring control of the research stations to the appropriate district offices. The new arrangements with statewide or regionally-based programs meant that staff at a district office were primarily responsible to their program leader. That person might be in head office or another regional centre. The officer-in-charge of a regional centre therefore had a much reduced influence over the activities of the officers there, except where those people were part of a program which he managed.

A research station manager was in a similar position. For instance, at Mt Barker Research Station in 2008, the manager’s ‘senior officer’ for the animal program was different to his ‘senior officer’ for the cropping program, and neither was the OIC of Albany. The changes appeared to have effectively returned the district OIC to the position that existed before 1977, but the interactions were potentially more complex.

In effect it seemed that staff were located in the regions but were not necessarily primarily committed to addressing regional problems. It also seemed that servicing of the needs of the immediate district had become a secondary consideration of the regional centre. This, together with the policy of not attending to individual farmers' issues, appeared to have uncoupled the past close relationship between farmers and the department and was reflected in serious criticism from some farmers and farmer groups.

The Natural Resource Management (NRM) Program, which developed to operate substantially on a catchment basis, did not appear to suffer from this separation but seemed to operate partly outside the general work of the department. However, the introduction of minimum tillage cropping and the dominance of cropping as a farming activity in the medium and low rainfall districts, removed many of the problems which drove the focus on natural resource management in the early 1980s. Some of the remaining problems are not as directly related to farming practices which can be changed or modified. There is some evidence that the drier seasons over the past 20 years have reduced the potential impact of secondary salinisation which has been another key natural resource issue. This probably means that the significance of the NRM movement as a separate function to general farm research and advice may need to be reviewed.

After the 1977 review, advisers were required to deal with the whole farm and its issues. There may be scope to return to this approach.
Farm experimental work

One of the strengths of the department's extension services in the 1960s, 1970s and 1980s was farm experimental work. All offices were progressively equipped to carry out this work efficiently. By 2008 there was a substantial drop-off of this activity, probably related to the focus on program management. At the same time a number of farmer groups employ researchers to carry out on-farm research. This work is often funded by the research corporations and therefore competes directly with the department for funds. This development further reduces the contact of departmental officers with the farming community and probably reflects dissatisfaction with the current focus of the department in this area.

The issue which had always existed in providing advice to farmers was timing. Like all individuals, farmers will listen to and consider advice given to them most effectively at the time they need it. This made general group extension such as spring field days less effective. It should also make one-to-one advice as given by the private consultant, who is also aware of the farmer’s personal and financial situation, the most effective method of providing advice. But in the case of the private consultant a high level of technical competence in addition to financial expertise was required if they were to be effective advisers.

From the department's point of view the advent of the internet gave farmers immediate access to technical information from departmental or other websites.

Extension service beginnings

In the early years the shortage of field staff and the difficulties of travel and communication meant the department depended largely on printed material to communicate with farmers. The Bureau of Agriculture was aware of this situation from the time it was created and published the first issue of the Journal of Agriculture in April 1894. In this publication it set out its immediate objectives, noting that it would take some time to become fully operational. In the first six months of the bureau's existence over 16,000 copies were distributed. It was available free to members of agriculturally-related associations. Non-members were charged an annual subscription of 2 shillings (20c). The Journal continued to be a valuable communication tool and in 1896, 51,450 copies were distributed. Much later the Under Secretary reported that there continued to be a big demand for it. It is surprising therefore that the new Under Secretary decided in 1909 to terminate its publication. It was not published again until Sutton revived it in 1924.

As recorded elsewhere, the department had a small staff in those early years and there was a focus on the infrastructure and financial issues involved in farming. Also it was not until mid-1921 that a professional officer was appointed as Director (Under Secretary). Presumably in those intervening years farmers depended on interpersonal communication, and the department must have placed a lot of reliance on providing advice through field days and other group activities and publication in newspapers and magazines.

From the beginning to 1920 the department's only field staff were stock, fruit and other plant inspectors, rabbit inspectors and managers of the experiment farms with one or two 'experimentalists' or plant breeders. In 1905 there were eight professional/administration staff plus some 18 inspectors and two farm managers. In 1909 there were three state farm managers and two stock inspectors outside Perth and 16 plant and produce inspectors, most in the country. At this time rabbits were not supposed to be west of the barrier fences. In the 1909/10 financial year the department took on the responsibility for providing water supplies and road clearing in advance of settlement and as an aid to settlement in the new 'outlying' areas. It also provided some initial capital to civil servants who were retrenched and as compensation had the opportunity to take up blocks in the Tammin area.
In 1911 a new branch with eight traction engines was established to pull trees as part of the development process. These activities, along with those of the rabbit and other inspectors, provided some opportunity for information transfer.

In 1916 under the headings of the Development of the South West, Potato Industries and the Wheatbelt there were two inspectors. There were also 10 inspectors working on diseases and 18 concerned with pests of the fruit industry. In addition, there were two stock inspectors, a rabbit inspector and the Chief Rabbit Inspector.

By 1920 there was an assistant field officer at Narrogin, two stock inspectors, 23 fruit inspectors and two inspectors of rabbits in addition to the Chief Inspector. The Merredin State Farm manager and a sheep and wool inspector (probably an instructor) were employed under heading of 'The Development of the Wheatbelt'.

These officers were in the farming areas and would have had an information transfer role. This would have also applied to the professional officers who were based in head office.

In this early period the field stations or state farms were important sources of information for farmers. Hamel was the first such field station and was established in 1898. It was a small area of 114 acres on the Drakes Brook near Waroona, for growing wheat varieties and crossbreds and testing various fodder plants.

The 1903 Journals report that the Chapman Field Station and Narrogin Experiment Farm had been established and were being developed. The 1905/06 report states that ‘the farm (Chapman) was now useful to test various crops and pastures and to provide practical instruction in farming for intending settlers in quest of training’. The Narrogin farm was established to demonstrate the advantages of improved cultivation, to raise stud stock for the benefit of farmers, and to provide training for farmers’ sons and others wishing to settle on the land. Early in the 1906/07 financial year the Nangeenan (Merredin) State Farm was transferred from the Lands Department to the Department of Agriculture. It was also used for testing crops and demonstration of farming methods.

**Extension – early development**

GL Sutton was appointed Commissioner for the Wheatbelt in 1911 and soon after made the following comments: “Most areas are in a pioneer stage of development, most settlers have had no farming experience but are anxious to learn and a vigorous information service is needed”. There is little evidence that this was either funded or staffed before the 1920s. Any plans would have been disrupted by the outbreak of war in August 1914 and the loss of staff to the army.

In 1919 Sutton suggested that consideration be given to settlement east of Merredin, which was then regarded as the eastern margin of the wheatbelt. He went further and said that in his opinion if such settlement was undertaken the department would need a cadre of graduate agricultural advisers to advise the settlers. No action was taken until Sutton became Under Secretary in mid-1921. He immediately took steps to recruit available graduates and locate them in close contact with the industry.

In his first report in 1922 he noted that two agricultural advisers with the necessary training had been appointed, one to the ‘southern’ areas. His duties were to cooperate with the Agricultural Bank inspectors and to advise farmers in order to reduce defects and improve farming methods. While a position was available for an adviser in the north, Sutton had been unable to obtain a suitable graduate. The policy of having the field advisers cooperating with the bank inspectors is interesting. It had been discussed with the hierarchy of the bank and subject of a conference in early 1922. It was presumably based on the view that the bank was likely to be dealing with people of limited resources and/or new to farming and were in most need of advice.
In 1923 another two graduates and a diploma holder were recruited. At the same time an agricultural adviser had been appointed to the Geraldton district for five months to “stimulate interest in dairying”. This proved so successful that it had been decided to place three graduates and a college diplomate, who had been recruited at that time, in the country. One was located in Wagin, one in Bridgetown, one in Bunbury and one in Geraldton. This was the beginning of the department’s regional extension services staffed by well trained officers.

At the same time Sutton took further steps in developing the extension services. He was perhaps the first to use the word ‘extension’ to describe the conveying of knowledge to farmers through demonstration or the written or spoken word.

An early action was to re-establish the Journal of Agriculture after a break of 15 years. The first issue of the new series was available in April 1924. In addition 13 Bulletins were issued. The second step was to accept an invitation from Westralian Farmers Limited in 1924 for officers to give talks to the radio audience from their new radio station (6WF at the time, but 720 ABC today) in Perth.

In the light of later developments it is worth noting that in 1921/22 there were 14 trials of wheat or oats varieties, nine fertiliser trials, four depth of ploughing and four drainage trials carried out on farmers' properties.

In the 1920s a series of crop competitions was started through the wheatbelt to demonstrate cropping potential through the efforts of leading farmers. The Royal Agricultural Society initiated the first cropping and fallowing competitions, starting in 1921 with the entry being a paddock or limited area of the farmer’s crop. There was also a competition for the best wheat yield across a grower’s whole crop. This competition started in 1924 and ended in 1926. The minimum size crop was 150 acres.

In 1928 the District Challenge Wheat Yield competition was inaugurated. Teams of five farmers from a district competed against groups from other districts.

In 1929 another major competition was inaugurated. This was for a sum of £150 ($300) provided by a successful farmer. The farmer’s mean yield of his best five crops over a period of 10 years was calculated. This yield was further modified by calculation of bushels per inch of rain.

These competitions were judged by departmental officers. While time consuming it gave the officers contact with good farmers who would have been interested in new information and also a source of advice on their methods and experience. These young officers also spent a lot of time visiting and advising farmers, either on their own or with agricultural bank officers. By this stage motor transport was available and communication was greatly improved.

In those early days much of the information prepared by expert staff was also published in the local newspapers.

In the higher rainfall areas the main activities of the department centred around the developing Group Settlement Scheme in the 1920s. It was heavily involved in planning the clearing and pasture development of these settlements. However, there were many problems for the new farmers and from a departmental viewpoint young advisers were exposed to the difficult situation of many group settlers. These ‘groupies’ had little experience in farming and probably none of dairy farming.

The scheme resulted in the clearing and development of a great deal of forest country with new soils which took time to become productive and had special nutritional problems. These soils demanded a high level of scientific work by research workers before they became fully productive. This work was largely done in the years during and after World War II. While the development of the groups finished in the early 1930s, the problems continued.
Sutton outlined his view of the importance of the extension services. His retirement was approaching in 1937 when he wrote:

The practical value of the work of the department is largely determined by the effectiveness of the extension services in disseminating information and advice in the farming areas. An endeavour has been made to keep farmers informed with respect to the most effective methods of managing their holdings ... and also to keep them in touch with the latest advances in agricultural techniques. The general work is in the hands of a group of field officers located at key positions throughout the agricultural areas, and this is supplemented by specialist advice from head office. The country personnel includes 14 agricultural advisers, seven veterinary officers and 32 officers engaged in herd recording, orchard inspection, stock inspection and other work affording an opportunity for the dissemination of advice by means of personal contact. This is further supplemented by Field Days, attendance at agricultural shows and by field demonstrations. The heavy demand for their services ... is testimony to the high value placed on them by the farming community.

Sutton went on to say that in order to make technical advice and assistance available to the district managers and inspectors of the Agricultural Bank, the headquarters of agricultural advisers were still located with them or in as close as possible.

In 1937, agricultural advisers, instructors or inspectors were stationed at Geraldton, Carnarvon, Northam, Katanning, Bunbury, Harvey, Roelands, Manjimup, Albany, Narrogin, Bridgetown, Denmark, Gosnells, Mundaring, Northcliffe and Vasse, while veterinarians were at Beverley, Bunbury and Derby.

The numbers reflect a commitment to country services. In 1940 the total staff recorded in the Public Service List was 146, of whom 60 were professionals, 52 were general division officers (largely inspectors) and 34 were from the clerical division. Thirty-five per cent of the professional staff were in rural areas.

World War II and the period of recovery after the war had a major impact on the department's staffing and services, including its developing extension service. This is detailed in Chapter 3.

The outbreak of war with Germany in 1939 caused an almost immediate loss of experienced and senior staff. The war with Japan, starting in December 1941, resulted in a loss of supplies of fertiliser, rubber and significant amounts of oil. The diversion of the manufacturing industry to the war effort meant that farm equipment supplies virtually disappeared.

To achieve an informed approach to the control and distribution of scarce equipment and materials District War Agricultural Committees were established throughout Australia to deal at the local level with these problems. Their task was to plan and solve the problems at a local level. They were all chaired by departmental officers and included the local manpower officer, a paid executive and four others, at least two of whom were farmers.

Thirteen of these committees were formed throughout WA. They proved very valuable but absorbed a lot of field staff time.

After the war another wave of land settlement took place. During 1946/47 the Under Secretary commented that the department was less than holding its own in providing extension services desperately needed by new settlers and an agricultural industry which was slowly starting to develop again after two decades of stagnation. Whereas there had been 14 graduate advisers in the field in 1937, there were only the four country advisory offices and the three officers mentioned in 1947. They were Gerry Throssell, who had served with the AIF and was posted to Geraldton when he rejoined the department; Jim Marshall (who would later lecture at Muresk and Fremantle Technical College) was at Beverley; and Eric
Watson (who later joined CSIRO and managed ‘Glen Lossie’ Research Station at Kojonup) had offices at both Kellerberrin and Merredin. The reduction in comparison with 1937 reflects the impact of the war. Of these officers, only Gerry Throssell remained in the department by 1950.

Post-war developments
The increase in staff following World War II resulted in 97 professional officers in June 1950 and 114 by June 1952. Although there was some lag in appointment to the country pending young officers getting basic experience, the numbers in the field rose quite rapidly. Office accommodation was often unsatisfactory and this was progressively upgraded. By 1958 there were 115 officers engaged full time in extension activities and a further 98 engaged partly in extension and partly in administration or research. In the wheat and sheep areas there were seven district offices—at Geraldton, Northam, Narrogin, Katanning, Moora, Mt Barker and Esperance, with another planned for Merredin in 1959. New offices had been built in Moora and Katanning and a new one was planned for Esperance.

Examples of the work undertaken in the 1960s are given below.

Extension work in the 1960s
In the fruit industry there was continued demand for advice on the use of new hormone sprays, pest control, disease and packing and storage. In 1960/61 the main issues related to the heavy apple fruit set and advice on how to carry out chemical thinning. Also, new information was available on control of bitter pit in Granny Smith apples in storage, which needed to be conveyed to growers. New quarantine requirements by countries importing fruit from Australia required special attention in the packing shed, checking for the presence of San Jose scale and woolly aphids.

There was a very heavy stone fruit crop and a need to promote and advise on thinning. In the packing sheds it was the year the wooden box was to be replaced by the cardboard carton and there was a need to instruct the industry on its use. Other important annual issues included soil fumigation of apple trees; control of citrus disease; packing of stone fruit and oranges for export; hormone sprays for setting Early Madeleine grapes.

In 1961/62 the apple crop was light, harvest was short and not enough fruit was available to meet export requirements. New owners, methods and general issues such as disease and pest control were the main areas requiring advice. These two years reflected the work in the fruit industry over the decade.

In the vegetable industry the 1960/61 focus was on the certification of areas for potato seed production. In this year there was a greater demand for certified seed than could be met. It involved inspection of the areas planted for seed production to ensure there were no aphids present capable of transmitting virus. Advice was given on a range of other issues including to processors on selecting areas for growing peas for snap freezing, to growers on producing the crop and to others on growing green sprouting broccoli. In 1961/62 the same issues were the focus of advice. Advice was given to the Onion Board on cool storage of onions. The department also conducted schools on a range of horticultural issues.
Sheep field day on a farmer’s property.

The cropping and livestock industries of the medium and lower rainfall areas were serviced by offices at Geraldton, Moora, Northam, Merredin, Narrogin, Katanning, Albany and Esperance. The area covered included 12,000 holdings and 22 million cleared acres. Officers were advising farmers on all aspects of crop production and pasture and stock management. They were involved in conducting 329 field trials and judging 43 crop, pasture and fodder conservation competitions in 1961/62. Visits to the offices, to farmers’ properties, ABC talks, film evenings, field days, field walks on farmers’ properties, telephone discussions in and out of hours were all part of the contact with farmers. Officers were also involved in stock inspection, animal health issues and vermin and noxious weed control. This was the pattern for the decade.

The work of the general advisers in the high rainfall areas broadly mirrored that in the wheatbelt in relation to all aspects of pasture production and stock management. They also dealt with issues in servicing the dairy industry such as solids-not-fat, antibiotic residues in milk, management of milk or cream production, storage and collection from farms. During the decade a new type of field day was organised combining the farm and factory with a focus on milking machine performance, sanitation, antibiotics, marker dyes, factory quality tests, calf rearing etc.

The pig industry was in part associated with the dairy industry, in part with cereal production, and a developing intensive housing industry. Numbers fluctuated, being particularly affected by the price of grains. When wheat prices were high pig numbers in the wheatbelt were low and vice versa. During 1960/61 numbers increased dramatically by 45,000. Visits to farms, attendance at field days and sales were all part of the pig specialist’s work.

Veterinarians were located at the larger offices and attended to animal health problems on farmers’ properties. There was more demand from the larger animal-based industry but they advised sheep owners on general issues and attended to any unusual deaths. Like other specialists they attended field days, visited farmers’ properties, and gave talks and demonstrations as required.

Euthanising a stranded whale. Department veterinarian Brian Gabbedy checking for a heart beat. District veterinarians were often called on to undertake unusual community services.

Until the 1977 reorganisation, soil conservation specialists were at most larger offices. Their role was advising on, demonstrating and implementing soil conservation works. They also gave advice and carried out demonstrations on saltland
management. For example, in 1961/62, 180 farm visits were made from one office giving advice, planning and supervising construction of soil conservation works. In the early 1960s these specialists were called on to undertake a special and long-term role of stabilising a major eroding and degraded part of the Ord River catchment.

Officers of the North West Branch were located through the pastoral areas. They provided advice to horticulturalists in the Gascoyne and to the pastoral community. Pastoral work was particularly challenging as it involved stocking rate management. This advice in turn was based on catchment surveys being carried out progressively by specialists in the field. Where it involved reducing stocking rates it was quite threatening to the enterprise and usually not well accepted. This work continued and over a period of 10 to 15 years brought about a progressive change in the attitude of pastoralists.

Separate from the field staff, most head office staff had a partial advisory role. Specialists such as the plant pathologists, entomologists and weed control experts dealt with problems referred by the field staff but also had a large demand on their services from farmers and householders who came direct to head office. They also attended field days at research stations or in areas with special problems. The plant pathologists gave advice on all aspects of plant disease control, management and avoidance. In particular they dealt with issues related to new types of fungicides, antibiotics, nematicides and plant protectants.

The entomologists gave similar advice related to a wide range of insects. In particular they were involved with advice on new insecticides. An example of the potential demand for this sort of advice was the appearance of new organo-phosphate insecticides, dimethoate, fenthion and trichlorfon, which all became available in 1960/61.

The Weeds and Seeds Branch officers were also involved in advice on weed control, seed production, strain identification and certification and the use of new chemicals. They dealt with material presented at head office but also spent considerable time in the field.

The staff of the Western Australian Herbarium provided a plant identification service, particularly poison plants. They also gave advice on tree planting and to apiarists on location of potential sources of honey.

Officers of the Plant Research Division and the Soils Division spent a significant part of their time in the field inspecting or sampling experiments, discussions with field staff and providing specialist advice to farmers and farmer groups at field days and meetings.

Part of the funding of the extension services came from two special Commonwealth grants, the Commonwealth Extension Services Grant and the Dairy Industry Efficiency Grant. These made a valuable contribution to developing and equipping district offices.

In 1960/61 the Journal of Agriculture was published monthly and the circulation reached 17,600 of which 16,000 were sent free to farmers.

A new style of publication was the Agricultural Memo, initiated by Jim Doyle, the officer-in-charge of the Esperance District Office, in July 1964 and mailed direct to all farmers in the region. Its aim was to overcome the difficulty of contacting and making farm visits to new land farmers who were spread across a rapidly developing region extending some 180 miles (300 km) between Ravensthorpe in the west and Boyatup in the east, and up to 75 miles (120 km) north of the coastline to beyond Salmon Gums.
Regionalisation of the department

As the department expanded there was a progressive improvement in the facilities in the country. Dedicated office buildings were available at all centres, or good quality office space was leased. Specialists were located at Geraldton, Albany and Bunbury. These major offices had their own equipment for field trials on farmers' properties.

In 1977 as part of the reorganisation of the department a decision was taken to establish the major offices at Albany, Bunbury, Busselton, Derby, Esperance, Geraldton, Katanning, Kununurra, Manjimup, Moora, Northam and Narrogin as independent branches responsible to a new Assistant Director of a Regional Services Division. In addition all staff at the district office were made responsible to the officer-in-charge. These officers retained their divisional affiliations but were seconded to the district office. The small offices of Broome, Three Springs, Merredin, Lake Grace, Jerramungup, and Bridgetown were attached as part of the nearest larger office.

In 1980 the regionalisation process was expanded by the appointment of research officers at Esperance and Merredin, development of the Animal Breeding and Research Institute at Katanning, and the launch of the Farm Machinery Unit at Merredin to provide research and extension support in farm mechanisation, primarily to the heavily mechanised grain industry. In 1983 this process was extended through the transfer of responsibility for most research stations from the Division of Plant Production to appropriate district or regional offices.

In 1983 the status of Merredin changed to an independent branch when the Dryland Research Institute was opened and became part of the office.

In 1984 the new Director of Agriculture saw a need for a change of direction in the country offices. He felt that they were likely to become less involved in providing 'recipe' advice but would take on an important analytical role in studying farming systems, identifying problems and selecting target areas for technical improvement.

In February 1980 a Metropolitan farm advisory office was set up at South Perth. It had been found that many farmers contacted head office seeking advice related to farming districts while the enquirer was an absentee owner or a farmer visiting the city. Since there was an increase in this type of enquiry it was decided that advisory staff would be located in head office. Most professional staff at head office were specialists without the whole-farm understanding necessary for effective advice. Very particular advice was still referred to specialists but it was intended that most enquiries would be handled by competent general advisers. As a result, the Kelmscott District Office was closed and its functions taken over by the new Metropolitan and Midland District Offices.

Strategically placed trees are important in reducing salt encroachment on arable land.

As further development of the regionalisation concept, a major new combined research and extension facility was opened in Bunbury in 1985. Kununurra had had these facilities for some years. Over the next decade similar facilities were built in Esperance, Northam and Albany. Specialist research staff were located at all these centres. They were now fully equipped regional research facilities. Interestingly, the Geraldton office, despite its lack of a major new facility, was very active in the development of management systems for the ‘new agriculture’.
Following a further review of the department presented in 1987, the rural areas of the State were divided into six regions: Kimberley, Southern Pastoral, Northern Agricultural, Central Agricultural, South West, and South Coastal. A senior officer was appointed to take charge of each region and the district offices became responsible to that officer. With these changes the regional structure of the rural services of the department was complete.

Cooperative extension activities and on-farm research in association with other divisions of the department or with commercial organisations were a significant role of the extension officers. In this way solutions to local problems were resolved or issues of special interest extended to the farming community and possibly to business interests in the district. While initially the program for each individual office was planned in Perth and handed to the district office as a fait accompli, in later years the OIC and/or specialist officers on his staff took part in the planning process.

Services such as herd recording, milking machine testing or soil and tissue analysis were organised through the district office. For example, where a soil testing arrangement for vegetable growers was developed by a research officer, the district officer used his contacts and skills to inform the farmers of the proposal, its implementation and the potential outcomes. As a result, there was general support for the program and progressively wider acceptance and extensive use of the results by growers.

The expansion of the on-farm experimental program was such that by the 1990s around 1000 on-farm experiments were carried out annually by district officers in association with head office specialists. These experiments were estimated to take about 30 per cent of the time of the district office. The district officers were also involved in organising regulatory services where these were needed. At one district office an export vegetable industry had grown which required an inspection service to maintain quality control and to ensure that the product met the specification of the importer.

By 1990 the country staff had increased and there were 64 graduates in the wheat and sheep areas supported by 43 technicians. In the high rainfall areas there were 17 graduates supported by nine technicians at six offices. The effect of the policy commenced in the early 1980s to have research officers and equipment in the rural areas had a major impact on the work of the department.

The focus on regionalisation was demonstrated by a 1991/92 report which referred to 40 per cent of the department’s staff being in the regional advisory and research support program.

Regional research

There had always been a role for extension workers in on-farm experimental work. However, the staff were not initially equipped to carry out this work efficiently. In 1957 a mobile planting unit which consisted of a 12-row disc drill on loan from the Massey Ferguson Company and a four-wheel-drive Land Rover plus a two-wheeled trailer arrived at the Geraldton office in time to plant the experimental program. This unit was supplied by the companies in response to pressure from the Mendel-Wongoondy Pasture Improvement Group. The Land Rover transported the unit and acted as a tractor for the drill.

The success of the Geraldton program encouraged the supply of mobile planting units to other regions, resulting in more active engagement by advisers in the research process throughout the cereal and sheep areas. The units became universal across the department's offices and led to a substantial increase in on-farm research. It meant that farmers did not have to provide machinery and help with planting at a time critical to them. Many more trials could be planted at the right time and more accurately in areas with conditions different from those encountered on research stations. The enlarged program reflected the need to
investigate problems across different soils and rainfall conditions. This need across the State was further reflected in the large statewide program outlined above. In Geraldton the district office established a field unit which largely replaced the work done on and from Chapman Research Station, which closed in 1994.

On-farm experimentation brought special benefits for extension workers:

- Locally relevant information for extension to farmers and visual demonstrations for farm groups at meetings and field days.
- Research officers from Perth were able to expand their research station programs to do more on-farm research in collaboration with advisers.
- Advisers improved their technical expertise through closer association with subject specialists and in turn, research officers were better informed on farm problems and were helped by district office staff who planted and harvested the trials.
- Over time the original drilling equipment was replaced with better equipment and machines for small plot work.

There was a progressive increase the regional offices' role in regional research, with increased numbers of research staff based at the district offices in large well equipped offices. By the early 1980s the effect of the policy to have research officers and equipment in the rural areas was having a significant impact on the quality of the work. Some academics, commentators and politicians believe central organisations such as universities and CSIRO can do all the research necessary for agriculture. This view is flawed because of the differences in the environment and soil types across an area as big as Western Australia.

Examples of the type of programs managed by district offices in the 1980s and early 1990s follow.

In the Albany region a survey found an apparent high level of footrot undetected on a large number of properties which resulted in a test which allowed investigators to separate the benign footrot strain from the virulent strain. This test was accepted nationally.

Jerramungup office identified a need for different techniques for sowing crops on deep sandy soils compared with soils with a shallower sand cover. They also demonstrated that the new Polymorpha medics were well adapted to the hardsetting grey clays of the district. Minimum tillage planting was particularly important because of the risk of wind erosion.

The Bunbury Centre was involved in:

- cattle grazing trials, breeding and production studies, cattle and sheep parasite studies and the examination of the methods of growing and handling conserved forage for grazing animals
- an alternative farming system involving sheep, ongoing crop variety trials and dryland and irrigated pasture studies, horticultural trials featuring a range of alternative fruit crops and viticultural studies in the Margaret River area
- ongoing research with pathogen-tested potato planting material
- a trial to evaluate melon varieties from all over the world.

The specific research programs covered a range of enterprises. Studies were undertaken in the grape industry which included the physiology of vine dormancy, chemical control of vine growth and importance of the time of pruning. In pasture research new clovers were compared with Trikkala subterranean clover as winter pasture legumes. Staff was also involved in studies of the biological control of dock and doublegee, and saltbush selection trials. The Harvey office concentrated on improved methods of grading paddocks for irrigation, management of recently graded paddocks and selection of new and improved pasture species for use under irrigation.

At the Esperance office a whole-farm systems approach was taken in the experimental program; no one topic
considered in isolation. All aspects of the farm business were considered involving stock, crops and land management and the effects of insects and diseases on production. There was also interest in exploring alternative production systems including the growing of wildflowers or perennial pasture such as lucerne on the deep sandy soils. This was coupled with continuous cropping of the better soils, leaving the soils unsuitable for cropping with a permanent cover involving other forms of production.

At Geraldton office during 1985/86 the development of stable farming systems through conservation farming was a major extension objective. The objective was the provision of the technical information to allow farmers to double yields on the extensive sandplain soils of the region by the year 2000. To do this, crop rotations, disease and pest control and water use efficiency of crops as well as issues of soil compaction were investigated.

At the Katanning office the trend was towards an increased proportion of crop on the farm enterprise. The research focused on the evaluation of medic pasture varieties and appropriate Rhizobial bacteria for more acid soils. The work included investigation of the digestibility of medics and other pasture species. Trials were also conducted in pens on ammonia-treated oats compared with other grain rations as a supplement during summer.

The Manjimup office directed its horticultural research towards the expansion of export markets. This was achieved through the introduction of new varieties and crops believed to have export potential. A small trial consignment of a range of vegetables was air-freighted to Singapore and was well received. Agroforestry research was also being conducted jointly with the Department of Conservation and Land Management.

The Bridgetown office was developing a farm water supply database. With 35,000 records of water tests on the whole State, work was undertaken to monitor subsoil water salinity trends. There was also a major concern about the development of stomach worm resistance in sheep to the available chemicals. The staff had developed considerable knowledge of goat husbandry and their help was sought in seminars and field days throughout the State.

At Merredin office, research focused on developing longer-term sustainable rotation systems for all soil types in the region, the use of a new medic, and continued work with field peas on soils unsuitable for lupins. They were also involved with testing serradella on suitable soil types. In the machinery field, studies were directed at reducing seed loss of lupins during harvest and improving the field efficiency of boom sprays. Techniques for stubble retention and managing stubble during seeding, where it had been retained, were also studied.

At Moora, work was focused on cereal varieties and testing herbicides, pasture species and fertilisers. The research station also investigated summer supplementation of weaner Merino sheep and showed that lupins were much better than cereal grain for this. Trials were also conducted on the first lupin varieties bred for resistance to the Phomopsis fungus.

Narrogin staff were involved in catchment hydrology, salinity, land drainage and pasture variety testing. Preparations were made for a major grazing trial to test the value of saltbush. Farmers were helped to plant 300 ha of wavy-leaf saltbush on the Tulibin flats. An area had been planted with trees on a salt-affected site in an endeavour to lower the watertable. It was found that the watertable was more than a metre deeper than on adjacent control areas. This provided an effective method of treatment of land threatened by salt encroachment. Analysis was carried out of the costs and returns for individual enterprises on a number of farms. The results were the subject of discussion within groups of farmers and proved valuable in showing economic trends both to the farmers and to the department's officers.
Staff at the *Northam office* investigated growers’ concerns about *Rhizoctonia*, which affected the establishment of the first crops of lupins sown on grey sands. A problem with cereal cyst nematode was found to be more widespread than previously thought. Research into the impact of transient waterlogging on nutrition and root rotting was also in progress. A different nematode affecting subterranean clover was also identified. The office was also testing the adaptation of the new medics, *Medicago murex* and *M. polymorpha*, to a range of soil types and refining the techniques to help farmers get the best establishment results. New subterranean clover varieties were also tested on different soil types.

The *Kalgoorlie office* was heavily involved in the study of the grazing behaviour of goats in the mulga shrublands with strong support from the pastoral industry. Kalgoorlie officers were also investigating techniques to establish vegetation to stabilise overburden heaps. A program aimed at maintaining and improving the resource base of the pastoral industry while gaining maximum productivity was in progress on the Nullarbor Plain.

The *Kununurra Regional Office* was involved with both the pastoral industry and the irrigation areas. The research program in the pastoral industry was largely located on the Ord River Regeneration Station and the Fox River Station, with some work also in the west Kimberley. The major research projects were studying the suitability of different Asian and locally adapted European cattle breeds, the dynamics of a typical Kimberley cattle herd, the effects of different grazing systems on cattle and on the pasture, and the value of weaning as a management strategy. There was also continued assessment of irrigated leucaena pastures for finishing young pastoral cattle. Indications were that the best results were obtained where Brahman-cross steers were used and the leucaena grazing intensity had been maximised.

Work on the degraded Fitzroy River frontage was successful and a team of departmental officers was working on regenerating the many thousands of hectares of grazing land which had been degenerated through previous poor management. A high salt level in some soils was seen as a problem and various techniques were used to overcome this. In the irrigation areas there was some work at Camballin and on a small horticultural development at Broome. Staff were also involved with implementation on-farm of relevant results of the work being undertaken at the Frank Wise Research Centre.

It seems likely that the move in the early 1990s to partial and then full program planning and funding has not left these district-based programs focused in the same way.

**Key sources of information**

The 1994 report of the department refers to a survey of 150 wool growers which identified influential groups providing interpretation of production and market information to producers. These included private consultants, the department, wool brokers, ram breeders, sheep and wool classers and their peers. There would have been conflicting information provided between some of the sources.

The results highlighted the difficulty that producers had in identifying the most reliable information on issues such as the characteristics of wool having greatest influence on price. The survey showed that the market signals needed to be clear and extension initiatives needed to be broadened to encompass influential providers of information, as well as farmers. As a result a new project was developed to focus on key producers who provided information to others and on improving the information available to other information providers.

**Pastoralist liaison committees**

The department was aware that the transfer of information to pastoralists was difficult due to the problems of communication. Staff were not satisfied that communication was
effective. In 1980, quite independently, two
groups of pastoralists met with departmental
officers to address this problem. The
outcome was the setting up of regional
committees of pastoralists and departmental
officers which would meet annually to
discuss mutual problems. On the basis of
this experience liaison committees were set
up in the Kimberley, Gascoyne and North
West, Murchison, and Goldfields regions. In
practice the committees' prime role was to
act as a coordinating body between the
department and pastoralists. The meetings
would review research needs in the area of
interest and examine progress of research
being conducted. Importantly, they would
advise and assist in the dissemination of
technical information to other pastoralists.

Home Garden Inquiry Centre
A home garden inquiry centre was
established in 1977 as a service to the
metropolitan community, who were really the
department's major funders. Part of the
centre's role was to intercept inquiries which
otherwise would have been directed to
specialist staff, distracting them from their
core business. It was an immediate success,
with inquiries increasing from about 50 a day
to more than 100 in peak seasons. About a
quarter of the 15 000 inquiries made during
the summer concerned lawns and resulted
from the dry summer and the water
restrictions. A further quarter concerned
flowers and trees and shrubs, including
water and insect problems. Another group
sought advice on establishing native
gardens. As well as providing useful
information to city people, the centre raised
the profile and prestige of the department
among the general community.

Market Information Service
This department's information service was
expanded in 1977/78 to supply more
information covering a wider spectrum of
industries to farmers. An innovation was a
24-hour phone-in service introduced early in
1978 to provide farmers with up-to-date
information on livestock sales. The reports
were recorded on automatic answering
machines. Information concerning livestock
was also covered in two new weekly reports
titled Meat Comments and Meat Notes
introduced early in 1978 for newspapers and
ABC rural radio. In 1979 the information
service was extended to include all country
sales.

Grain News, which was a weekly report on
world grain, oilseed prices and trends, was
started in 1977 and used by the country
radio and rural press. This publication
provided information on changes in oil, grain
and oilseed prices over the past week and
month and the reasons for the changes.
A weekly market sheet summarised relevant
news received from AAP Reuters, grain
news, meat and wool news and relevant
prices for commodities.

The department published an annual Farm
Budget Guide, dating from the early 1970s. It
was widely disseminated and accepted as a
reliable reference for farmers. A farm finance
booklet was also published, outlining the
availability of finance to farmers and
including practical hints on how to approach
lenders.

The Avondale Project
As part of the celebrations in 1979 of the
150th anniversary of the foundation of
Western Australia and a lasting tribute to the
State's agricultural development, an historic
exhibit was prepared at the Avondale
Research Station. While Avondale remained
an important research establishment a
display was designed to provide, on one site,
aspects of agriculture of the past, present
and future.

The Avondale property dated from the early
days of the Colony and occupied land
formally assigned to Governor Sir James
Stirling and Captain Mark Curry before 1836.
The original homestead, garden and stables
appeared to have been built in the 1880s.
The classically constructed stable was
restored and returned to its former use.
Clydesdale horses were housed there and
occasionally used to demonstrate horse-powered machinery. Harness and similar artefacts are also on display. Avondale houses a collection of machinery dating back to the 19th century; much of it donated by the farming community and restored by a special 150th anniversary fund. The project was opened by the Prince of Wales in September 1979.

Machinery research and extension

In the early 1970s, through the Narrogin District Office, an arrangement between the department and the Kondinin and Districts Farm Improvement Group examined farm machinery and labour efficiency in the cropping industry. The issues examined were:

- efficiency of spraying in relation to size of the boom spray, the need for and timing of replenishment of chemical and water in a spray as it affected the output and efficiency of particular machines
- relative efficiency of air seeders compared to the combine, where variations in field efficiency between machines was overshadowed by variations between farms; particularly the time spent handling seed and fertiliser
- durability of scarifier tyne points, following farmers' complaints about their poor wearing characteristics
- farmers' experience on the reliability of all major brands of seeding machines as collected in a survey
- the reliability of boom sprays
- efficiency of handling seed and fertiliser, which had proved to be a major issue.

Based on the results, highly successful seminars were conducted at Hyden and Geraldton. Some 400 people attended the two-day seminar at Hyden and 170 attended a one-day seminar at Geraldton.

General advisory work in the 1990s

By the June 1992 report the extension services had been operating in the six regions defined for some five years, and operating before that for a further 10 years as independent branches of the Department of Agriculture. The important issues and trends are summarised below.

In the Agricultural Regions:

- Collapse of the wool and wheat prices in late 1990 placed farmers and pastoralists in a precarious financial position.
- The rural downturn affected the farming community’s capacity to implement high cost land conservation measures.
- Awareness of the quality of the product and the market opportunities resulting from improved quality was increased.
- A wheat price rally in 1991/92 improved farmers' position marginally, but it was 1992 before the wool market recovered.
- Industry support for research and development had continued to decline and the activities of several research stations were reviewed to maximise efficiency and maintain effectiveness.
The number of producers leaving the industry increased, particularly in the lower rainfall wheatbelt. Some remaining farmers needed financial assistance.

International markets became more demanding in the specifications of product required.

Agriculture continued to be under community pressure from environmental groups.

Land Conservation District Committees had increased their activities and farmers were increasingly forming catchment groups to improve their sustainable farming practices.

In general, to remain competitive, farmers were having to become better skilled technically, with an increased need for specialisation aimed at supplying high value products to meet specific markets.

In the **Southern Pastoral Region:**

- Carnarvon growers using irrigation water were establishing export opportunities for vegetable and fruit crops.
- Cauliflowers, Chinese cabbage, mangoes and grapefruit were all being exported and the potential for more exotic subtropical fruit was being examined.
- Technical issues centred around improved use of irrigation which was based on work which began in 1986. These irrigation recommendations were being extended to crops other than bananas.
- A feral goat eradication program began in mid-1991. This depended on a coordinated approach across station boundaries; 13 Land Conservation Groups and one group of pastoralists had split into a number of cells. This reduced the risk of reinestation once the goats have been removed. The department was involved in coordinating the campaign.
- In the pastoral areas there was growing concern about the total grazing pressure on the vegetation, with kangaroos and goats providing as much pressure as sheep.

In the **Central Agricultural Region:**

- Twenty-two sub-catchment planning groups were established to undertake farm and catchment planning under the Avon Catchment Plan. Six of the groups was partially funded under an ALCOA landcare project.
- Landcare education had started at school level.
- A comprehensive plan was drawn up to support farmers through the rural downturn. During spring 1991, 2057 farmers were contacted at 118 meetings, representing half of all farmers in the region.
- District advisory committees for extension and research had been strengthened and revamped in each centre.
- Farmers were moving towards more sustainable farming systems, with an increased focus on soil type.

In the **Northern Agricultural Region:**

- The use of groups through farm walks, field days, seminars and technical update meetings had allowed contact with 60 per cent of the farmers in the region.
- Producers had rapidly adopted improved production practices including earlier sowing and high yielding wheat packages. This had highlighted the advantage of integrated extension work with plant breeders, physiologists, agronomists, advisers, economists and farmers involved in the development of the extension program. These programs were based on the developing lupin/wheat rotations.
- Land Conservation Districts and landcare groups were providing a focus for a wide range of research, demonstration and the extension activities with an unprecedented focus on landcare projects and the development of sustainable farming systems.
Land management extension concentrated on farm planning and low-cost techniques. About 8 per cent of farms were planned through catchment groups.

There was concern about deterioration of pastures in the West Midlands, which needed more research input.

In the South Coast Agricultural Region:
- Cooperative work by the department and industry developed a production package which could lift productivity by 100 to 200 per cent. The technology to produce yields close to the biological potential had been adopted rapidly by the industry.
- Research, development and technology transfer advisory committees based on district offices or research stations provided assistance in developing programs and priorities. Four of these committees were chaired by farmers. They highlighted the need for further research into the stubble management component of the high yielding crop package.
- The Esperance Downs Research Station was redeveloped to demonstrate sustainable farming systems.
- Water use had become an important issue and the department had re-allocated resources to appointment a plant water use research officer to coordinate a multi-disciplinary research, development and technology team at Esperance.
- Soil sampling and the use of the department’s fertiliser use analysis computer model had saved farmers up to $2 million through adopting the recommendations for reduced fertiliser use.
- The monitoring of fertiliser run-off from catchments had produced benefits through improved efficiency and reduced fertiliser wastage.

In the South-West Agricultural Region:
- Extension focused on milk quality, particularly improved control of mastitis. This resulted in the somatic cell count of the WA milk being the lowest in Australia.
- Reduced pollution of the Peel-Harvey estuary through planting trees and shrubs on the banks of streams, monitoring sources of phosphorus entering streams and the treatment of leaching sands with red mud were significant programs.
- Flood irrigation districts were surveyed for salinity.
- Nutrients leaching into other streams and estuaries were monitored.
- Biological filters as a means of treating dairy effluent were demonstrated.
- Adverse effects of over-watering of flood-irrigated pastures were shown to be important.
- Assistance was given to sand dune stabilisation projects.
- The Wokalup Research Station was redeveloped as an industry-managed commercial dairy. This was supported by industry to the extent that 130 animals were donated to establish a herd. The farmer members were exploring the means of raising another 100 animals and $170 000 in working capital needed for running costs.
- Discussion groups were active south of Bunbury, focusing on the development, production and utilisation of dryland pastures.
- Dairy groups at Waterloo and Harvey showed more interest in irrigated pastures. The department used the Dairy Farm model to demonstrate the impact of a range of management decisions on profitability.
- There was concern about the need to refurbish the delivery system for irrigation water.
Beef discussion groups were developed in relevant districts. The Beef Farm financial model had been used in discussion groups.

Horticulture and orchard improvement groups were active at Harvey-Donnybrook, the Perth Hills and north of Perth.

Quality assurance was actively promoted for all fruit.

The Peel-Harvey Estuary Catchment Management Plan was implemented with the same issues as above. Similar work was carried out at other estuaries in higher rainfall areas.

In the Kimberley Region:

Siltation of Lake Argyle has been a major issue since the inception of the project. Nearly a million hectares of degraded pastoral land was resumed for rehabilitation and protection from overgrazing. A review indicated that despite considerable sediment flow continuing into the lake, there was long-term security of water supply for a fully developed Ord irrigation area. In a seriously eroded and degraded area of 35 000 ha, where there were major gully systems, there has been no evidence of new gully development during the past 40 years. The gullies were stabilising and will probably be stable within 100 years.

A management plan for the Ord River catchment was developed and provided for comment at the end of 1992. Degradation of pastoral lands was a major issue based on historic overgrazing. The department enrolled community and industry support to develop a framework for sustainable land use.

Ongoing planning and infrastructure development resulted in dramatic improvement of range condition on the Fitzroy River frontage since the 1980s. Infrastructure cost around $15 million and 500 000 ha of river frontage land was either totally destocked or under strategic grazing management.

A watering program was developed for the important banana industry in the Kununurra area.

A pilot control of the Heliothus budworm which was 80 per cent resistant to pesticides was being assessed.

There was increased demand for research-based technical information on horticulture, with a move to diversify into alternative crops.

Staff located at country offices are shown in Table 5.
Table 5 **Staff located at country district offices in mid-2009**

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<th>Veterinary officers</th>
<th>Development officers</th>
<th>Research officers</th>
<th>Technical officers</th>
<th>Biosecurity officers</th>
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Modelling

Modelling is in the education area because it deals largely with decision support systems. While these are probably used more by researchers and farm advisers than by farmers, that will change as the farm population becomes more computer-literate.

The development of decision support systems and modelling began in the department in the mid-1970s and early 1980s. There were two streams of work. One was concerned with the development of decision aids for the operational and day-to-day decisions made on the farm and the other was concerned with simulating the whole-farm enterprise. The first had its roots in the Plant Research and later the Plant Industry Division and the other in the Marketing and Economics Branch.

However there were substantial ‘spin-offs’ from the original economics work which had direct operational application. The more complex of these systems were modified to meet changing demands over the years, or to meet special needs.

Two important outcomes were the development of the NP Decide model by the Plant Industry Group and the development of the Midas model by the Marketing and Economics Group. But many other decision support systems of varying complexity were developed over time.

In the Department's 1988 annual report the Dairy Branch of the Animal Production Division commented: "In keeping with the general movement to farm models a dairy farm model was developed by the Dairy Branch. This model aims to optimise the use of all dairy farm resources and activities together to give the best financial performance for the individual enterprise. The model shows that profit could be increased on most farms by adjusting the breeding pattern, feeding more concentrates in summer, calving heifers at an earlier age and, in the irrigation areas, increasing the area of early-germinated pastures".

Feeding was a key issue and intensive research was being carried out. Other key issues were early calving of heifers and maintaining high reproductive performance so that the cows maintained a 12-month calving interval through their productive life. A 1990/91 report refers to the development of a computer program, Dairyfeed to help producers make decisions about grain purchases, which were a high cost item.

At a 1990 conference 10 decision support systems which had been developed to that time were listed.

On the basis of the work in the various parts of the department, an electronic directory Tools to Assist Decision-making was produced by the department on its website in 2007. This was designed to identify for farmers and advisers some 40 tools which had been produced to aid decision-making on various aspects of farming. They were primarily focused on broadscale farming of the medium and lower rainfall areas. The tools listed were:

- **e-Variety Profile** helps growers to choose a variety to suit their circumstances. It was based on yield trials, agronomic characteristics, disease risk and herbicide sensitivity. The model included 53 wheat, 24 barley, 14 oat and 37 canola varieties.

- **e-Variety Guide for Stripe Rust** assists in the selection of the right variety for stripe rust giving two varieties for each agricultural zone, relative yields, costs of varietal change, chemical control, and returns as affected by variations in wheat pricing.

- **Flowering calculator** estimates flowering time for a selection of crops and varieties to ensure optimum flowering for selected varieties.

- **Potential Yield Calculator** estimates soil moisture at start of the season and estimates potential yield for a range of crops as season progresses.

- **Select Your Nitrogen** is a quantitative support system to address soil nitrogen issues and their effects on yield and
quality and dollars in a broad acre cropping system. The major emphasis is on the effects of rotation, tillage, soil type and rainfall on soil nitrogen availability.

- **Imagine** provides a financial analysis of alternative land uses. It can include long rotation crops such as trees and allows spatial configuration within the paddock, for example an alley farming scenario.

- **Step** deals with the cost of making the transition from one farming system to another, based on whole-farm development budgets.

- **Lime and Nutrient Calculator** estimates the acidification and removal of nutrients associated with broadacre rotations. It considers removal related to production, leaching and acidifying fertilisers, covers crops, wool and meat production.

- **Potassium in Agricultural Systems** allows users to assess short and long-term potassium nutrition of agricultural production systems. It provides a great deal of user flexibility as it operates on a weekly time step.

- **Damcat 4** allows the user to design dam and catchments for supplies based on expected monthly demand. It allows for different climate and demand variables.

- **Dam-Volume Calculator** can calculate potential supply reliability based on a given demand and evaporation in a scenario of no rainfall over the period being considered.

- **Rain tank 2** is a simple program to determine optimum roof area and tank size for rain water collection to meet a nominated demand and reliability of supply.

- **AgET** estimates the degree of aquifer recharge under different soil and crop combinations. It does this for the range of agricultural regions and soil profiles and landscapes over defined times.

- **Catcher** uses the AgET data to calculate the water balance for a farm or catchment. It can operate for a whole region, paddock, farm or a small catchment at any time.

- **Flowtube** can predict the area of shallow watertable under different management scenarios for whole farm regions, catchment or hillsides, based on inputs from transect bores and other hydrological information.

- **Leakage Calculator** makes a first pass aimed at raising awareness of leakage from a landscape.

- **Profile Manager** can be used to manage the wool fibre profile through the season.

- **Agroforestry** estimates the profitability of a farm forestry project.

- **Fleece Calculator** is a simpler decision support tool for Merino producers to consider the costs and benefits of in-shed flock selection.

- **Lamb Planner** is a non-electronic wheel planner to assist farmers make informed choices on timing of lambing and management of the breeding flock.

- **Green Feed Budget Calculator** assists farmers to manage their feeding regime during the green pasture period including autumn deferment, supplementary feeding, stocking rates, different pasture species and climatic areas.

- **Pasture Watch** and **Pastures from Space** provide real time pasture information and a range of tools to make grazing decisions. Pasture growth at the farm scale is provided as a basis for managing stocking rates. The base data on pasture growth is sourced from the internet. It costs $500–750 annually to take part in the system.

- **Anthracnose Calculator** aims to measure spread of infection from infected seed and infected blue lupins along fencelines. It needs special skills and software.

- **APSIM (Agricultural Production Systems Simulator)** measures rangeland which has been affected by a range of variables. It is primarily for researchers.
- **Blackleg Sporacle** was designed to forecast the onset of blackleg ascospore shower from canola stubble as a basis for sowing and fungicide decisions.

- **Blackleg Risk Appraisal Tool** is based on an assessment of risk of ascospore showers from canola stubbles and the growth stage of the canola. It aims to give guidance on fungicide use and possible strategic sowing dates.

- **Blackspot Manager** is based on black spot history in the region. It aims to forecast the spread in the region as affected by climate.

- **Barley Yellow Dwarf Virus Risk Forecast** aims to predict yield loss due to disease spread in cereal crops by forecasting aphid arrival, disease spread and yield loss, mapped on a shire basis, rainfall and temperature for the period.

- **Cucumber Mosaic Virus Risk Forecast** is similar to BYDV but focused on cucumber mosaic virus on lupins.

- **RIM (Resistance and Integrated Management Model)** is a decision tool for investigating and evaluating the biological and economic impacts of weed management options for annual ryegrass control over a long rotation.

- **NP Decide** is dealt with in some detail elsewhere. It is primarily concerned with decisions on nitrogen and phosphorus fertiliser use.

- **Optlime** is based on a wealth of information developed for WA conditions. It assists with soil acidity management including lime quantities and potential crop decisions.

- **Rootmap** simulates the interaction between the plant root and the soil as affected by issues such as nitrogen and moisture levels. Makes a pictorial representation.

- **Splat** aims to help with the selection of cultivar and nitrogen rate within the context of seasonal variation. The model estimates yield, nitrogen and dollar responses for a range of environment and management scenarios.

- **Tact** aims to provide critical information for assessing risk in sowing wheat. The model uses climate analysis and simulations of yield and development as its base data.

- **WA Wheat** enables users to predict yield and quality resulting from seasonal conditions and management of the crop. It also estimates possible leakage of water and nitrate beyond the root zone for particular soil types and locations. It allows planning for the coming season but has little flexibility within the season.

- **Regional Farm Model** allows for analysis of potential whole-farm financial outcomes resulting from developing seasonal conditions. It allows a quick overview of a farm business and the outlook at the end of the season.

- **Climate Calculator** uses historical rainfall data for a location to develop a picture of the climatic risks. It is useful both at the start of a season and through the season.

- **Quarantine Significance Model** simulates, using a base of no government intervention, the potential damage from the introduction of an exotic pest or disease. This sets a base for considering what is reasonable to spend on eradication.

- **Pastoral models included, SCHAF for the sheep areas and CATMAN for the cattle areas.** The models could use station records and district averages to examine a wider range of management options than those which might have otherwise been attempted. In addition, the University of WA developed a computer model with the assistance of the department’s rangeland management staff which simulates the pastoral system and can test the economic consequences or opportunities of different management practices.

- **Four global models have been used to look at the potential impact of climate**
change. Comparisons were made in terms of simulated monthly rainfall and maximum and minimum temperatures for eight selected locations in the grainbelt with estimates of the impact on potential yield. The simulation of future yields showed a decline in most locations but increases in some higher rainfall locations due to the combined effects of increased carbon dioxide and reduced waterlogging.

- **Decide** had two or three iterations. Originally it focused on the use of phosphate and was called *P-DECIDE*. As nitrogen fertiliser became an increasing part of the accepted cropping system, the model was developed further and became *NP Decide*. It was a computer-based program designed to predict wheat yield or pasture growth responses to varying applications of nitrogen and phosphorus fertilisers. It predicted yield and dollar responses for any yield potential and soil nitrogen and phosphorus levels. It contained a facility to include a test result for soil phosphorus and an allowance for the root disease take-all. It could be used for deciding on fertiliser type, rate and time of application and could be applied to individual paddocks, particularly where individual paddock fertiliser histories were available.

- Simulation models were also produced to help research workers understand agronomic systems and the interaction of agronomic practices and the environment with crop growth. By understanding the systems it was possible to transfer the results between sites. The simulation of situations allowed researchers to examine hypothetical issues such as the interaction between phosphorus response and levels of disease in lupins. The outcome could then be incorporated in the *DECIDE* model to improve its accuracy. The simulation approach was also used to test the use of lupins in a cereal-based rotation. Various ways of using the lupins could be tested to give guidance to likely field outcomes through using existing knowledge coupled with considered assumptions in a hypothetical range of situations.

- A major commercial fertiliser manufacturer provided a soil analysis service to farmers for many years. Initially this was based only on a chemical analysis. The department has collaborated with the company to develop a service which utilises *DECIDE* in its assessment of the advice to be given to farmers. As the body of data has accumulated that service has become more valuable to the farming community. In one instance after a serious period of droughts in the eastern and north-eastern agricultural areas the company offered a free soil analysis service to the farmers. In a cooperative effort between the department and the company some 7000 samples were analysed and the data combined with analysis by *DECIDE* resulting in advice being given to a large number of farmers in just 100 days.

- **MIDAS**: The second major development also began in the early 1980s with a group centred on the Marketing and Economics Branch. They undertook the challenging task of developing a whole-farm bio-economic model that became known as *MIDAS* (Model of an Integrated Dryland Agricultural System). This model was initially developed to examine the economic validity of the trend at the time for farmers to crop a very large part of their farms with a large reduction in the area of pasture. This was a major move away from the ley farming system which had been a major part of the farming system for the previous 20 to 25 years and its overall economic validity was questioned. Development was initially a collaborative effort between a small group of influential agricultural economists, scientists and farm advisers. The model facilitated the analysis of various farming system issues.
One of the principal authors of MIDAS commented that for over two decades there was a reasonably sustained commitment to the revision, extension and application of the MIDAS-based farming system analysis. There were now many regional versions of the original MIDAS model and despite the vagaries of funding, staff turnover and change in computer technology, the suite of MIDAS models continued to be applied to topical and strategic research and policy issues facing dryland farming systems in many parts of southern Australia. Associated with the construction and application of a suite of MIDAS models there have been several other related models that complement MIDAS. One such model which considered season and price variability and the farmer’s risk attitudes was called Mudas.

In the late 1990s a group of researchers collaborated in developing a workshop-based farming system management game called Risky Business. This provided an experimental learning game which could be used in a workshop situation to allow the players to experience the annual real life environment of risk and financial exposure faced by most farmers.

A diverse and large set of research outputs was generated by the many participants in the use of the MIDAS models over the 1980s and 1990s. The extent of this work was reflected in a publication list of more than 120 papers in journals or delivered at conferences. In particular the Western Australian group developed a national and international reputation for its modelling skills.

Publications and media services

The Journal of Agriculture

For many years the Journal of Agriculture was the flagship for communication with the farming community and the outside world, providing advice to farmers on one hand and a vehicle for publication of the results of research, surveys or observations to other readers. The articles were reprinted in a Bulletin series and were available singly and mostly free on request.

In the first six months of the Bureau of Agriculture’s existence over 16 000 copies of the Journal of Agriculture were distributed. The initial publication was fortnightly and four pages, increased to eight pages later. It was available free to members of agriculturally-related associations. The Journal continued to be an important source of information for farmers and in 1896, 51 450 copies were distributed.

Much later the Under Secretary reported that there continued to be a big demand for the Journal. It was surprising therefore that the new Under Secretary decided in 1909 to terminate its publication, presumably for economic reasons. It was not published again until the first edition of the new series in 1924. It continued to be published in monthly or quarterly issues until it was finally terminated in 2001.

Over the years the department published many classical articles recording research, advice and other information, and the issues from 1896 onwards remain an invaluable chronicle of the progress of agriculture in Western Australia.

Farmnotes

Farmnotes are brief factsheets on specific issues, usually on a single A4 sheet, which provide up-to-date information in a readable format. Farmnotes were colour-coded and numbered for easy filing and retrieval and were updated as necessary. Most were printed in-house so that new material could reach subscribers within a few days. Farmnotes were introduced in 1974 and were immediately popular. Issues on garden management and other urban matters are also available. They continue to be a popular form of publication with both the farm and urban community although the internet has to some extent taken over their role.
Chapter 8 – Extension, education and other services

Agricultural Memo
The publication of the district office newsletter Agricultural Memo was the brainchild of Jim Doyle, a young adviser faced with the problem of contacting many new land farmers, absentee landowners and resident managers in the Esperance area. At the time there was no radio station and telephones were either not available or unreliable, leaving mail the only reliable contact. Initially the memo was published as a folded foolscap sheet printed on both sides and produced monthly at the district office. It dealt with issues of immediate importance of which farmers needed to be aware. It required few resources and improved communication with all farmers in the region. Its enthusiastic acceptance confirmed Jim Doyle’s belief that regular contact via the newsletter would help reduce the feeling of isolation in pioneering farm families and would foster favourable attitudes towards the Department of Agriculture, with positive flow-on benefits for extension and research.

The concept of the AgMemo was quickly adopted by other district offices and when Jim Doyle retired from the Department of Agriculture in late 1987 most agricultural districts were producing their own versions. That still held in 2008, 45 years after the first edition, and is testimony to its value and acceptance by farmers and to the commitment of district staff.

Industry and regional newsletters
In all industries the department provided extensive information services, usually organised on a regional basis. Issues being promoted in regional groups in cropping areas were sustainable farming, farming for soil types and the need to adjust the farm enterprise mix in relation to prices. Numerous newsletters targeted at specific regions or industries have been issued by branches and district offices over the years.
Probably the most notable was *Dairy Notes*, posted regularly to all dairy farmers and containing specific technical information.

**The Direct Mail Service**

Until 1979 the *Journal* was free to farmers and posted to them automatically. It had been published from 1894 to 1909 and from 1924 to 1991, when electronic media began to take over. In 1960/61 the *Journal* was published monthly and the circulation reached 17,600, of which 16,000 were sent free to farmers. There was always some doubt about whether it was well enough read by farmers as some articles were clearly too technical for the publication’s intended audience and in 1979 a decision was taken to charge for publications forwarded to farmers. For a fee of $5 per year farmers could receive all *Farmnotes* in categories of their choice. In 1981 the costs were modified, with the *Journal* costing $10 per year and *Farmnotes* $10 per year. The cost of the package was $15 per year.

At 30 June 1981, 540 farmers were receiving the *Journal*, 322 the *Farmnotes* only and 3548 were taking both, making a total of 4410. The number had dropped and probably represented around 30 per cent of commercial farmers.

**Specific books**

Starting with the book written by Andrew Despeissis on horticultural and viticultural management in the early days, the department published a wide range of books and comprehensive bulletins on specific topics. Early examples were *Eucalypts of Western Australia* by CA Gardner and *Weeds of Western Australia* by GRW Meadly, both updated and regularly reprinted.

More widely distributed was *Vegetable Growing, a guide for home gardeners*. It was first published during World War II to encourage householders to grow their own vegetables in times of shortage. It became the basic text for vegetable growing and was updated and reprinted many times; it is still available from the department. Poison plants, lupins and insect pests were among other subjects covered in detail.

Some recent books are listed below:

- *Integrated Weed Management in Australian Cropping Systems: a training resource for farm advisers*, was published in February 2007. While initially aimed at the Western Australian situation it has been developed as a national tool.

- A book on perennial pastures for Western Australia was released in June 2007, detailing the current state of knowledge and prospects.

- *The Wheat Book* was produced and sent to growers during 1990/91. This was a crop variety sowing guide and technical manual for wheat producers.

- *Weeds Resistant to Herbicides*. Although research staff were encouraged to publish their work in national refereed scientific journals there remained some lengthy material and reports of detailed surveys not suitable for this outlet and a *Technical Bulletin* series was established in 1969 for these.

**Rural press and radio**

Almost from its establishment the Department of Agriculture maintained a productive relationship with the farming press and country newspapers, and especially the ABC Country Hour. The Information Branch issued a weekly package of press releases to the media and ensured that rural reporters had ready access to departmental information and staff. For several decades the ABC Rural Department broadcast a number of radio talks each week by departmental specialists and for a time the department recorded talks and interviews for issue to rural radio stations.

**Film and television**

Early in the 1950s the Dairy Division established a mobile film unit which toured farming districts of the South West to show
films relevant to dairy farmers. The film nights were hosted by district dairy advisers, which gave them added contact with farmers. The film shows also became social occasions for the isolated farmers of developing districts; cartoons and general interest material were included to encourage families to attend. Reacting to a shortage of technical farming material the film unit took the initiative of making their own short extension films on dairying subjects. This led to the production of longer films produced at the request of other branches of the department. The most ambitious was a record of the Ord River catchment regeneration project.

When the first rural television station opened at Bunbury in 1968 its management invited the Department of Agriculture to produce a television program which it titled *Farming Today*, broadcast weekly in two series a year. It was relayed to the Albany and Geraldton channels. While the department's administration supported the concept it proved difficult for the small film unit to maintain an adequate supply of acceptable material with limited resources. Nevertheless it was well received by the farming community and continued for nearly 20 years, after which the increasing sophistication of television production and changing audience interests brought it to an end.

**Some educational initiatives**

**Narrogin School of Agriculture**

The Narrogin Experiment Farm was established in 1903. In its early years, along with Chapman State Farm, some experimental/demonstration work was carried out and it was used for young men coming to Western Australia seeking farming experience. They were charged a fee for their training, accommodation was provided and they worked on the farm. The students provided much of the farm labour. There were six students at the beginning of 1905/06 and 14 by June, with more on their way from England. The students paid little more than £2 ($4) a year for the privilege of working on the farm!

At this time 474 acres (190 ha) were under cultivation. By 1907 there were 40 students and the charge for their tuition had increased to £10 a year. At this time new quarters were being built and the Minister decided it should concentrate on farmer training. In his report in 1909 Professor Lowrie criticised this practice, recommending that such training be obtained on a commercial farm. Since experimental work was limited by the variable soil types he recommended that Narrogin be sold. This was not accepted.

In 1913/14 it was changed to an educational facility, named the Narrogin School of Agriculture and became a formal training school for young farmers. New courses were developed under direction of a board consisting of the Director of Education, the Professor of Agriculture and GL Sutton (then Commissioner for the Wheatbelt). The courses provided for a Junior Certificate of Agriculture, a Senior Certificate of Practical Agriculture and a Senior Certificate of Agriculture which could lead to a diploma at the university.

By 1916 the Narrogin School was regarded as being a sound educational establishment. However, by June 1921 the Narrogin School of Agriculture had been transferred to the Department of Education in accordance with government policy that all educational activities should be with that department. It continued to be a valuable facility under the Education Department for the remainder of the century.

**Muresk Agricultural College**

The formal consideration of the establishment of an agricultural college goes back to March 1919 when State Cabinet approved the appointment of a committee to advise on the most appropriate approach to establishing such a college. It appeared the government wanted a college similar to Hawkesbury in NSW or Dookie in Victoria. The committee consisted of the Director of
Education, the Professor of Agriculture from the University of WA, the Commissioner for the Wheatbelt, the Government Analyst and Agricultural Chemist and a farmer, AJ Monger. They were to advise on the location, acquisition of a site, the host department, the scope and operation of the college, relationship with the Narrogin School of Agriculture, and appointment of teaching staff. They were asked to estimate of total cost of establishment and the annual cost of operation.

The Commissioner for the Wheatbelt, GL Sutton, who would later be Under Secretary for Agriculture, pressed for the college to be managed by a Board of Governors and closely allied with the University Faculty of Agriculture. The Premier preferred greater use being made of existing facilities in the high schools and the university. A decision was finally taken to establish the college at Spencer’s Brook and the Muresk property of 2220 acres was purchased in 1924. The development of Muresk began as part of the Department of Agriculture. This was a strange decision, presumably based on the fact that similar colleges in other states were part of the departments of agriculture.

Although the department wanted the college to have a close relationship with the university this never happened, possibly because of the distance from Perth. Muresk remained in the department until it became part of the WA Institute of Technology (WAIT), now Curtin University, in 1969.

The original cost of establishing the college was £61 000 ($122 000), of which £14 000 was paid for the property. Muresk’s Diploma of Agriculture was initially based on a three-year course in which the time was spent evenly between practical work, hands-on experience and training and study of the underlying theory of farming. The focus was to train future farmers. Unlike similar colleges in Australia about 55 per cent of its graduates returned to farming. The remainder went to agribusiness and the Department of Agriculture.

In 1967 the department decided to reorganise the course to provide the students with additional scientific and business management training and less practical training. The focus remained on training future farmers but the modification was a response to changing needs. It was intended to remain a two-year course. The proposal included raising the educational entry level from year 11 to completion of secondary education. This changed course, which would have required additional expenditure on facilities and staff, was planned to start in 1969.

The first principal was Mr HJ Hughes, who took up his position in November 1925 before the plans for the building were finalised. He was able to focus attention on getting the college to a functional stage. It was opened on 30 October 1926.

In an early statement Hughes outlined his vision for the functions of the college as:

- To train students in the science and practices of farming, in business principles, and in the rural economy.
- To carry out research.
- To raise the standard of agricultural practice by holding short courses for farmers.
- To raise the general standard of stock in the farming districts by breeding and distributing pure bred cattle, sheep, pigs and poultry.

His overall strategy was to give the science courses early and then focus on application of the science to agricultural practice and the business principles of farm management. As part of farm practice he saw a need for the students to be instructed in blacksmithing, engineering and construction.

In June 1927 there were 45 students in residence—26 in first year and 19 in second year. As there was no entry exam the educational standard varied considerably. There were three classes of students:

- 16-year-olds who were to complete the three-year course to achieve a practical
training in farming and an understanding of the underlying science.

- A second group were interested more in the underlying science as a background for employment in business or government in agriculturally-oriented occupations.
- A third group were agricultural science students from UWA undertaking practical work at the college.

Hughes recognised the varied age and qualifications as a problem but chose to deal with it internally rather than limit access for potentially good students.

By 1928 the educational level of students entering the college had risen to a level which would allow them to manage the course. Subsequently, entry to the full-time course required completion of year 10 of secondary education. By 1929 there were 64 students—27 in first year, 21 in second year and 16 in third year. The academic courses were determined by an advisory committee of the principal, two university professors, two prominent farmers and the Under Secretary of Agriculture.

Early in the college’s life a group of merchants from the city decided to set up a fund to help Muresk undertake research. This was known as the Merchant’s Research Fund and was important in adding a research component to the college activities. Initially this was focused on pasture species. Dr TC Dunne was an early Merchants Fund Scholar after he returned from PhD studies in California. His work on subterranean clovers made an important contribution to the use of pastures in WA. In the early 1940s some experimental work was also being carried out in conjunction with the University Institute of Agriculture on the influence of seasonal conditions on wool production.

Muresk continued to develop through the 1930s but student numbers were affected by the onset of the Depression in late 1929. The number stabilised at about 40 students as the financial situation made it difficult for farmers to have their sons at college. There were 41 students enrolled in 1935. The significance of the dairy industry at that time is reflected in the decision in 1938 to establish a course in butter and cheese manufacture and factory operations. Muresk saw the decade out with 36 students.

In September 1938 the original principal, Mr Hughes, retired and was replaced by Mr W Southern.

From a farming point of view there were some difficulties. Initially there were poor yields on much of the area due to the relatively low natural fertility of the soils. There were strips of better soils developed over diorite intrusions which could be seen crossing the paddocks. Early in the life of the college subterranean clover was spread over various fields ‘in the hope of establishing this valuable fodder’. The full range of industries was represented. There was a stud Guernsey dairy herd which performed well at the Royal Show. There were two stud pig herds, Tamworth and Berkshire. There was a small orchard and vineyard. The stud animals were additional to the normal mixed farming activities with grain and sheep.

When World War II began in 1939 enlistments caused a shortage of labour on farms, which affected student numbers as potential students were required on their parents’ farms. Most of the young men finishing the course went straight into the army. In March 1942 the Military required the buildings for defence purposes which effectively closed the college.

The farm operations were continued under the supervision of the Superintendent of Wheat Farming until the college reopened and the staff were absorbed in other occupations or at other locations. In the event, the Military never used the college and at the end of 1944 permission was given for it to reopen. A positive outcome from the army ‘occupation’ of the college was the building of cool rooms, a butcher’s shop, and staff quarters.

When Muresk reopened in 1945, 54 students took up residence. In 1947 Muresk became involved in the Rural Training Scheme and
took in ex-servicemen for training. There were 64 students in 1948. The numbers rose slowly with a mixture of the normal student body with some ex-servicemen. They did well and were regarded as a benefit to the college. Later, most ex-servicemen trained through a short course at Harvey.

In 1954 the entrance level was changed to require completion of year 11 and the course was reduced to two years. These changes together with increased accommodation increased the potential graduates from the mid-20s to 60. The change was achieved by eliminating the first year of the old course, which was largely covered in the high schools.

There were some major improvements and changes during the 1950s and 1960s. These included a new hall, dormitory, sick bay, library, biological sciences laboratory, lecture room, 10 houses, shearing shed, modern dairy, machinery sheds, engineering workshop, grassed oval, improved water supply, SEC electricity, modern kitchens, change to the Large White breed of pig, and inclusion of a polled Shorthorn cattle herd.

Following this change the numbers attending grew slowly and in 1962 filled the available accommodation of 74. However, the increased accommodation of 102 held only 89 students in 1964. In 1967 there was accommodation for 122 but only 78 students were in residence.

This reflected an uncertainty about the future role of the college. The question revolved partly around what training was needed for future farmers. Mixed into this debate was an argument for retaining it as a training institution for the technical officers needed in government, commerce and Industry agencies and companies.

There was eventually a consensus that Muresk should be retained for farmer training but with a changed course which catered for the greater complexity and technology input in post-war farming. Much of this came from the changes in available equipment, fertilisers, modern pesticides, improved knowledge of animal husbandry, breeding and disease and greater awareness of the need to treat farming as a business.

With the retirement of the long-term principal, Mr Southern in 1967, a new principal was appointed and the course was rewritten. The academic subjects were upgraded, there was a large component of farm business management and the time spent on practical farm activities was greatly reduced. The farm was now designed to operate without student labour.

This course was planned to be introduced in 1969, when entrance would require completion of secondary education. However, the Commonwealth Government of the day decided to change agricultural colleges to Colleges of Advanced Education (CAEs). In 1968 the department made a submission to the Commonwealth to have Muresk and its new course accepted as a CAE.

Subsequently the WA Government decided to make Muresk part of the new Western Australian Institute of Technology and this transfer occurred in 1969.

The college then required the upgrading listed above but was broadly equipped to carry out the training proposed by the department. It had accommodation facilities and developed lecturing and science facilities. It retained its coverage of the dairy, pig, and poultry industries. It also had a sheep flock of 5000 sheep, a large beef herd on a well-watered and developed property of a little more than 4000 acres.

When the government decided to transfer Muresk to the WA Institute of Technology, a new course was established. The entry level required was completion of secondary education, the course was of three years' duration and degrees were awarded to graduates. It moved from being primarily involved in farmer training to training professionals who would work in agriculturally-related enterprises or government departments. Some farmers' sons also attended.
The new Muresk has produced young professionals trained to work in agribusiness. While some have returned to the farm the focus has shifted and today there is no educational facility focused specifically on farmer education. It can be argued that an opportunity was lost to produce a college uniquely focused on farmer needs, closely tied to an organisation with the same overall focus at the cutting edge of scientific advances in agriculture.

At the time of writing (2010) it is understood that Curtin University of Technology proposed to close Muresk.

**The State Herbarium**

The first recorded collection of WA plants was made by the Western Australian Museum, which was established before the Bureau of Agriculture. The focus meant that while the collection was properly archived, it was not worked on in any way. As soon as the bureau was established it began a new plant collection. This was driven partly by the need to identify the poison plants of the *Gastrolobium* and *Oxylobium* families and the need to identify plants which might be useful for grazing or would indicate particular soil types but also by scientific curiosity. The Forests Department and the University of Western Australia Botany Department also established collections of flora at about this time.

One of the first professional appointments to the bureau was a botanist, Dr Alexander Morrison. He was a medico with a very strong interest in botany. Appointed in 1897 he made a major contribution to the herbarium collection and the study and identification of poison plants before his appointment was terminated in 1906. The position was not filled again until 1911.

Over the following decade and a half the three collections continued to grow but taxonomic research and a systematic documentation of the WA flora were lacking. Pressure mounted from concerned scientists to establish a State Herbarium.

One of the early stimulants for an amalgamated herbarium came from an unusual source. In 1923 the Seed Merchants Association of Western Australia requested the Department of Agriculture to make routine purity and germination tests on samples of seeds on behalf of members of the association. The Director, George Sutton, advised that he could not agree to this request due to a lack of staff. He proposed an innovative solution. This was to combine the three existing herbaria (Department of Agriculture, Museum and Forests Department) and their staff into one institution. According to Sutton, this would greatly increase efficiency and enable the development of a seed testing facility at no extra cost to the government.

Sutton put his proposal to Conservator of Forests, Stephen Kessell, who agreed, and to the Western Australian Museum, which did not. Sutton and Kessell then put a joint submission to their ministers, who supported it and approached the Public Service Commissioner requesting the amalgamation. However, the museum stood firm and nothing happened.

Around 1920 the Conservator of Forests appointed a young and enthusiastic amateur botanist, with no formal qualifications, Charles Gardner, as a plant collector. Gardner made the first extensive collection in the Kimberley and other collections in the South West. He would become a legend for his contribution to the collection and identification of the State’s flora over succeeding decades. In 1924 he transferred to the Department of Agriculture as Assistant Botanist.

Around 1928 further pressure developed for the establishment of a State Herbarium including the available collections. In 1928 a further joint submission by Sutton and the Conservator of Forests, Stephen Kessell, was agreed by their Ministers and approved by the Premier. The decision was taken to establish the State Herbarium in the Department of Agriculture. This was formally gazetted in January 1929.
The Museum chose to maintain its own collection and it was 1957 before a new Curator obtained approval from the Board of Trustees to transfer the Museum collection to the Western Australian Herbarium. Gardner was appointed as the State’s first Government Botanist in 1929. He held this position until his retirement in 1960.

The herbarium has had a number of ‘homes’. The original collection was housed within the department’s first offices in various locations in St Georges Terrace. These were seldom ideal and in 1901 Morrison complained about the conditions. When the State Herbarium was created in 1929, it took up premises in the Observatory building opposite the main gate to King’s Park, sharing accommodation with the State Astronomer. In 1958 it moved to South Perth when the department occupied its new headquarters. The herbarium now had air conditioned space and protection from fire for the first time, but was still far from ideal. In 1970 a completely new, purpose-built building was opened on the site. It was built among a stand of pines. In 1971 the department had the pines cleared and the area planted with a range of native species as a more appropriate surround. The area was planned and planted by the staff and for almost three decades was totally surrounded by native vegetation.

In the mid-1980s, in a submission to a Parliamentary Committee looking at the organisation of a range of agencies in the State, the Director of the Department of Agriculture recommended that these agencies be combined into a single unit and that the herbarium be part of that new organisation. This recommendation was based on the status of the herbarium and the growth and diversity of its collection. Its main function was no longer economic botany, much of which was dealt with in other parts of the department. It had become a high class taxonomic and research facility and a genuine State Herbarium. Subsequently the Department of Conservation and Land Management (CALM) was formed, incorporating the Forests Department, the National Parks Authority and the Wildlife section of the Department of Fisheries. The herbarium was transferred into CALM, thus ending an association of 60 years.

**Author’s note**


**The research stations**

Hamel Field Station, established in 1898, was Western Australia’s first research station. It was a small area of 114 acres on the Drakes Brook near Waroona and was used for growing wheat varieties and crossbreds and testing fodder plants. There were 50 varieties and crossbreds of wheat at Hamel in 1898. As the Chapman and Merredin farms developed after 1903 and 1907 the wheat variety trials were transferred to those stations.

One of the ‘fodder plants’ to do well at Hamel was subterranean clover, which was virtually unknown in WA at the time. Most of the grasses tried did not do well. *Paspalum dilatatum* was an exception. Some of the
wheat varieties and crossbreds did well. The manager recommended that the farm produce seed potatoes of a number of varieties for distribution to farmers. This was seen to be important to reduce disease and improve the quality and yield of the crop. This program was undertaken and lasted for many years.

In his 1900 report Lindley-Cowen pressed for a farm to be provided which could be run on commercial lines and provide training for young settlers coming from Europe with no idea of the climate, soils, or farming methods of Western Australia. He believed that WA was the only State which did not have such a facility. He felt there was also an opportunity to use such a station for breeding stud bulls or stallions or even horses or mules for use in the Colony. He stated that there would also be an opportunity for experimental work to be done on such a property.

Over the next 70 years a number of such farms were established. Some were closed after they had achieved their objectives, were replaced by alternative facilities or required for other purposes. They were originally called ‘State Farms’ when their role was largely demonstration of recommended farming methods. As the role changed to a greater focus on experimental work the generic name of ‘Experimental Farms’ was used with those having a special purpose called names such as ‘Stud Farm’ or ‘Light Land Farm’. Finally as the experimental and investigational role became completely dominant they were called ‘research stations’.

The 1982 review of research stations

Following an internal review in 1982 it was recognised that a reorganisation of the research stations was necessary. To do this, funding would be needed and this was marshalled by reaching an agreement with Treasury to dispose of some of the current stations and use the funds raised for acquisition or modification of existing resources. These changes were made progressively over the next two years. Some of the older research stations lacked the capacity to focus on current issues while still providing an administrative base for utilising new sites. An example was the absence from existing research stations of soil types of major significance in the eastern and northern wheatbelt. To address this issue the department established a number of research farm blocks. The new research blocks were situated on land leased from farmers or exchanged under lease arrangements. The new research blocks were at East Chapman, Mullewa, Salmon Gums, South Carrabin and North Badgingarra.

The department also purchased land south-east of Busselton to establish a new research centre, particularly into nutrition of livestock. To finance these changes the department entered into an agreement with Treasury to relinquish control of the Woodlands, Bramley, Northam and Denmark Research Stations. Beef and dairy research became concentrated at the new Vasse Research Station following the transfer of the Northam Research Station to the WA Institute of Technology. The Avondale Research Station at Beverley was upgraded to carry out sheep production research. The work at Woodlands was transferred to the Medina Research Centre. Vegetable research had previously moved there and was integrated with floricultural research.

To provide for increasing agronomic work on crops and pastures in the higher rainfall areas the department expanded the Mt Barker Research Station by acquiring an additional block at Manurup. This was partly equipped by transfer of resources from the Denmark Research Station.

The early state and experiment farms

The Chapman State Farm and Narrogin Experiment Farm had been established in 1903. Chapman had a special origin. In 1902 when agriculture was part of the Lands Department, the Dairy Consultant, AF Crawford, was promoted to the position of Land Officer for the Victoria District in the
Lands Department. Shortly after his appointment he conducted members of the Agricultural Advisory Board on a tour through the land districts adjacent to Geraldton. Their task was to report on the agricultural possibilities and to advise the Agricultural Bank whether it would be justified in advancing money on properties in the district. Their report was decidedly condemnatory, one member going so far as to say that “not one bag of wheat would ever be exported from the Geraldton districts”.

Crawford was convinced that this was wrong. In his opinion profitable crops could be grown even on some of the ‘third class’ land. He approached the Minister for Lands and asked that he be allowed 300-400 acres of land and £1000 ($2000) to demonstrate the possibilities of the district. The Minister was sympathetic and the land was allocated “in the Chapman Valley at Nabawa, nine miles from Bowes siding”. Crawford was placed in charge.

At the time the grant was made the sale of land in the area was at a standstill. When it became known that, in the first experiments on the property, the third class land had yielded 9 bushels per acre, there was a rush of applicants for land. The government was soon buying up private estates to provide additional land. As a result, the area was largely settled before the station began to operate. This became Chapman State Farm. In 1905/06 the department identified three state farms – Chapman, Narrogin and Hamel.

The Narrogin farm was established to demonstrate the advantages of improved cultivation, to raise stud stock for the benefit of farmers and to provide training for farmers’ sons and others wishing to settle on the land.

In 1904/05 the Under Secretary asked for land and funds to be made available to establish a Dairy Industry Experiment Farm. He pointed out that horse breeding was a potential source of income for the State, with the Indian army needing 3000 to 4000 horses annually. Early in the 1906/07 financial year a portion of land in the Brunswick area was vested in the Department of Agriculture “for the purpose of creating a Dairy Farm”. The farm was to have primarily a demonstration role with limited experimentation. The area, which included some deep alluvial soils associated with the Brunswick River, was considered very suitable for dairying. It was intended that the farm be stocked with pure-bred dairy cows and pigs.

Merredin Research Station was established by the Lands Department in 1904 as part of the Nangeenan Land Settlement Scheme to demonstrate farming in an area considered marginal. In 1907 it was transferred from the Lands Department to the Department of Agriculture. It was decided to concentrate farmer training at Narrogin. Progressively the mixed stock at the farm and the older horses were sold and replaced with stud stock. A successful trial of topdressing pasture with artificial fertiliser was reported in 1906/07.

An interesting side issue at this time was concern at the increase in the cost of hessian bags from 6 shillings (60c) to 8 shillings (80c) each. The 4 bushel bags would have weighed 240 pounds (109 kg) if full of wheat. Clearly, men were men in those days, although there had been a suggestion earlier that 2 bushel bags be introduced. By the 1930s, 3 bushel bags were standard. These weighed 186 pounds (84.5 kg) full of wheat and were heavy enough.

A demonstration mentioned in the 1906/07 report was that at the Chapman, Narrogin and Nangeenan farms, practical examples of wheat growing on fallowed land were being provided. For the purpose, one ploughman equipped with a good team of four horses, a three-furrow stump-jump plough, cultivator, set of harrows, drill, and harvester was given the task to sow the seed, plough and cultivate the fallow land for the next season and harvest the crop from a 640 acre (256 ha) area. The only assistance given was in carting the crop off the land.

The trial proved that one man could “with good application and keeping abreast of the
seasons”, in 12 months, farm 1 square mile (640 acres), half of which was seeded and harvested in every alternate year while the other half was fallowed for the following year. This demonstration may have been the origin of farms which were between 700 and 1000 acres in the eastern wheatbelt. Alternatively, it may have only been meant to show that the size which had been decided on was the correct one.

In 1909 the Acting Director of Agriculture, Professor Lowrie, an eminent agriculturalist, reported on the value of the state farms. He had undertaken an extensive tour of the agricultural areas and concluded that the state of WA farming was such that the need was for advice on practical farming more than experimental and trial work. He had hoped to recommend additional experimental farms and an experimental program but the state of the industry did not make this appropriate. He also concluded that the three wheatbelt farms had been established to show that farming was possible in these areas and since this need had passed, they should now be sold. He considered that Chapman was too isolated and Merredin was outside the wheat growing areas. He saw Narrogin as unsuitable for experimental work because of its variable soils and drainage problems. He did not agree that it could provide practical training for young farmers. In his view, training of potential farmers should be carried out on commercial farms. Fortunately his advice was not taken.

Following the 1911 drought, when many new farmers lost their seed wheat as well as having no crop, legislation was passed to allow farmers to purchase seed wheat from the government. A board, consisting of the Under Secretary for Agriculture, AJ Monger and A Gorrie, authorised the distribution. The grain was produced on the Merredin and Chapman State Farms or bought in. This board apparently absorbed a considerable part the Under Secretary’s time. The same provision was needed after the 1914 drought.

In his report in 1913 the recently appointed Commissioner for the Wheatbelt (GL Sutton) rejected Professor Lowrie’s recommendation to dispose of the wheatbelt stations. He decided that the Merredin and Chapman State Farms should both carry out trials, cereal breeding and demonstration work and should grow considerable quantities of clean seed wheat of certified varieties so that farmers could renew their seed with a variety of their choice. Much of the seed used on farms at this time was mixed and not necessarily of the variety the farmer believed it was. The purchases were authorised by the Grain and Foodstuff Act. As an additional service to farmers dairy bulls were introduced onto wheatbelt state farms for mating cows for farmers who had one or two cows as milk animals. It was also proposed that flocks of pure British breed rams be established to provide farmers with sires to produce crossbred lambs from Merino ewes as an added source of income. It is not clear that this was ever done.

By 1915 the varying roles of the wheatbelt state farms were largely established. Narrogin had a developing educational role. Merredin and Chapman together had assumed the experimental role and wheat breeding work and the development and release of new varieties were their dominant tasks. The 1918/19 report recorded the release of eight wheat varieties including Nabawa, with two earlier oat varieties, Burt’s Early and Lachlan.

In 1918/19 Sutton advocated courses of training for returned servicemen of no previous experience who were taking up farming. While this could have been relevant to Narrogin, the Brunswick State Farm, which was the first state dairy farm, was handed over for the training of repatriated or returned soldiers in 1919/20. Possibly the Group Settlement Scheme was in the politicians’ minds at the time. Brunswick was never returned to the department.

After Sutton’s promotion to Director of Agriculture in mid-1921, the experimental and plant breeding programs were continued.
under the direction of the experimentalist. Sutton outlined the main functions of the wheatbelt experiment farms as:

- growing of pure pedigree seed of the main varieties of wheat for sale to farmers, to ensure farmers had a supply of seed which was true to name and free of impurities
- production by selection and crossbreeding of new varieties of cereals and fodder crops suitable for the wheatbelt
- experimentation aimed at improving the yield of wheat and/or reducing the cost of production. Such experiments would deal with cultivation methods, fertiliser rates, seeding rates, and comparison of varieties.

The farms were to be conducted solely for educational and experimental and not for commercial purposes.

This reflected the progressive move after 1910 away from the original purpose of these farms of demonstrating that wheat growing was possible in the districts where they were established.

In his 1922 report the wheat experimentalist confirmed that the work at Chapman and Merredin followed this direction. The field work consisted of depth of sowing trials, soil mulching experiments, seeding rate research, variety trials for both wheat and oats, fertiliser trials and rotation experiments.

The test rows included pure line breeding for the production of pedigree seed, variety test rows for wheat, oats and barley, identification rows for wheat, oats and barley, smut resistance tests, fungicide experiments, seasonal planting experiments and milling tests.

Seed supplied by a Commonwealth Seed Improvement Committee was also planted in that year. The purpose of these trials was to determine the true type of most of the well known varieties of wheat in Australia. Sample plants of each variety were returned to the committee. The work in the identification rows was successful in exposing varieties masquerading under false names.

The distribution of pedigreed seed continued as a very valuable activity of the department. It not only ensured farmers had access to seed of the variety they wanted to use, but it focused attention on the recommended varieties and away from those which had little merit. It was also a method of promoting new varieties which had shown promise in tests on the experiment farms and farmers' properties. This activity continued until the 1980s when the role was transferred to private seed producers.

By the mid-1950s research stations in the medium rainfall zones were operating totally on the clover ley farming system. This change reflected the impact of the clover-based pastures, tractors, higher prices and improved knowledge. It was a huge change when compared to pre-war cropping, when crop/fallow or crop/stubble/fallow were the standard rotations.

The wheatbelt stations

The 1960s

During the 1960s the wheatbelt stations followed a broad experimental program covering:

- Cropping systems: It was found that thorough land preparation for weed control was vital. Ploughing proved superior to scarifying because of its superior weed control. Ploughing as soon as possible after the opening rains was superior to other systems, again probably due to better weed control. Oats was useful as a cleaning crop. Superphosphate levels could be reduced where super had been applied for a number of years before cropping. In 1961/62 further experiments compared various methods of cultivation, trash removal and seeding techniques. Trash removal and disc ploughing gave the best results under the conditions of the experiments.
• Fertilisers: It was shown that there was scope to use nitrogen in later crops in a multi-crop system but use on new land was the most profitable.

• Cereal variety trials were carried out annually.

• Pasture experiments including fertiliser needs, were carried out on different clover species and cultivars across a range of soil types.

• Animal studies: Time of lambing, feeding of weaners, rate of stocking and ‘flushing’ trials were conducted. Management of sheep had become an issue with set stocking favoured from 1961/62. By 1970 it was estimated that half of the stock on the stations was being used for experimental purposes. The 1969 drought provided an opportunity for studies of management of livestock in drought conditions.

• Plant breeding and introduction occurred on a large area of the research stations.

Chapman Research Station
Chapman was initially used to demonstrate farming techniques, varieties, different fertiliser rates and to provide seed wheat. At a field day in 1913 it was recorded that 200 people attended. These numbers need to be considered against the difficulty and distance of transport and the population. In 1925 the range of experiments carried out at Merredin and Chapman was expanded to look at fungicides for the control of smut. At the same time the collection of varieties was tested for resistance to the three types of smut (ball, loose and flag), ear cockle and take-all. While established varieties were resistant to flag smut there was no varietal resistance to loose or ball smut.

The 1927 report on the time of sowing experiments concluded that the most satisfactory yields were obtained from late varieties sown early. The experiments were planted on fallow. The result was relevant to the new cropping system developed later in the century.

A collection of saltbushes and bluebushes was held at Merredin in the late 1930s. Material from the Murchison and Hines Hill had been collected. This was the beginning of work on identifying plants which could be productive on areas which had become saline following clearing of surrounding timbered areas.

By 1957/58 the breeding program at Merredin focused on wheat and six-row barley. The program at Wongan Hills focused on oats and two-row barley and at Avondale on linseed, in a hope of reviving that industry. Merredin was also working on barrel medic, selecting the most promising types and bulking them up.

Merredin Research Station
A field day was held at Merredin for the first time in 1913 when some 400 farmers attended. Cereal breeding, particularly wheat breeding, became a major activity of the station. In 1922 the report states that two varieties Nabawa and Merredin, were proving successful and another two Dindiloa and Carrabin were being tested by farmers. In the 1921/22 summer 500 farmers were each supplied with up to five bags of pedigreed seed. In 1925 the range of experiments at Merredin was expanded to investigate fungicides for the control of smut. At the same time the collection of varieties was tested for resistance to the three types of smut (ball, loose and flag), ear cockle and take-all. While established varieties were resistant to flag smut there was no varietal resistance to loose or ball smut.

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The Dryland Research Institute was established on the property in 1983. Since that time the organisations have performed as a unit.

The name of the stations across the department was changed to Research Support Units during the 1990s.

The Merredin Dryland Research Institute. An aerial photo of the Institute established in 1987 to focus on issues in the eastern wheatbelt.

**Newdegate Research Station**

Like the other stations Newdegate was used as a testing station for varieties, rotations and cultivation techniques. Some work on copper residual values was also carried out. During the early 2000s it was downgraded and most of the land leased. A small area was retained for experimental work.

**Dampawah, Ghooli and Salmon Gums**

In 1925/26 the government decided to establish three new experiment farms in the eastern wheatbelt. The sites selected were at Ghooli, near Southern Cross, Salmon Gums, and Dampawah Springs (East of Perenjori). Dampawah and Ghooli were established to test the eastern boundaries of wheat production. There had been some settlement in Salmon Gums from around 1910. The poor performance of the area was the subject of a Royal Commission in 1917 and of a major soil survey in the early 1930s. The station was established to obtain information on how to manage the soils of the area. This was substantially identified but some experimental work continued there until it was closed in the early 1990s.

Dampawah was established at the centre of a subdivision for farming which had been surveyed by the Lands Department. Development of these stations was slow, with little record of experimental work at Ghooli and Dampawah. The general performance of wheat at Dampawah was such that the Superintendent of Wheat Farms stated in a memo that “yields in the area may be equal to or even a little better than established areas if sound practices were used”. The proposed settlement around Dampawah never proceeded and settlement never proceeded east of Southern Cross, although successful wheat farming was established west of the town. The poor prices following the Depression, poor seasons through much of the 1930s and the outbreak of war in 1939 led to Dampawah and Ghooli both being closed in 1940/41.

**Wongan Hills Research Station**

In 1923, after examining a number of possible sites, it was decided to establish an experiment farm at Wongan Hills. This was an area of light land and the farm was to be used to determine the best methods of using that land. It was planned to carry out trials with a range of potential fodder crops, tillage experiments, and wheat and oats. While this was clearly an experiment farm its role was initially different from Merredin and Chapman and it was titled Wongan Hills Light Land Farm.

Wongan Hills Research Station – the beginning of development. From humble beginnings it became the department’s premier wheatbelt research station.
Opening of the Wongan Hills office.

It was officially opened in 1925. Very little experimental work was done at that stage with most of the cleared area planted to wheat and oats to determine how the crops grew. This was an experiment in itself. The seed produced was sold as part of the pedigreed seed to farmers.

Early results from Wongan Hills were disappointing but the fertiliser level used on virgin country was relatively low. In 1928 the results were of the same order even though the area had been previously cropped in 1925/26. However, in the dry year the sandy-surfaced areas performed better than the gravelly country. The average yield was about 10.5 bushels per acre (710 kg/ha). Subclover sown under an oat crop did not perform well.

In the post-war period legumes were planted and were successful. Following improved performance Wongan Hills became the major research station for the wheatbelt. The station was used particularly for work on understanding the soil and fertility changes under ley farming. Wongan Hills also became the centre for plant breeding, with testing also done at Merredin, Esperance and Mt Barker. In 2006 a major seed storage and preparation facility for all cereal breeding was established there.

In 2008 a company was established with the Department of Agriculture and the Grains Research and Development Corporation as joint owners to undertake all the department’s barley and wheat breeding. While the company used the major processing and storage facility it did not use the farm areas, which were largely leased to private farmers.

Avondale Research Station

In 1924 Avondale State Farm was transferred from the Lands Department. The intended role was to produce seed of selected pedigree varieties of wheat and oats. It was to be known as the Avondale Seed Farm. However, virtually from the time of purchase it was used as a depot for assembling dairy cows, heifers and bulls for despatch to Group Settlement farms. This continued for the period of the Group Settlement Scheme.

From 1928 to 1930 Avondale was the headquarters for Bennetts’ study of the braxy-like disease. During this period a small laboratory was built and equipped on the station. It was also used in the 1930s for extensive studies related to the development of a fat lamb industry following the collapse of wheat and wool prices in 1929/30.
selection was also undertaken at Avondale with considerable success before that industry also failed. Avondale was also used to test peas, vetches, lupins and a range of pasture species.

In 1979 the collection of historically important machinery was housed at the station and is still maintained there. The display was prepared as part of Western Australia’s Sesqui-centenary celebrations.

In 2008 the station was transferred to the National Trust, due to the machinery collection and the historic buildings which dated back to the early settlement of the Avon Valley. The Avondale Project is covered earlier in this chapter.

Esperance Downs Research Station

Esperance Downs Research Station was established in 1949 to determine the best methods of developing almost a million hectares of sandplain soils within a good rainfall zone in the Esperance Shire. It was initially an outstation of Salmon Gums but quickly became a very important station. The station received an average rainfall of 450 mm, of which 300 mm fell from May to October. Experimental work revolved around the establishment and maintenance of legume-based pastures (usually subterranean clover). This development continued through the 1950s to 1960s. The experiments included cropping on virgin land and on land which had grown a number of years of clover, determination of fertiliser needs including trace elements, and comparison of subterranean clover cultivars and alternative legumes. Lucerne was successfully established and managed under grazing. Later experiments investigated stocking rates and the impact of a range of subclover cultivars on sheep fertility. Some work was also done with cattle following the introduction of 160 Aberdeen Angus to the property in 1965. The stocking rate in June 1965 was nearly nine dry sheep equivalents per hectare. The station was the focus for successful development of what has become a major agricultural area.

In later years, due to a salinity problem the station was partly restructured to demonstrate salinity control and management methods on part of the station and commercial livestock/cropping on the rest.

Badgingarra Research Station

Badgingarra was established west of Moora in 1959, to investigate methods of development of the area known as the West Midlands. Work involved studies of problems of initial development, pasture establishment, stocking rates, and monitoring breeding problems on subterranean clover pastures. Studies of lupinosis were also part of its role. It was located on an area with a higher percentage of better soils than the average farm in the district but there was enough poor deep sand for experimental purposes. Additional crown land was later acquired at north Badgingarra. The station was used extensively through almost 50 years of active use. It had a particular role in the use of lupins as part of the new farming system developed in the 1970s and 1980s.

It was decommissioned in 2008 in preparation for handing over to the local community.

The Animal Breeding and Research Institute

The Animal Breeding and Research Institute (ABRI) was established in 1980 as a result of a recommendation by the Rural and Allied Industries Council Conference in July 1977. It was developed using State funds and located in the Great Southern 6 km east of Katanning. A policy advisory committee was appointed to oversee the selection of the property. Staff were appointed in late 1980 and the committee had its first meeting in July 1980. This committee decided on programs relevant to the extension and training services, and the sheep breeding and research objectives to be implemented. A comparison of the major sheep breeds in the State was established, using sheep provided by the studs.
ABRI continues to run as a field station and has a full experimental program. Today part of this program involves cropping-related activities. Departmental activities at Katanning have been progressively centralised at a new office/laboratory facility in the town. The new office/laboratory complex was opened 1999/2000 when it became known as the Great Southern Agricultural Research Institute. The original Katanning District Office was sold in 2003/04.

The Metropolitan Area stations

**Medina Pig Research Station**

The Pig Research Station was opened in 1967. There was some initial criticism of the facilities but these were progressively improved. By 1970 the role of the station had been confirmed as a minimum disease facility and it was stocked accordingly. It was proposed that three separate herds be maintained—Berkshire, Large White and Landrace. Research has continued there to the end of this review. By 2008 it was the only such government-owned facility in Australia.

**Poultry Research Station**

Development of the Poultry Research Station began in 1952 but with delays due to shortage of funds it did not become operative until 1954/55. Initially it examined issues such as bird density, the impact of hatching dates of pullets on production, the effect of ‘step down’ lighting on egg size and different food sources. Interestingly in one instance, a higher death rate was experienced when a South African fish meal and Cheynes Beach whale meal were used in a ration. Research on feeds and feed mixtures for both layers and meat birds were important work of the station over a number of years.

The station was closed in the early 1980s as part of a rationalisation of the department’s research stations and the work was transferred to Medina, where the Intensive Industries Centre was established.

**The Vegetable Research Station at Herdsman Lake and Medina**

This station was in the development stage in 1955/56. Initially no work was done by the Vegetable Branch and the vegetable plantings were used by other branches. The 1958/59 report states that “the property is now reaching a stage where it will prove its value to the industry”. By 1960/61 the station was already under threat of being moved to allow for the area of the adjoining Churchlands High School to be expanded. In 1962/63 five acres were released to the Education Department for use by the new high school, and a site was selected north of Medina for the Intensive Industries Research Centre. By 1963/64 the Medina site was being prepared for planting and in 1964/65 the station had moved to Medina and the Herdsman land was transferred to the Education Department.

The high rainfall stations

**Brunswick State Farm**

In his 1904/05 report the Under Secretary asked for land and funds to establish a Dairy Industry Experiment Farm. He pointed out that horse breeding was a potential source of income for the State with the Indian army needing 3000 to 4000 horses annually. Early in the 1906/07 financial year a portion of land in the Brunswick area was vested in the department “for the purpose of creating a Dairy Farm”. The farm was to have a mainly demonstration role with limited experimentation. The area, which included some deep alluvial soils associated with the Brunswick River, was considered very suitable for dairying. It was intended that the farm be stocked with pure-bred dairy cows and pigs. The cows would be herd-tested so that the potential value of any surplus stock would be known at the time of sale. In addition the government was providing financial assistance to farmers by selling
cows to them on two-year terms and
endeavouring to provide suitable bulls to
maintain or improve the quality of the stock.
In 1907/08 the first successful sales of stock
from the farm were reported. Despite the
care taken, some complaints were received
about the quality of the cows supplied to
farmers. The reports state that when
returned to good feed and good
management the cows almost always
recovered their capacity to produce. Milking
machines were also offered to farmers on
two-year terms. The Irrigation Expert
reported that interest in irrigation due to the
success of a small area on the Brunswick
farm.

In general the station filled a gap during the
period of its operation. It was taken over
after World War I for returned servicemen to
obtain experience, and never returned to the
department.

**Denmark Research Station**

In 1913 the government instructed the
department to establish a model dairy farm
at Denmark. The government planned to
encourage dairying by making finance
available to farmers at liberal rates through
the Agricultural Bank. A dairy factory and
bacon factory were later added as part of the
farm operations. Brunswick and Denmark
were to have a primarily demonstration role
with limited experimentation. Denmark also
provided both the butter factory and an
additional option for farmers to market their
pigs through the bacon factory.

In 1921 there was a report from the Denmark
Stud Farm, that a paddock had been planted
to subterranean clover at 2 pounds per acre
without manure as a green manure crop, to
be ploughed in to save expenditure on
expensive nitrogen fertiliser. At the time the
main pasture was based on perennial
ryegrass, cocksfoot, paspalum and ‘mixed
clovers’.

In 1925 the Denmark farm was reorganised.
The butter factory was turned over to the
farmers to be run as a cooperative factory.
Since the farm was in the Guernsey zone,
the Jersey cattle which had been on the farm
were replaced by a part-stud and part-‘grade’
Guernsey herd. The pig herd was also
enlarged with a stud of Berkshire pigs. Two
Guernsey bulls and two stud Berkshire boars
were held for the use of settlers wishing to
improve their herds. A stud Clydesdale
stallion was placed on the farm for the use of
settlers wishing to breed horses. The farm
was then titled the Denmark Stud Farm.

In 1940/41 Denmark started research into
the use of poorer quality soils carrying
bottlebrush and stunted jarrah. Various
aspects of this work continued over the next
25 years. This included experiments on the
Plantagenet Peaty Sand which showed that
copper and potash were important, in
addition to lime and phosphate. Important
plant introduction work was also carried out
there over a period of years along pig
management, farm-scale trials of pastures
and fodder crops, and determination of
fertiliser regimes.

The station was almost totally pastured by
the early 1940s. It was also reported that
during the year a milking machine was
installed as a labour saving device! During
the war it was largely on a maintenance
basis because of labour shortages. After the
war it continued largely as a stud stock and
demonstration farm. An experiment on viral
pneumonia eradication from the pig herd
was carried out there and there was on-
going work on pasture establishment on
poorer land, and some plant introduction.

By 1970 the work had expanded to study
stocking rates on particular pastures, the
productivity of perennial pastures on suitable
soil types in the Denmark area, pig feeding
trials, and trials of the trace element
requirements for livestock, together with a
range of other detailed work on fertiliser use.
This level of work continued through to 1982,
when the station was transferred to the
Denmark Agricultural College as part of the
research station rationalisation at that time.
Useful equipment was transferred to the new
experimental block at the Mt Barker
Research Station.
**Wokalup Research Station**

In 1942 the department took over a farm at Wokalup, just south of Harvey. It would later become Wokalup Research Station. As it was developed work on animal management and plant introduction was carried out there. In 1955/56 it was decided to centre an artificial insemination program at Wokalup and the appropriate infrastructure was built and technicians were trained. Action was taken to purchase bulls for all the breeds used in the industry (Guernsey, Jersey, AIS, and Friesian). While suitable bulls were obtained of the Guernsey and Jersey breeds it was difficult to get suitable bulls from the other groups. By March 1956 commercial operation began, with 1500 cows being inseminated in the first year. The program was managed by the department until early 1967 when it was taken over by the independent Artificial Breeding Board, which was established under legislation.

In 1961/62 artificial breeding was used to develop two herds (one Jersey and one Friesian) for comparison. Milk composition was compared as this was a real concern at the time. Time of calving and weight at birth was also followed for sale stock to determine the influence on weight at birth on sale value. This work was in addition to the continuing plant introduction and nutrition program.

In 1965/66 pasture research included time of closing for hay, plant introductions, nitrogen fertiliser on early oats, and the use of chemicals in the establishment of pasture. By 1970 the station was milking 100 cows and carrying out extensive work on stocking rates and other animal management issues as well as continuing its pasture establishment and management work. At this time a very large beef cattle experiment was established, to compare the productivity of different breeds of beef cattle. The work on nitrogen use, stocking rates and plant introduction continued through the 1980s.

Wokalup was handed to the industry in 1992/93 to become an industry-run dairy farm testing modern dairy practices and for demonstration. The industry was not able to make the necessary arrangements and the station was finally transferred to the Harvey Agricultural School.

**Bramley Research Station**

Bramley Research Station was purchased to continue experimental work on the role of phosphorus in the fertility and productivity of dairy cows. This work is reported in Chapter 6.

It was also demonstrated that the paddocks at Bramley were deficient in cobalt for developing calves. In 1961/62 a range of experiments continued despite the limitations imposed by the small size of the property. The phosphate feeding trial continued, copper residual availability was investigated, cobalt availability was studied, and heavier stocking rates were investigated. Throughout its life the focus continued to be on carrying capacity, phosphorus nutrition of milkers, calf rearing, parasitology, cobalt nutrition and some unique pasture nutrition and management trials. In 1982/83 Bramley was sold as part of the research station review. All dairy work was transferred to Vasse when Wokalup was closed in 1992/93.

**Vasse Research Station**

The Vasse property was purchased as part of the research station rationalisation in 1982/83. The focus was to be on animal nutrition in an overall study of issues related to beef and dairy cattle. It replaced facilities at Northam, Denmark and Bramley Research Stations. The original aim was to maximise production from the available paddock feed, particularly the spring flush. In a review of research station facilities in the 1990s it was decided to centralise all dairy and beef work at this station. In 2003/04 refurbishment and extension of the facilities began. These include a centre pivot irrigation system and an ultra-modern computerised dairy, which was opened in 2008.

In 2009 there were two major experiments, both focused on production per unit of feed energy.
In the beef herd, the focus was on the energy cost of the mother. Angus cattle selected for high energy and low energy conversions or high and low feed efficiencies were used. This is part of the Cooperative Research Centre on Beef Production centred on New England University.

The challenge for the beef industry remained its ability to receive reasonable on-farm prices, permitting the adoption of much of the technology adopted in the dairy industry. The feed production systems can be the same but affordability in an uncertain market situation is difficult.

The second experiment was testing the production from dairy cattle at five stocking rates and five rates of nitrogen fertilisation of the pasture. The rates of nitrogen were nil, 1, 1.5 and 2 kilograms per hectare per day applied as urea. The five stocking rates were 1.25, 1.5, 1.75, 2.0 and 2.25 cows per hectare. There was no evidence of trace elements affecting plant growth but the cows required selenium and may have required cobalt. In wet years additional sulphur was needed late in the season. On-farm the nitrogen application and stocking rate were determined by the amount of ground cover. A leaf area index of 2.5 seemed about right for maximum production.

The station is also experimenting with wheat cut at the early dough stage as a potential source of silage. The plant material is produced on a ‘hill block’ off the main station. Experiments are planned in consultation with farmers.

When the feed in the experimental farms dries off, the herds are run on the pivot sprinkler-irrigated pasture of perennial ryegrass and white clover. The animals are supplemented with high quality silage made by rolling pasture at 40 to 50 per cent moisture and wrapping it in plastic to produce anaerobic conditions.

This could be the shape of the future dairy farming but the areas of uncertainty are:

- price of nitrogen versus the price of milk
- price of land, which for the Busselton area, is running at from $10 000 to $15 000 per hectare
- the availability of irrigation water. If water allowances are very low there may be a case for transfer of water rights from Harvey to the area south of Capel. The available area would stretch from Capel to the south coast.

**Mount Barker Research Station**

Mt Barker was purchased in 1967/68 as a basic research facility for the margin between the high rainfall livestock-based beef and dairy industries to the west and the cropping industries to the east. By 1982 it was clear that more work on crops and pastures was needed in this environment. The station was expanded by the purchase of an additional block at Manurup north of the station. Initially, the cropping work focused on the performance of cereals in the area but as the station developed it became the key site for the work on rapeseed. This outstanding work which produced the foundations of the modern canola crop is reported elsewhere but was made possible by the Mt Barker facility. By 2008 work on sheep and cropping was reduced.

**The horticultural research stations**

**Manjimup Research Station**

In the early days of the tobacco industry, trials were carried out on farmers’ properties but this proved to be unsatisfactory. By 1939/40 the department had established two experimental sites, one at Jardee (west of Manjimup) and the other at West Donnelly. In 1942/43 the experimental program continued at West Donnelly but the department had decided to establish a research station nearer Manjimup. At Manjimup in that year the work was focused on developing the new station and transferring equipment from Jardee.

In 1944/45 a research station was opened and all experimental work on tobacco was transferred from Jardee and West Donnelly.
In 1953 this work was transferred to another new area 8 miles (15 km) west of the town. While it came under the control of the Horticulture Division, in 1956 it was primarily used for tobacco research. In 1955/56 an extensive experimental program was carried out investigating fertilisers and their placement, varieties and irrigation. Fertiliser trials were continued showing the value of nitrogen and phosphorus and sorting out the rates for particular circumstances.

While the work showed clear benefits in production with the use of irrigation it aggravated the chlorine level which became the big quality issue. When the industry collapsed after poor sales in 1961 and an abortive attempt to sell in Melbourne in 1962, an area was used for experimental work for potatoes and other annual and short-term crops.

During 1966/67 this station was closed and a new site purchased in the Middlesex district 23 km south of Manjimup. The land consisted primarily of Karri loam and there was a frontage to a permanent stream, Smith’s Brook. Sixty-four hectares of 259 ha was cleared. Some experiments investigating internal parasites in sheep, and barley yellow dwarf disease of oats were started. Extensive horticultural research was carried out on the property. This included trials on the processing crops, beans, peas, asparagus and peaches. New varieties of apples were also tested, particularly red varieties. In the late 1970s a variety and irrigation trial with wine grapes was started. The result stimulated the rapid development of the industry in the district.

However, the site was distant from Manjimup, making it difficult to integrate its activities with those of the district office. In the spring of 1985 a new site was selected 7 km south of Manjimup. In 1986 the Minister for Agriculture opened the new centre at the 107 ha site. It had good water supplies and soil typical of the district’s quality horticultural crops. Development was in two phases—relocation of the staff and relevant work from the old station, and moving the district office from the town.

Phase 2 was completed with the erection of an office block, laboratories and conference rooms, opened in September 2000. The new facility was known as the Manjimup Horticultural Research Institute. In 2009 a third of the station’s resources were taken up by the apple breeding program, with the remainder divided between the grains program, viticulture and vegetables. Testing new crops such as green tea, cool climate citrus, and avocados was in progress.

Manjimup Horticultural Research Centre opened in September 2000.

Stoneville Fruit Research Station

Stoneville was the major research station for the fruit industry from the mid-1950s until the 1990s. Development work started in 1955/56 and continued through to the late 1950s. This included extensive plantings for trials of rootstocks and pruning techniques, and small-scale work on hormone and weedicide use. Jarrah sawdust was used successfully as a mulching and hilling material. In 1958/59 progress in planting material for rootstock trials was reported. In spring 1959 the first trial with orange rootstocks was planted, followed by an apple rootstock trial in 1960. The 1965/66 report refers to a very successful year, with 10 years of development completed.

From 1970 an active development and research program was undertaken. Stoneville produced very valuable information on rootstocks, particularly for apples and oranges. It also had a major role in the breeding and selection of apple
varieties. The magnitude of this work and the time scales involved make this a major undertaking for any facility. This is reflected in the decision to make this the National Apple Breeding Program. It produced the Lady Williams, and later Cripps Pink and Cripps Red varieties. In the late 1980s it was decided to centralise horticultural research at Manjimup, and Stoneville was sold in 2000/01.

The Swan Viticultural Research Station
The government purchased a 92-acre property in mid-1954 to develop as a viticultural research station. Initially work was done on cover crops and their impact on vigour and yield of vines. Later it was reported that 11.5 acres were planted to experiments dealing with rootstocks, long-term fertiliser use, and replanting. Rootstock trials were started in 1960/61. Development work continued in 1961/62 and by 1965/66 the station had an active research program, with 24 experiments underway.

The northern research stations

The Ord River
In 1941/42 the Department of Agriculture and the Public Works Department established an experimental site at Carlton Reach on the Ord River. Irrigation equipment was installed and an officer appointed. Mitchell, buffel, Birdwood grass, paspalum, Phalaris tuberosa and lucerne were planted. The Public Works Department had shown that there was adequate water and a good dam site and was interested in the possibilities of irrigation. By 1942/43 the experimental areas were largely established and providing useful information.

In 1945/46, following an agreement between the State and Federal Governments for a joint investigation of the agricultural potential of the area, a comprehensive plan was prepared by CSIRO for investigational work. The development of the necessary infrastructure was a State responsibility and expected to cost $50 000. The State would provide the farm staff and CSIRO would provide the professional staff.

The site chosen was further down river from the Carlton Reach site which was upstream from where a diversion dam was planned. This was built later. By 1948/49, 450 acres of the Kimberley Research Station had been cleared and some graded ready for planting of the wide range of crops to be tested.

In 1950/51 work started in earnest after CSIRO appointed a research officer to implement the program. Over the next decade the station was fully developed and became an independent but isolated research institute. It was well staffed and managed. On the basis of the work carried out there and the extensive soil survey of the plain area by the department, a decision was taken to build a dam on the Ord River and develop an irrigation area. The staffing and management of a research institute in an isolated location with significant social problems associated with that isolation is a story in its own right, which should be written.

As the first step in developing an irrigation area a diversion dam was built upstream from the research station. Water was pumped from this dam into a major irrigation channel and irrigation was started.

In 1961/62 some very good rice yields were reported. Cotton and oilseeds were also tested. There was some uncertainty as to the potential effect rice could have on the water-table and by 1962/63 it had been decided that cotton would be the commercial crop. Because it was desirable to harvest in low humidity, the best harvesting period was identified as from mid-June to late August. High quality defoliation was shown to be vital in achieving high quality fibre. Rotation work showed that if annual cropping with cotton was to be practised it was best not to irrigate the area during the uncropped period. Experimental work also showed nitrogen level and time of application were important determinants of yield. Insect control and chemical weed control in cotton were also important.
Irrigated maize crop on the Ord River Irrigation Area.

Over the rest of the decade wide-ranging investigations covering cotton, sorghum and rice crops, cotton and sorghum rotations, irrigated forage crops, dry season lot feeding, entomology and soil chemistry was carried out at the station.

Sugar showed as a highly suitable crop in the work at the station. Some commercial trials were carried out by the CSR company in the mid-1960s. These did not give good results, which was surprising in view of the excellent results obtained a decade later.

The nature of its work at Kimberley Research Station, which dealt with underlying principles more than immediate issues, reduced its capacity to address the day-to-day problems of the developing agriculture of the area. For this reason the department decided to establish an independent experimental area.

In the late 1980s CSIRO decided to cease work at Kununurra and the Kimberley Research Station reverted to the State. It is now the Frank Wise Research Centre.

Kununurra Experimental Area

In 1969 the department took up an area of the black soil plain to carry out more farm-focused trials. An area of 40 acres of cotton was planted. The area continued to be used for trials on issues such as time of planting, fertiliser rates, crop management and levels of insect control. Sorghum varieties were tested for yield and the suitability of the stubble as cattle feed. Areas of rice and sugar were planted. In 1969/70 a full-time cotton agronomist was stationed at Kununurra. Insect control management work was started, to determine the best insect management strategies. The development of resistance of the cotton bollworm to insecticides eventually caused the collapse of the cotton industry and the area became important in biological control work. Work continued, seeking alternative crops. A sugar pilot farm was also established.

Abydos Woodstock

Abydos and Woodstock pastoral properties were taken over for experimental purposes. They had been abandoned and much of the fencing had been burnt and none of the mills worked. It was hoped to develop and demonstrate methods of land management to make the country productive again. A large amount of work had to be done to renew fences, repair the mills and to control wild dogs and euros.

It was planned to put 5000 breeding ewes on the property in 1948. However, further fencing was needed and further water points repaired and problems with wild dogs needed to be solved before experimental work could be undertaken. Dogs were being trapped or poisoned at a rate of five per week during the year.

In 1951/52 it was reported that improvements were continuing and sheep had been put on the area. The dog problems had been reduced. Work began at Abydos on spinifex management, the potential of buffel and Birdwood grasses and vermin control. There was a heavy population of euros and a CSIRO officer was stationed at Woodstock to study this problem.

Surprisingly, despite the continued dog problems it was 1964 before a 400 ha paddock was enclosed by dog-proof fencing. In 1965 another 200 ha area was 'almost completed'. A considerable amount of useful research was done after the problems were
reduced to a manageable level. This work is described elsewhere. Work continued from 1954/55 through to mid-1976, when it was finally closed.

Gascoyne Research Station

The decade from 1941 to 1950 was one of mixed fortunes for Carnarvon growers. The long drought of the mid to late 1930s finally broke in 1941. The years that followed featured variable climatic conditions, difficulties with transport during the war and some serious effects from cyclones, disease and insect pests. The department started to develop a research station but after reaching an operational level in 1942 it had to put it on ‘care and maintenance’ for most of the war. Between 1945 and 1947 the Gascoyne Research Station was refurbished, a new program developed and research was resumed. Many plants had to be brought in for experimental work, including a large number of pineapple varieties. Trials were initiated on varieties of bananas, papayas and a suite of vegetables. Studies of plant propagation and planting methods were started with bananas. By 1948/49 the research station was fully functional.

Over the decades which followed, experimental work covered fertiliser trials, soil amendment, rates of irrigation, plant spacing and other issues related to the crops being grown in the area. The soil amendment trials were initiated because there was concern about the deterioration of the structure on some station soils.

Conservation of water supplies was important and research was undertaken to determine the actual needs of the banana plant. Crops such as beans and other vegetables with lower water requirements were important to the town over dry periods. Work was also carried out on fertiliser rates and times of planting for a range of other vegetables and melons. At times this work became central to the research station as producers switched to vegetables in response to the shortage of water.

In the early 1960s work was in progress with passionfruit, bananas, papaya, beans, tropical apples, custard apples, dates, onions, strawberries, grapes, avocados and mangoes. However, bananas continued as an important crop. Watering trials on the parent plant and followers were very important.

Some work was also done to select strains of buffel grass and kapok bush which would germinate in winter, in order to improve the protein level of pastures at that time of the year.

Later research was directed mainly towards irrigation techniques aimed at gaining the most value from a relatively limited water supply. It was shown that the water required for a tomato crop could be reduced from 8.5 megalitres per hectare to 3.3 ML/ha without drop in yield.

There was also some work on rangeland, examining the opportunity for ponding to conserve water to encourage seed to germinate and assist the revegetation of scalded land, and use of medics adapted to pastoral conditions, as an alternative pasture species.

In the reviews of the 1980s Gascoyne was transferred to the Horticulture Division and became part of the Horticulture Program. A limited amount of research was carried out in 2008. It also served as an out-station for the cereal breeding program, aimed at shortening the generation time.

The Ground Water Station at Wiluna

Wiluna station was established in the late 1950s to test the possibility of developing a horticultural industry based on underground water resources in the area. However, studies showed total volume to be relatively restricted with uncertain recharge rates. Development work was completed in the early 1960s and experimental work initiated. By 1964/65 an extensive trial program covering cotton, lucerne, citrus and other fruit was being undertaken.
Over the period to the early 1970s the mining industry expanded dramatically in the area; it was decided that the limited water resources should be reserved for that industry's use and the station was closed. It was taken over by a grower who tested commercial crops. While these were successful there were high marketing costs and the project did not continue.

**Fitzroy Pastoral Research Station**

The Fitzroy Pastoral Research Station was established in 1966 on 85,000 acres, which was excised from a pastoral lease for studying the impact of grazing systems on native pasture. The work was intended to cover both sheep and cattle but with sheep rapidly disappearing from the Kimberley, the focus shifted to cattle. This area was selected to encompass all the important soil types in the area. It was planned to continue work in another area known as the Collins Yard trial area, as an adjunct to the station to include alluvial soils.

However, it was 1970 before the facilities were in place and the first experimental animals were brought in. The early work showed responses of weaners to mineral supplements of phosphorus and non-protein nitrogen in both winter and summer. The station was closed in 1978 when better facilities became available at the Ord River Regeneration Area.

In 1982/83, following a report on the condition of the Fitzroy frontage area, a soil conservation district was declared in the west Kimberley and a major regeneration program commenced. This project was under the direction of a Soil Conservation Advisory Committee, which included pastoralists. It resulted in a dramatic refurbishment of the grasslands along the Fitzroy River frontage. The investment in infrastructure to achieve stock control and other features of the program was $15 million. One estimate was that in its degraded state there was a loss of turn-off of at least 6000 animals a year.

**Ord River Regeneration Area Research Station**

The Ord River Regeneration Station was initiated when it became possible to carry out the most important cattle management studies on the regenerated pastures. The principles of grazing management of native grasses had already been demonstrated at Collins Yard and elsewhere and the station at the Ord focused on herd management issues as they affected herd structure and potential profitability. The work provided information on which development of proposals for restructuring the Kimberley cattle industry depended.

**Camballin Experimental Area**

The Camballin area was established to test the possibilities of irrigation on the flood plains of the lower Fitzroy River. A number of summer crops, including sorghum, were tested on the area. Three legumes were also tried. Problems of bird damage ruined experimental work on rice and sorghum. However, the major problem was control of flooding. Attempts to achieve this proved ineffective because of the magnitude of the flooding. Further work was not undertaken and various attempts to establish commercial cropping in the area failed. Any future development of the Fitzroy would require the floods being controlled with dams on the tributaries upstream.

**Pastoral Research, 1964/65**

The 1965/66 report details a series of experiments involving pasture establishment on the Pindan near both Broome and Derby, and exclosures through the Gascoyne and Murchison. There were some trials with *Sorghum almum* on Mt Hart station in the north Kimberley raising the possibility of establishment under dryland conditions where the rainfall was over 35 inches a year. This work was continued to the end of the decade. Although important, it was done outside any formal facility.